Research in Networked Learning

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Sustainable Networked Learning

Individual, Sociological and Design Perspectives

Springer

Research in Networked Learning

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The field of Networked Learning has been emerging as an exciting and innovative area of work since the 1990's. It now includes a very active community of senior researchers investigating the nexus between the use of technology in higher education, and its underpinning theory, practice and pedagogy. Networked Learning is generally restricted to learning that is mediated by digital and social media that support user connectivity, interaction and content generation. Like CSCL it has a strong interest in collaborative learning but networked learning implies a greater concentration on remote rather than face-to-face collaborations. Networked Learning literature also emphasizes more collaborations involving medium to large numbers rather than dyads or very small groups. However Networked Learning is not restricted to collaborative learning nor is it restricted to the strong links that terms like cooperation, collaboration and community imply. Rather the theory and pedagogy of networked learning is more concerned with developing approaches to learning that encourage and support learners to be critical and ethically responsible citizens in both their practice and lives. The Research in Networked Learning book series is likely to appeal to and be purchased by a diverse core audience to include:

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The series is supported by the international Networked Learning Conference. The innovative, and level of work produced at the conference and by scholars in this domain makes this a very exciting and dynamic series.

Do you have an idea for a book on research in Networked Learning? Please contact the editors: Nina Bonderup Dohn nina@sdu.dk / Maarten de Laat mdelaat@uow.edu.au / Thomas Ryberg Ryberg@hum.aau.dk

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Endorsements of Sustainable Networked Learning

Endorsement by Laura Czerniewicz, Professor Emerita

Sustainability has several connotations including stewardship, conservation and being future-looking. This book incorporates all three concepts when it effectively addresses the implicit question – what can be usefully sustained for learning since the Covid-19 pandemic dramatically dislocated teaching and learning in the HE sector globally? And how do these changes challenge and chart the trajectory of networked learning? Wisely, cognisant of the erratic (and often glib) forecasts that add little value, these chapters do not make impossible-to-verify predictions. Rather this collection grapples theoretically and through empirical cases, with the meaning of the profound changes wrought by the virus's impact on the HE sector, as well as the ways that pre-existing trends and issues were amplified.

In the service of networked learning's long-standing social justice agenda, the authors in this book address the critical issues which surfaced during the harshest period of the pandemic and which will continue for the foreseeable future: hybridity, materialism, datafication and the changing nature of networks as AI infiltrates everything.

A carefully curated collection, these thoughtful and thought-provoking chapters offer intellectual sustenance to the many academics and professionals grappling in diverse learning environments with the ongoing long tail of the Covid-19 pandemic.

Written Cape Town, May 2023.

Chris Jones Professor Emeritus, Liverpool John Moores University

This stimulating volume derives from the Networked Learning conference series which began 25 years ago. This longevity is important because the chapters are outcomes of a conference series that has recorded and influenced educational

developments during a variety of technological changes. For example, in this collection, there is a concern with surveillance, which has been a recurrent worry since the 1990s, even though the form it takes has varied with the available technologies. The recurrence of such themes emphasises the need for longitudinal work located in a strong research tradition. To emphasise the speed of technological change, Artificial Intelligence (AI), large language models and the more recent and multi-modal GPT4 are only touched on in sections that were largely developed prior to the explosion of interest in AI. Networked learning has maintained a stable but evolving research focus despite these dramatic shifts, in technologies and in social and political contexts. These changing contexts include the Covid-19 pandemic.

The book is in five sections which are full of clear and relevant insights, and it is fitting that there is a direct engagement with the impacts of lockdown in the final section. Readers will find work covering design, empirical research and theoretical perspectives. I recommend *Sustainable Networked Learning* to anyone interested in new technologies and how they interact with the changing contexts of education and learning.

Tim Fawns, Associate Professor, Monash University

Based on an unconventional conference, both in format and in the rich and diverse perspectives on education of its participants, this book uncovers important but often invisible nuances of learning, practice, design and governance. The adaptive approaches to the conference, which can be seen in the introduction, seem to parallel the need for responsive and open approaches to education in our current technological, political, sociological, economic and environmental landscape. Indeed, these, under a broad umbrella of sustainable networked learning, are important themes within the book, alongside data, materiality, biology, possibility and constraint and more. It seems that we need to look not only to new design possibilities and ways of adapting at a micro level, but bigger approaches to rethinking how we configure education and its institutions. And yet, in amongst all of these grand and complex issues are humans and human values, still necessary ingredients for meaningful experiences embedded in relationships stitched together by vulnerability, trust and care. Just as I would expect from these authors, this book is filled with rich, varied, interesting, critical and, in my opinion, necessary accounts to help us navigate education in a networked world.

Contents

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Chapter 1
Introduction

Jimmy Jaldemark, Maarten de Laat, Nina Bonderup Dohn, Marcia Håkansson Lindqvist, Lena-Maria Öberg, and Thomas Ryberg

The present book has emerged from the 13th International Conference on Networked Learning (NLC, 2022), held 16–18 May, 2022 at Mid-Sweden University, Sundsvall, Sweden. The conference had a high number of interesting, high-quality research papers, which made it a difficult task to select papers to be further developed into chapters for this book. To aid our editorial decisions, in the final plenary session of the conference, we encouraged the delegates to discuss what themes and ideas they had found most interesting and/or thought-provoking during the many presentations. Comments were collated on an online board (a padlet), creating a rich plethora of potential focal points for this volume. With this as the outset, we found a set of overarching themes that each encompassed a sufficient

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number of papers corresponding to delegates' articulated interests. From there, the process leading to the present collection included several rounds of reviews and revisions through which authors of the chosen papers have further developed their contributions.

NLC 2022 was the first Networked Learning Conference to be held physically after the COVID-19 lockdowns. Right from the beginning of the conference planning, we anticipated that several delegates would still not be allowed to attend in person. We also wished to carry forward the lessons learned about online conference participation in NLC 2020, which was held fully online. Therefore, we ended up deciding on a hybrid format, allowing both physical and virtual attendance. In the following section, we reflect on both how this hybrid format worked in practice, and on how it actually represents a step in a transition that started many years ago, long before COVID-19 turned the world upside down. We begin with the latter.

Transitioning the Networked Learning Conference into a Hybrid Conference

Since its inception in 1998, the Networked Learning Conference has offered a space for academic discussion, research and innovation in the area of digitally enhanced learning. It has provided a platform for academics and practitioners to focus on the use of digital pedagogies, technologies and designs to advance learning. In this sense, the conference series has discussed issues of digital transformation long before they became the mainstream concern that they are today for institutions, events and organisations. The core of the discussion has been three interrelated aspects: human-interpersonal relationships; technology; and collaboration to understand and advance learning and engagement in knowledge processes. Thus, in essence, networked learning involves processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledge-action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies (NLEC, 2021, p. 319). It promotes connections between people, between sites of learning and action, between ideas, resources and solutions, across time, space and media (p. 319).

Conventional Conference Format

From the beginning, the networked learning community organised and hosted scientific conferences following the conventional face-to-face, in-person format. At the inaugural conference in Sheffield, most participants were British, and the first five events were held in England, alternating between Lancaster University and Sheffield University, on a biennial basis. The networked learning community, however, started to develop an international audience, and in 2008, the conference

was hosted outside Great Britain for the first time, in Halkidiki, Greece. During all these years, the conferences were physically located and built on the mode of traditional synchronous face-to-face communication. Even though many presentations at the conferences discussed online learning, particularly as carried by the asynchronous communication mode, the conference format itself was built on face-to-face communication. Delegates' metalevel reflections on the networked learning possibilities involved in the conference itself were restricted to the opportunities which meeting a "network of people" with similar interests poses. Alhough this certainly is an important meaning of "network" within NLC (cf. Dohn et al., 2018), it is interesting that the understanding of "network" most prevalent within the conference at the time – according to which the network is one of both ICT infrastructure *and* social relationships (Dohn et al., 2018) – was not considered as an option for the conference itself.

Hot Seats – Online Extension

This situation, of a sole focus on in-person participation, changed in 2010 where Hot Seats was introduced as an experiment with an alternative online networked learning format. The aim was to generate a space for massively open online public learning events on research and advancement in networked learning, to supplement the in-person conferences. The Hot Seat series consisted of online seminars where researchers and practitioners met online to share ideas about contemporary issues under the guidance of leading experts in the field. These seminars were held in the non-conference year between NLCs and served both as a bridge between these physical events and as an opportunity to bring up topics that could inspire contributions to the next NLC. In the Hot Seat, a keynote speaker would introduce an inspiring or thought-provoking topic and support discussion of it over a set period of time. In effect, the Hot Seats created a space for open participation in networked learning events and offered an opportunity to meet and interact with leading experts within the field and to build meaningful relationships with a "network of people" working for learning and innovation. The series was highly popular, with over 600 registered participants, and was upheld until the 2016 conference. However, its success meant that it demanded too much time and support from the organisers, which in the end led to the decision to discontinue this opportunity.

Fully Online

In 2020, the conference was planned to be hosted at the Kolding campus of the University of Southern Denmark. While the conference is held every other year, the hosting university has typically been announced two years before, at the closing of the previous conference. This was also the case for the 2020 conference. Then, after

nearly two years of planning, booking venues, budgeting, deciding fees, discussing themes for the Call for Papers, recruiting keynotes, reviewing papers, revising papers, et cetera, the unthinkable happened. Less than two months before the conference was to be held, the world went into lockdown mode. The pandemic hit the world with full force, and universities all over the world were physically closed. Emergency remote teaching was the answer to keep the sector going. Every detail building on physical attendance was annulled by the tiny little organism COVID-19. The networked learning conference consortium had to make a quick decision: cancel, postpone or move online? With thoughts of "taking our own medicine" fully for the first time, the consortium decided for the latter, and NLC 2020 was held as a completely online event.

In the Introduction to the book coming out of NLC 2020 (Dohn et al., 2021), the conference organisers reflect on the experiences the online format afforded. The reflections read somewhat quaintly, and did so even at the time of publication of the book, because of the many conferences that have since been carried through online. Still, the reflections document how the "medicine" went down, as it was taken for the first time. The conference organisers note that approximately 500 registered for the conference and that more than half of these people attended in total, with an average attendance of 150 people per conference day. In terms of geographical location, the conference markedly increased its outreach to other continents than Europe. In line with this, participants commented on the sustainability of the online format, both environmentally and as regards opportunities of participation for academics in countries less economically well-off than the Global North. A highly distinctive feature of the conference was the lively discussion that took place in the chat alongside the presentations – to the extent that some participants expressed that "the only thing I am getting is the chat" (Hansen, 2022).

However, the online format had decisive disadvantages, too. Though conference participation increased both in numbers and geographically, sustained recruitment of the many new delegates to the network learning community afterwards has not been achieved. Further, onsite networking affords conditions between sessions and at social events that are hard to recreate in an online version. This is a challenge for all, but in particular for online participants who do not know each other from preceding meetings, for example, earlier Networked Learning Conferences. We suspect that this is part of the reason that sustained recruitment of the NLC 2020 delegates has not succeeded. Furthermore, conference evaluation showed that if given the option, onsite participation would be the preferred form for most of the delegates. Taking dedicated time away from work/office to meet peers and have in-depth discussions adds value that cannot be met during online participation.

In sum, the online version of NLC2020 brought some important lessons to the Networked Learning Conference consortium. One conclusion was that online participation opportunities should be a part of future conferences. Technological development affords good opportunities to present research online through synchronous video conferencing tools. Another conclusion was the need for onsite participation to maintain and develop the networked learning community. Both of these conclusions reach back to the core issues of the Networked Learning Conference since its

inception: The interrelation of human-interpersonal relationships, technology, and possibilities of collaborative engagement. Social aspects of learning in networks should be emphasised and supported technologically and materially to allow the best possibilities for networking between NLC participants. Going fully online is a possibility but not optimal, as it only engages one set of networking modes.

Hybrid

These conclusions, along with the uncertainty of different countries' lockdown policies for Spring 2022, led the consortium to decide for a hybrid format for NLC2022. A hybrid format is not the same as a simple combination of online and onsite. It adds further networking value by merging these two formats.

A comparison with hybrids within biology can clarify the point. In general, a hybrid is a fusion of separate forms where the fusion creates new traits not found in the original forms. An offspring of different species is a common example. Thus, a liger is a hybrid of a male lion and a tigress. It is the largest cat in the world, larger than both its parents. It is social like a lion and enjoys swimming like a tiger. Conversely, the offspring of a male tiger and a lioness is called a tigon and is smaller than both of the parent species. These examples illustrate how a hybrid is something other; it differs from the original forms. Within education, a similar example is the fusion of campus-based education and online education. If these are combined with the aim to create a hybrid, new conditions for participation emerge. Not only does the hybrid educational format combine features and include intersections of practices and settings from both forms, it also adds unique features (Jaldemark, 2021). Most important are the features that dissolve dichotomies – for example, between analogue and digital, asynchronous and synchronous, onsite and online, real and virtual, practice and theory. Ideally, the hybrid allows participation to take place in a boundless or seamless way where networked technologies flexibly support humans and their changing practices and settings (Jaldemark, 2010; Jaldemark & Öhman, 2020; Nørgård, 2021).

Returning to the design of the conference, the decision for a hybrid format meant optimising networking opportunities by linking ideas that are usually seen as separate or even dichotomous. Compared to the earlier conferences formats – where participants met conventionally in a synchronously co-located physical place (onsite) or online synchronously (fully online) or online asynchronously (Hot Seats) – the hybrid design could facilitate unique opportunities for networking by combining and integrating features of these earlier formats. In particular, the design should form opportunities for hybrid networking by intersecting onsite and online participation in various asynchronous and synchronous formats supported by digital network-enabling technologies such as videoconference systems and asynchronous discussion threads.

The conference planning process started as usual, with the consortium initiating a call for a potential host of the forthcoming conference. Of the three submitted

proposals, as indicated, the hybrid proposal from Mid Sweden University was chosen. This university has decades of experience in designing online and distance education built on networked learning ideas. Therefore, the local organisers were well equipped regarding experience and technology to deal with the pandemic situation and design a hybrid conference format. However, a few months before the conference, the committee was still unsure whether an onsite event would be possible. The pandemic continued to rage around the world, and many countries were locked down. Accordingly, at this point in time, the option of a fully online conference such as NLC2020 was still open as potentially the only way forward. However, Sweden and the other Nordic countries called off the lockdown in early 2022, and other countries followed. The host and the consortium finally made the decision to carry the hybrid format through, that is, to include both onsite and online participants (Jaldemark et al., 2022).

The conference was held onsite in Sundsvall 16–18 of May 2022, but with the opportunity of participating online as part of the design. It attracted more than 130 delegates of which the majority attended onsite (approximately 90). The keynotes were held by Maha Bali, Gert Biesta, and Martha Cleveland-Innes and had three different formats. Bali´s keynote was a live online event sent from her homeland Egypt to online participants and the onsite participants located in the main physical hall. It was, to a large extent, based on dialogue between her and the audience. Biesta's keynote was held in the main hall and streamed online. Dialogue with both online and onsite participants was facilitated through an online chat tool. The keynote by Cleveland-Innes was a streamed live session from Canada with a few dialogical moments of auditory questions posed and answered within the session.

More generally, the conference program included Full papers, Short papers, Round tables, Symposia, and Workshops. Presentations were performed in different formats that combined onsite and online participation with different technological solutions. The choice of format was made in alignment with the specific conditions pertaining for the presenters in question. Thus, some sessions were held fully online using a videoconference tool; some were held only onsite for the participants located at the venue; some were hybrid, combining onsite participation with online streaming through a YouTube channel; and finally, some sessions were hybrid with onsite participation and complimentary online videoconferencing. As an example of the latter, one of the symposia had papers with multiple authors where some presenters (even of the same paper) were online and others onsite. Workshops were held as either fully onsite or fully online sessions.

The design of the conference afforded participation from many different time zones. Online participants were located from Australia over Europe to North America. Planning online sessions to create a schedule with optimal conditions for all time zones was a challenge for the hosts. This challenge arose anew several times in the weeks leading up to the conference, as the aftermath of the pandemic and changing regulations in delegates' home countries meant that some participants registered as onsite participants were not able to travel. The opposite was also true: participants who had expected to participate online were then, at the last moment, actually able to

be onsite. This forced the host to rearrange both online and onsite sessions repeatedly before the final version of the schedule was in place.

Due to the hybrid format of NLC2022, the conference once again could afford onsite physical networking. For many delegates, this was the first time they travelled to an international event since the lockdowns, and expressions of joy at being physically together again was a repeated occurrence throughout the three conference days. Informal networking during coffee breaks and the arranged social events in general had a high priority – "now that it was finally possible again". For the fully online participants, the conference proceeded more as the by then familiar "business-as-usual"-practices developed during the lockdowns, with conference participation intermeshing with their other academic and personal obligations at the site where they were physically placed. This led some delegates to experience differences in participation commitment for online and onsite participants. Others have emphasised the unequal participation opportunities and that the hybrid format *in practice* easily ends up favouring one participation form over others. Interestingly, however, it was not always the same format that emerged as the one favoured. This can be illustrated with the differing courses that the three keynotes took. Biesta's onsite keynote to some extent favoured the onsite participants. Though questions were asked through an online tool that was the same for both online and onsite participants, the overall contact with the audience present in the same room was naturally greater (due to eye contact and immediately visible bodily responses) than with the participants online who were not visible to the keynote speaker. For the streamed keynote by Cleveland-Innes, the situation became the opposite. Due to technical problems in the onsite auditorium, the delegates physically present in Sundsvall were only able to hear some of the keynote and did not have much chance to discuss with the speaker. In contrast, the online participants apparently had no technical problems and thus participated in the full keynote, including having some more informal discussions of the keynote topic with the speaker whilst everyone was waiting for the onsite technical problems to be solved. Finally, the streamed keynote by Bali worked well technically for both online and onsite participants, and on the face of it, everyone was on par as regards the interactive discussion facilitated by Bali. However, as the onsite auditorium's video connection was muted, it was possible to have small-group discussions in the auditorium before answering her questions. Online participants did not have a similar option, as there were no "breakout room" sessions, and the chat was disabled. In sum, one important lesson learned from the hybrid format of NLC 2022 is that it is very challenging to establish equal communication opportunities for all delegates, across their varying forms of participation. To this may be added some more down-to-earth, but no less important practical lessons, for example, the need to have space onsite where delegates can participate in online sessions without disturbing each other. Without such space, the onsite participants may, in practice, feel they need to stay muted so as not to cause echoes – or risk disturbing co-located people participating in other online sessions.

Summing up, from the NLC2022, we have learned that it is possible but also highly complex to design hybrid conference formats that both satisfy the added value of participating onsite and give the opportunity to participate online. Careful

planning of details is necessary. Emphasising both social and technological issues are key to reaching a sustainable design of conference formats. Likewise, design ideas need to balance cost-effective solutions. From a conference perspective, this translates into how our experiences from hybrid and fully online formats can be applied whilst also maintaining a realistic cost. Going fully hybrid in terms of hosting all sessions and activities both online and onsite is unrealistic because it takes too many resources to conduct and leads to high fees for participants. The practice of free participation for online participants was part of the NLC2020 solution. Such practice is not sustainable in the long run, however, because it lays the burden to pay for all services, technology, premises and travelling for keynotes on the onsite participants. Running a conference needs to have a budget that is sustainable to survive. For NLC 2022, this was solved by asking online participants to pay a reduced fee.

Overview of the Book

The book is organised into four main parts: (1) Data and datafication, (2) Sustainable learning design, (3) Sociological perspectives on networked learning, and (4) Networked learning in times of lockdown. The four parts correspond to themes identified by delegates at NLC 2022 as particularly salient and important, whilst all uniting under the overarching topic of sustainable networked learning, focusing on specific areas (data and learning designs) and/or complementary perspectives (societal and individual). Here, we briefly present the four parts' themes and the way the individual chapters deal with them. In the book's concluding chapter, we further discuss how the chapters combine to point out emerging issues within the field of networked learning.

Part I: Data and Datafication

This part contains four chapters that bring up different possibilities and challenges of the use of data in networked learning. They concern both data about learners, and the potentials which increased open access to data may provide learners. The ethical aspects of surveillance are discussed, and novel bio-digital data collection methods, as well as the use of data from augmented and virtual reality learning.

An emerging trend in networked learning is the increasing amount of data that is involved. How the future use of data in networked learning will turn out is hard to predict, but some thoughtful speculations are presented in the chapter "Reconfiguring Surveillance Futures for Higher Education Using Speculative Data Stories" by Jen Ross and Anna Wilson. The authors present a project where people have shared anonymous stories about the future and the challenges of surveillance in higher education. Some themes from the collected stories are presented, together

with a description of the tool that was designed to collect those stories. The tool created a space and an opportunity for people to make and share new meanings around surveillance, as Participatory Speculative Fictions. It is clear from the chapter, that a positive future data development in the field of networked learning requires analysis and discussion of the negative impacts of surveillance in learning relationships, as well as awareness of the exploitative commercial uses of collected student data, and the potentially discriminatory practices this may lead to.

In the chapter named "Networked Learning in a Postdigital-Biodigital Age", Petar Jandric and Sarah Hayes explore implicit connections between global concepts, such as bioinformation, bio digitalism and networked learning. The concept of bioinformation has old roots, but since the introduction of Covid-passports that use citizens biodata, a new set of questions have arisen, and dormant questions have become re-actualized. Questions that concern intersections between bioinformation and privacy is one of the points discussed in the chapter. The authors stress that the networked learning community has a history of commitment to biodigitalism. By revisiting relevant histories and concepts in these areas, the authors argue that despite radically different histories, research within these areas has resulted in different, often overlapping theories and approaches. In particular, networked learning has implicitly had a deep and successful theoretical alignment with postdigital-biodigital challenges through the concept of convergence. Thus, convergence is an important and sustained concept in networked learning that could help to break down perceived barriers to the development of cross-cutting research.

In the chapter "Open Is Not Enough: Designing for a Networked Data Commons", Anna Wilson, Hannah Hamilton, Greg Singh and Pat Lockley involve networked learning in a theoretical and methodological design assemblage. In their text they connect the concepts of openness, data literacy, (de)coloniality and participatory design into new formations. The basic idea is that letting these concepts mutate and hybridise will allow them to form something closer to the social justice ideals that networked learning aims at. The authors stress that big amounts of data will be a part of most future networked learning, and that, whilst we discuss the potential risks, we must also look at the opportunities and the beneficiary aspects. Networked learning should be carried out in a state of connectedness, and in communities that create and share their data, tools and alternative approaches. With a thoughtful use of open data, it is possible to create a positive counterpoint to the misuse of data in social media and e-commerce.

In the last chapter of Part I "Tipping the Canoe: What Can Be Learned from a Postdigital Analysis of Augmented and Virtual Reality in Networked Learning?", Marguerite Koole and Annie Beaumier use a postdigital lens to examine augmented (AR) and virtual reality (VR). This was done with the purpose of investigating the roles of AR and VR as potentially effective tools for networked learning. The authors start with two vignettes. The first vignette describes a VR application that invites the learners into a canoe where they are immersed into a lesson about indigenous constellations. The second vignette describes an AR application in which the learners direct their smartphones up against the sky to learn about other

constellations. These vignettes were used to discuss the analogue and digital modalities, and the combination of the two. This chapter is of great relevance to the networked learning community, since it explores how AR and VR can support human-technology relationships. It points out that if we can be more aware of these aspects of communication, it will be possible to design for more efficient networked learning.

Part II: Sustainable Learning Design

This part also contains four chapters. These chapters present empirical case studies of educational formats designed to be sustainable for both learners and institutions, and descriptions of the iterative processes of designing such educational formats. One chapter presents a future-oriented theoretical proposition for how to design for sustainability.

In the first chapter of Part II, "Sustainable Learning Design: A Case Study of Eight Undergraduate Science Module Interventions", Mikkel Godsk, Rikke Frøhlich Hougaard and Birgitte Lund Nielsen presents the result of a case study of eight undergraduate science modules investigating factors for efficient and sustainable Learning Design interventions. In the study, a mixed-methods approach was used involving educator interviews, student activity data, screening of learning designs, module evaluations, and an efficiency assessment. A total of six factors related to the educator and student perspectives are presented. Educators' consideration for the institutional cost-benefit perspective, perceived usefulness of technology-enhanced learning (TEL) and buy-in of its related pedagogy, students' buy-in of TEL, a consistent networked structure with online activities, reflection exercises and feedback, and the scale and reuse of the design are all significant factors for efficient learning designs. Three implication aspects of the identified factors for designing sustainable networked learning are a contribution to networked learning regarding the educator perspective on TEL, students' networked learning with technology, and the module organisation and institutional aspect.

In the chapter "The Future of Presence in Online Education, a Speculative Design Approach", Henrietta Carbonel discusses the movement towards rethinking the university of the future following the upheaval of emergency remote teaching during the COVID-19 pandemic. This chapter investigates new and emerging alternatives for creating innovative teaching and learning spaces and experiences. The question of how to create presence at a distance within a networked learning framework is also in focus. With a three-fold purpose the chapter explores the imagination, with teachers and educational designers, of what presence could look like in the online university of the future, how to critically engage with these futures as well as the evaluation of a speculative approach as a means to initiate a conversation and engage teachers in thinking differently about presence in online education. In six speculative design workshops, teachers and staff developed prototypes of what presence and affective closeness could look like in online education. The chapter investigates new

and emerging alternatives for creating innovative teaching and learning spaces and experiences. Through this study of innovative teaching and learning spaces, the chapter provides a contribution to networked learning regarding how presence at a distance can be created.

In the chapter "Strategies of Revision Between Design-Based Interventions: The Case of a Hybrid Learning Configuration", Anne Kristine Petersen, Peter Gundersen, Bjarke Lindsø Andersen and Marianne Riis investigate the revision process of a Design-Based Research (DBR) project. The project involved a hybrid and networked continuing professional development (CPD) course for educators from three higher education institutions which was developed, tested and redesigned. The design principle of the course had the aim of fostering inter-institutional collaboration among participants in relation to developing, testing and evaluating new learning designs in the participants' respective teaching practices. Semi-structured interviews with the course participants, which aspects of the course should be revised and which revision strategy to apply during the revision process is explored and discussed. Using the revision process between the two cycles of the course, the empirical contribution can be seen in the detailed unboxing of the steps taken by the research and design team. The chapter exemplifies data-informed revision processes regarding how a key design principle of a course is maintained. The contribution to networked learning is seen in how central aspects of the design are revised to create new solutions in hybrid learning.

In the last chapter of Part II, "How to Design for the Materialisation of Networked Learning Spaces: A Cross-Case Analysis", Mette Wichmand, Magda Pischetola and Lone Dirckinck-Holmfeld discuss the potential of a Networked Learning (NL) space. This NL space comes into being when participants establish communication, build connections and create dialogic practices. The chapter poses and explores the complex issue regarding how to design for the materialisation of a networked learning space for professionals in education. This is based on a theoretical framework using Bakhtin's idea of centrifugal and centripetal forces, the concepts of network core and periphery and the idea of the strength of weak ties. A NL space for professionals in education is investigated in two projects aimed at teacher/leader professional development in technology education. The newly materialised NL spaces allow experimentation and provide new practices and ideas for the participants' own organisations. This design of materialisation in new NL spaces is a contribution to networked learning.

Part III: Sociological Perspectives on Networked Learning

In this part, three chapters reflect on the role of networked learning in society. In doing so the authors address how conceptualisations of networked learning, and their designs and values can align and inform human action in society.

In the the first chapter of Part III, "Transformative Networked Learning: An Expanded Design Framework for Individual, Group, and Social Perspective

Transformations", Kyungmee Lee and Brett Bligh reflect on the design application of networked learning. They argue that networked learning research over the years has focused extensively on the networked part of networked learning and neglected the learning component. Furthermore, they argue that within networked learning designs the networked learning community has failed to translate macro-level critiques and transformations into micro-level design practice. In this chapter, they offer to reconcile this by presenting a design framework to articulate explicit and purposeful networked learning design and outcomes, by connecting individual perspectives and group practices with social change. This should connect learner interactions inside an online course with their holistic development, leading into meaningful changes in their lives outside the course. Their expansive framework makes a valuable contribution by explicitly connecting learning with social communities and their real-life contexts. Using the broader social context or society as a community, the aim is to transform social perspectives through community-driven collective networked actions.

In the chapter "The Mode 3 Network University and Design: A New Materialist Perspective", Adam Matthews reflects on networked learning to conceptualise the contemporary university in a wider social, political, and historical context. In doing so, he uses new materialisms to position the institution as networked and part of society and social change. This allows putting forward suggestions for incorporating technology into complex networked learning environments, from design to becoming. New materialisms offer an opportunity to bring networked learning, understood as human relationships, collaborative inquiry and technology, together holistically and see them as an assemblage where humans and non-humans have the capacity to affect and be affected in complex emergent relations. As a result, the author positions the mode 3 network university as an assemblage of actors, all affecting and being affected as relational entities, in constant flux and emergence with varying degrees of capacity as learning environments, designers and learners are constantly becoming. The mode 3 network university, he states, is part of society, is networked socially and technically and calls for the embracing of complexity, bringing together and working with human relationships, technologies and collaborative inquiry rather than seeing designers and technologists as solutionists.

In last chapter of Part III, "Framing Networked Learning", Henrik Brandén explores the meaning or conceptualisation of networked learning, not as a kind of human activity but as a way of viewing human activities. By doing so, he opens up the interpretative space for networked learning and its potential to inform human learning and development. He does this by referring to different metaphors to frame societies. Each metaphor, the biosphere, the distorted reality, the community and the market, poses a different frame of societal structures, systems and processes and therefore raises different questions about how to conceptualise networked learning as a way to view human activity. The chapter makes a valuable contribution by allowing researchers and practitioners to make their approach and designs of networked learning more explicit and aligned with human values and actions in our society. The use of the suggested frames encourages reflection and discussion about integration and mutual understanding. Combining different understandings

and approaches to networked learning could make it possible to "approach the complexity of networked learning in a more thoughtful, nuanced, and well-balanced way". It further allows for the concept of networked learning to become networked in itself and seek "connections, to transform and hybridise to pressing issues of our time".

Part IV: Networked Learning in Times of Lockdown

The two chapters forming this part of the book look at students' and teachers' learning experiences during the recent COVID-19 lockdowns. They document how the lockdowns led students and teachers to develop new patterns of participation as well as to new uses of their networks.

The chapter "Emerging Rhizomatic Networks and New Ways of Connectivity", by Roland Hachmann, Thomas Kjærgaard, and Hanne Fie Rasmussen, introduces a framework for analysing learning networks. This framework is used to zoom into and analyse three cases from a wider data set of 32 interviews conducted during the COVID-19 lockdowns. Drawing on distinctions between different ways of understanding networks by Dohn et al. (2018) the authors transform these distinctions into analytic categories to explore the three cases. They show how online teaching during the lockdown required students to establish new patterns of participation via establishing new structures and ways to collaborate, and provide interesting examples of how the term network can take on different meanings. The chapter is a poignant contribution to networked learning with its re-interpretation of 'what a network is in networked learning' as analytic categories. Thus, through their analysis, the authors show how all the understandings/categories posited by Dohn et al. (2018) are relevant and overlapping, despite reflecting fundamentally different understanding of what a network is. Furthermore, the chapter provides insight into students' varied experience and how they in different ways engaged in networked learning juggling between institutional and non-institutional technologies.

In the second chapter of Part IV, "University Teachers' Perceptions of Networked Learning During the Emergency-Remote-Teaching Period: A Phenomenographically-Informed Inquiry", Alejandro Acuyo Cespedes and Kyungmee Lee present findings from an investigation of higher education teachers' perceptions of personal learning networks during Emergency Remote Teaching (ERT). The authors argue that the ERT-period led teachers to emphasise their use of personal (informal) learning networks, and they situate this as an example of networked learning. They analyse 18 Academic English teachers' views on the benefits of network connection and how the instructors perceive the core benefits of their network use. The chapter is a valuable contribution to a better understanding of how higher education teachers have used their networks in various ways to cope with the challenges of ERT. This can help us think differently about professional development and change the focus from formal courses towards appreciation and support of teachers' collegial networking and access to valuable learning resources. Furthermore, the chapter's

identification of four different ways of using networks are an analytically valuable contribution to networked learning, in that it highlights network makings of increasing complexity: from access to resources to belonging in an academic community.

Final Remarks

The overarching topic of the present collection is sustainable networked learning. As indicated, the chapters deal with this in different ways, allowing us through the four main parts to present a set of complementary individual, sociological and design perspectives on what sustainability can mean for networked learning now and onwards. However, across the chapters, further issues emerge as potent questions for future research. In the book's concluding chapter we identify a number of these cross-cutting issues, more particularly the themes of:

- *Lasting effects of lockdown online teaching and learning?*
- *Digital sustainability for the future*
- *Future roles of networked learning in society*
- *Balancing utopia and dystopia in visions of AI and open data*
- *Speculative methods in research, education and design*
- *Balancing qualitative and quantitative data in the research of networked educational settings: Studies on the community and project levels.*

With the chapters of the present volume as starting point, the concluding chapter discusses the significance of these themes for networked learning.

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Part I
Data and Datafication

Chapter 2
Reconfiguring Surveillance Futures for Higher Education Using Speculative Data Stories

Jen Ross and Anna Wilson

Abstract Surveillance in many higher education settings has become increasingly pervasive and fine-grained. Concerns are growing about negative impacts on learning relationships, exploitative commercial uses of collected student data, discriminatory practices, and even political, social, or physical harm inflicted because of surveillance and monitoring. At the same time, complex surveillance cultures in higher education make it difficult to disentangle personal and collective responsibility, understand the gap between intentions and impacts, or navigate the risks that can come with addressing these matters. In 2020, the Data Stories research project used speculative and co-design approaches to develop a 'data stories' storytelling tool. The project supported people working and studying in higher education to create and share anonymous stories about what the future of surveillance in higher education might look like. This chapter explores the context for this work and draws out some themes from these stories, exploring a range of responses to surveillance that are expressed in them. We describe how the data stories tool was mobilised to produce a space for people to make and share new meanings around surveillance, in the form of Participatory Speculative Fictions, which have potential for working with and possibly reconfiguring a range of networked learning futures.

Keywords Surveillance · Higher education · Speculative methods · Co-design · Storytelling · Datafication · Participatory speculative fiction

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Introduction

In the 2021 Networked Learning redefinition paper (Networked Learning XE "Networked learning" Editorial Collective (NLEC), 2021), the authors note that the field is currently working with a rich set of questions about "trust, power, identity, belonging, difference, affection, reciprocity, solidarity, commitment and time"; "affordances, instruments, access, appropriation, ownership"; and "knowledge, values and action, learning and doing, meaning-making, negotiation, shared projects and praxis, scale, scope, pace and duration and the capabilities needed to shape a world worth living in" (p. 314). These questions are also at the heart of the speculative approach undertaken to elicit Participatory Speculative Fictions created using the Data Stories creator tool, with a focus on generating "a deeper understanding of the role surveillance has played and continues to play in universities and tactics and strategies for interrupting and perhaps reducing or reconfiguring its impacts" (Collier & Ross, 2020).

One such fiction, produced anonymously and published on the Data Stories web site in 2020, re-imagines the practice of remote invigilation of examinations (also known as remote proctoring) in the horror genre. At the time the story was written, remote invigilation was receiving a great deal of attention as universities around the world struck deals with ed-tech companies to help them respond to the closures of university campuses as a result of the Covid-19 pandemic. The companies and their practices came under scrutiny, along with the way remote invigilation affected students negatively, and unequally, including by invading their privacy and punishing divergence from narrowly defined norms of test-taking behaviour (Coghlan et al., 2021; Logan, 2021). In this story, The Invigilator,[1] an unnamed student becomes increasingly panicked as a remote invigilator interrupts them multiple times to insist that they can see through the webcam that someone is in the room with the student, contravening the examination regulations.

> I quickly turned around to the darkness behind me, there was nothing there, no pictures, no figurines that could be confusing on camera. "There is . . . no one here . . . no one is in the room".

The story ends on a note of dread, and combines supernatural creepiness with more mundane, but no less intense, revelations of the impact being watched has on the narrator: "my English was starting to suffer a bit, it was offputting having to answer these questions throughout the hardest bit of the test". While clearly an imaginative fiction, it conveys important concerns about the nature and stakes of surveillance in higher education, including a nightmarish feeling of being under suspicion and disbelieved, and the potential for the innocent to suffer material consequences.

This chapter discusses the sensibilities of surveillance revealed through Data Stories, and how these stories can help shed light on how values around surveillance, including privacy, ownership, power and trust, are enacted and interpreted through

[1] http://datastories.de.ed.ac.uk/datastories/view/254

digital technologies in higher education. For our purposes, surveillance refers to "the focused, systematic and routine attention to personal details for purposes of influence, management, protection or detection" (Lyon, 2007, p. 14), but also some emergent and less systematic forms of attention that characterise the intensive use of data-driven technologies and platforms.

The datafication of many aspects of higher education (HE) has led to a situation of increasing visibility and monitoring of the activities of students, staff and processes of learning, teaching and assessment (as well as research, knowledge exchange, human resources and a range of other activity). The contemporary university is therefore enmeshed in complex surveillance cultures, where individuals and communities are negotiating and actively participating in an "attempt to regulate their own surveillance and the surveillance of others" (Lyon, 2017, p. 824). This has impacts on relationships both within and beyond individual institutions, with lines of reporting and visibility extending to government, corporations and other actors in each educational ecosystem. Such visibility of people and processes is used for purposes both benign and problematic: data is used to facilitate co-operation, but also to gain advantage in a competitive system; to understand patterns of information needs among students in the library, but also to monitor attendance (with severe implications for international students, for example). Harms and risks from surveillance and monitoring can be difficult to quantify, but are tied up in some students' and staff's experiences of inequality and mistrust (Gilliard & singh, 2021). The use of learning technologies and digital environments produces significant opportunities for learning and teaching to be datafied, monitored and surveilled, and for those aspects which cannot be datafied to be rendered insignificant or undervalued. The globalised nature of the HE sector suggests that we are all on the same path, even if the extent to which surveillance cultures have developed to date varies across national, geographical and economic contexts. This chapter's authors are writing from within a UK higher education context, but at least some of the stories we discuss are from other higher education contexts, and the themes are similar.

The current situation of monitoring and visibility in universities includes sociotechnical imaginaries about the trajectories that technology may take in the future, what Jasanoff (2016) describes as "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (p. 4). Imaginaries are about the future, but they exist in the present and are shaped by predictions, promises, threats and narratives that influence what people consider possible, for themselves and for others. For this reason, imaginaries of surveillance and monitoring require attention if we are to create situations where people can act towards futures that are more trusting and equitable. At present, as we will see, these imaginaries are quite varied, depending on the extent to which the technologies and practices in question are understood as beneficial, intrusive, and so on. Many different understandings can be in play at once – leading both to hopeful imaginaries of highly personalised, bespoke education; and to dystopian visions of educational systems increasingly structured around surveillance and control.

In any case, the lack of clear consensus about the nature and potential futures of surveillance in universities should not be taken for a lack of concern. We have seen through the Covid-19 pandemic a greater sensitivity to the harms surveillance technologies can bring – not only to relationships and to learning environments, but to health and wellbeing (Doyle, 2021; Logan, 2021; Ross & Macleod, 2018). There is a need for more understanding of the experiences, hopes and fears of those affected by surveillance cultures in universities. At the same time, gathering such data can be complicated, as digital resignation (Draper & Turow, 2019), fears about repercussions (Beetham et al., 2022) and the sheer complexity of the digital ecosystems that now exist in higher education work against forms of research that ask straightforwardly for experience or opinion on these matters. We need more creative methods for developing insights into these issues. This paper discusses one such approach – Participatory Speculative Fiction – and its use in telling data stories to contribute to an understanding of desirable and undesirable networked learning futures.

Surveillance Cultures and Networked Learning in Higher Education

Learning technologies within universities help people communicate, collaborate and create, as well as make resources available, store data, keep track of activities, assess performance, remind us of due dates, check for plagiarism, and more. In addition to their specific functionality, many of these technologies offer the capacity for increased surveillance, and some are already being used to monitor or quantify learning activities. While networking learning approaches can support and help reimagine critical and emancipatory education (Networked Learning Editorial Collective (NLEC), 2021), some technologies that make them possible also bring increased opportunities for surveillance for purposes of both control and profit. Forms of monitoring can be helpful in increasing accountability, providing transparency that might improve quality, alerting people to risky situations, and providing opportunities for caring interventions. However, despite the potential benefits there are also potential detriments, especially when control and profit motivate the use of surveillance technologies, and when their unequal impacts are not recognised.

A ‘sensibility of surveillance’ in higher education (Ross & Macleod, 2018) is not just top-down, and often intended to be benign or helpful, but nevertheless contributes to surveillance cultures which “alter teaching and learning environments in complex ways that are often surprising and at odds with their original intent. What matters is not practice or purpose, but presence” (Knox, 2010). These technologies also contribute to a hidden curriculum of datafication, where being visible, tracked and monitored without meaningful consent is normal and expected. Even where consent is sought and given, it can be difficult for staff and students to carry out an informed cost-benefit analysis. Claims about the potential benefits of monitoring

technologies like Learning Analytics are not always borne out by evidence of positive impact (Watson et al., 2017; Wilson et al., 2017). All of this can lead to what Draper and Turow (2019) call "digital resignation", where people take no, limited or inconsistent action in relation to privacy concerns, because "while these people feel dissatisfied with the pervasive monitoring that characterizes contemporary digital spaces, they are convinced that such surveillance is inescapable" (p. 1825). Such resignation sits uncomfortably in a system of higher learning where critical thinking and the ability to question taken-for-granted ways of working is valued.

In addition, the privacy that is being surrendered has particular, and perhaps fundamental, value in the university. As Cohen (2012) argues, it functions to shelter subjectivity "from the efforts of commercial and government actors to render individuals and communities fixed, transparent, and predictable. It protects the situated practices of boundary management through which the capacity for self-determination develops" (p. 1905) and "the processes of play and experimentation from which innovation emerges" (p. 1906). Without an expectation of control over privacy, practices that might otherwise be noted and debated may instead become normalised. Macfarlane (2016) highlights how "bodily performativity" has become established in students' university experiences, where attendance (physical or virtual) is treated as a proxy for engagement in a range of problematic ways. He argues that "attendance policies demonstrate both a lack of trust in students and failure to respect their freedom to learn as an adult" (p. 81). Threats to self-determination, trust and respect are at the heart of why surveillance cultures are of urgent importance for networked learning scholarship and practice.

The pivot to online teaching, learning and assessment during the Covid-19 pandemic has exacerbated many existing issues and ushered in new forms of surveillance (Beetham et al., 2022), partly due to the speed at which institutions were forced to act, as a result of which:

> existing checks and barriers to technology adoption and digital learning were often set aside. At national or regional levels, for example, regulatory privacy laws were relaxed to enable widespread adoption of communication tools... and some countries with legal constraints regarding the limits on residential universities providing distance education relaxed those constraints. Within universities, contracts with software vendors were signed quickly. (p. 17)

Along with current intensification of surveillance, there has been increasing pushback against the impacts and harms of monitoring and datafication, and its unequal effects. Formal, informal, individual and collective responses to surveillance technologies have taken the form of resistance, advocacy, education, regulation, engagement and investment (ibid, p. 24). Future possibilities for digital participation are tied up with questions about visibility, anonymity and openness, and the spaces between them, with practices like critical disengagement, challenges to social media practices of value extraction, avoidance of controversy, and strategic concealment (Bachmann et al., 2017) offering visions for the "'renovat[ion]' of conventions of digital space" (Duffy & Chan, 2019, p. 127). Alternative ways of thinking about and enacting authenticity, including in anonymous spaces, may need

the contemporary university to examine "principles and frameworks which respect [anonymity's] social value" (Bayne et al., 2019, p. 104). And technical knowledge may need to be mobilised in the service of alternatives to intrusion and toxicity – not in the form of a temporary 'digital detox', but in genuinely different forms of engagement (Natale & Treré, 2020).

The risks of and further possible responses to surveillance cultures in higher education are in urgent need of exploration. However, there are barriers to this exploration – in the risks it poses to individuals at this point in time (Beetham et al., 2022); and in the power of sociotechnical imaginaries (Jasanoff, 2016) and discursive closures (Markham, 2021) that make certain technological futures seem inevitable. For this reason, creative, inventive and speculative methods are useful and necessary, and we move on now to discuss these concepts and approaches, and their importance in researching networked learning futures.

Speculative Methods for Researching Networked Learning Futures

Themes of automation, personalisation, efficiency, visibility and ubiquity have been the focus of attention, discussion and often heated debate in digital education contexts over many decades, with implications for how networked learning futures are conceived and anticipated. The role of digital technologies tends to be viewed in instrumental terms (Bayne, 2014), contributing to narratives of education that see the future as a site for optimisation, colonisation or protection (Facer, 2016), and educational research overemphasises a 'what works' agenda which limits productive futures work in the field (Ross, 2017). In addition, as noted, powerful imaginaries are in circulation: among these are 'edtech imaginaries' (Friesen, 2020; Watters, 2020), expressing ideals of education in terms of scale, personalisation, commercialisation and innovation. These imaginaries underpin policy and practice in both overt and subtle ways, and teachers, learning technologists and others have an important role to play in their generation, reception and development.

Much of this discussion and debate is underpinned by a (often unarticulated) assumption that technology will continue to develop and become more powerful in educational contexts. There is thus a common concern not only with present, and the affordances and capacities offered by current technologies, but also with possible futures. Facer (2021) clusters education futures work around five key questions:

> What will education be like in the future?
> What sort of education will prepare students for the future?
> How can students learn to think reflexively about futures?
> How can education be liberated from the future?
> How might education heal the future? (pp. 3–4)

Approaches to answering these questions draw on work from a range of fields including futures studies, critical education futures, educational technology,

anticipation studies and more (ibid, p. 4). Our interest in the Data Stories project was to build on work that engages in a critical and questioning way with digital education futures, and their impacts on the present. Our approach was to develop a method – Participatory Speculative Fiction (PSF) – to help bring ideas of surveillance and digital technologies together with an invitation to consider conditions which may not yet currently exist. The aim here was to create possibilities for working against established imaginaries and countering discursive closures, where "practices or technological designs are... removed from any chains of causality or results of decision-making, so that they seem like processes that just exist" (Markham, 2021, p. 392). Speculative methods in general offer a generative approach to this work (Ross, 2023). They are a way of using the uncertainty of the future creatively in the present. They function within a complex interplay of past, present and future; they are "overtly constitutive" of the problems, topics and questions they engage with (Wilkie et al., 2015); and they centre engagement and audience in a way that adds to the glitchiness (Bodden & Ross, 2020) and unpredictability of their effects. Michael (2012) describes them as "'inventive problem making' in which the parameters of the issue are reconfigured" (p. 536). In their foundational speculative design text, Dunne and Raby (2013) critique the "downgrading of dreams to hopes" (p. 8) that characterise the contemporary moment and its wicked problems, and identify in speculative design a way to use futures as:

> a medium to aid imaginative thought... Not just about the future but about today as well, and this is where they become critique, especially when they highlight limitations that can be removed and loosen, even just a bit, reality's grip on our imagination. (p. 3)

In this sense, speculative methods are not solely about designing preferable futures, but about revealing and developing insights about our current situation, what has led to it, and what might (conceivably) be different. Speculative approaches include fictions, researcher-made objects, participatory design or storytelling activities, and speculative analysis (Ross, 2023). The remainder of this section focuses on speculative storytelling methods that underpinned the PSF approach taken in the Data Stories project.

Researcher-written speculative stories go by a number of names: most commonly social science fiction, design fiction or speculative fiction. They mostly take the form of short stories or vignettes, often incorporated into or cited in scholarly articles. In educational research such approaches have been influenced by the use of speculative fiction in broader technology studies and sociological fields (see for example: Benjamin, 2016; Graham et al., 2019), and they are typically set in schools or universities. They tend to focus on the implications of data-driven education and platformisation, and are more often than not dystopian. This may be because they are informed by the significant amount of critical work done in the past decade that has highlighted the inequalities and risks that come with increasing datafication and privatisation. A 2020 special issue of the journal *Learning, Media and Technology*, focused on speculative futures, is a prime example of the use of speculative fiction in this field. For example, Hillman et al.'s (2020) three speculative scenarios cover

feature creep & privatisation, data exploitation, and recentralisation in a future Swedish school system, building on their review and analysis of the current state of the system. They highlight the risks, the persuasiveness and, eventually, the ubiquity of such a system. Selwyn et al. (2020), building stories around a Melbourne, Australia-based school of 2030 they call Lakeside, look at the mundane realities that people in this school might experience. Their linked stories paint a picture of a "standardized, benchmarked and centralized" system that has "little room for affective, embodied and spontaneous action" (p. 104). Cox (2021), analysing possible futures for artificial intelligence in higher education, observes the complex temporalities involved in telling stories about this topic:

> rather than a single technology, something like AI is an idea or aspiration for how computers could participate in human decision making. Faith in how to do this has shifted across different technologies over time; as have concepts of learning… confusingly from a temporal perspective, uses of AI and robots in HE are past, present and future. (p. 2)

Cox situates his own use of fiction as a research output, but observes that fictions are also used to elicit research data or can be co-created with publics (p. 3). This co-creative approach – what we have called Participatory Speculative Fiction – informed the Data Stories project.

Story-based research methods are well established in the social sciences and other disciplines, including in the form of narrative and fictional inquiry (Clandinin & Connelly, 2000; Clough, 2002), transmedia and digital storytelling (Hancox, 2017), and in futures-focused social science fictional methods (Gerlach & Hamilton, 2003; Suoranta et al., 2021; A. Watson, 2021; A. Watson & Gullion, 2021). Surveillance as a subject of social inquiry has been the focus of a number of storytelling projects in recent years (Cahill & Newell, 2021; Screening Surveillance, 2019). The PSF approach also takes inspiration from participatory modes of design fiction. Participatory modes provide a response to the tendency of design fictional or speculative approaches to foreground 'elite' or powerful voices (Forlano & Mathew, 2014, p. 11; Light, 2021) – those of researchers, for example. The elicitation of speculative stories from research participants, combining speculative fiction and co-design or co-creation, also offers a powerful way to enable participants to engage in public discussion of subjects or topics that they may be reluctant to talk about, perhaps because of complex loyalties, or perceptions of risk (Wilson et al., 2022). They are also effective in surfacing fears (and to some extent, hopes) about what has not yet happened, but might. Building on the development of a novel approach to the creation of Human-Computer Interaction (HCI) design personas and scenarios (Wilson et al., 2018), our project's PSF approach was intended to put potential users of a system's ethical and political values at the centre of the design process. It did so by creating a scaffolded storytelling process that prompted authors to step away from the confessional or the accusatory, instead imagining what might happen and shifting actors and interactions into new configurations. Working in this speculative register produced some fascinating and important visions of the contemporary and future university and the role of surveillance within it.

Telling Data Stories

Between February and July 2020, the project team undertook the development of a scaffolded storytelling tool that uses fiction writing to explore aspects of an interaction with technology, and hopes or concerns it raises, by speculating about what could happen. Authors can choose to publish their stories anonymously on the Data Stories web site: http://datastories.de.ed.ac.uk.

The storytelling tool consists of a three-stage process: prompts, mapping and writing. In the first stage, users of the tool are asked to think of "a time when you have used, or become aware of, a bit of technology (software or hardware) that was either explicitly being used for surveillance or might be used for surveillance, even if unintentionally". With this example in mind, they are invited to select and answer questions from a drop-down list, including prompts such as:

> What is being scrutinised/quantified?
> What technologies enable the scrutiny?
> What is the purpose – e.g. monitoring, audit, resource allocation, control, comparison, correlation?
> What form might an action or intervention take?
> Who benefits? What are the benefits?

Once a question is answered and saved, it becomes a story object that is placed in the second stage of story creation, the story map. In the map, the objects first appear as unconnected nodes, which can be clicked and dragged around the map space, with lines added between them and labelled to indicate the relationship between them. The mapping stage thus networks the story objects into an assemblage within which connections can be made, broken and remade, as the author plays with possible as well as actual relationships between nodes. The map produced in this stage then forms the inspiration and possible structure for a multimodal story, written and submitted in the 'write' tab of the tool. The story can contain text, images, hyperlinks, social media objects such as tweets, GIFs and emojis. The length and style of each story is not prescribed, and stories are submitted and published anonymously, with no personal information collected, no attribution and no link to an author. At the time of submission, authors have an option to allow their story to be repurposed within the data stories tool (using the 'turn-it-into' functionality, which creates a copy of the content as a new, editable story), generating a potential network of stories that have been directly informed by one another. The stories themselves, once published on the site, are in the public domain, so other uses and developments from them are also possible.

Two research questions informed the project design initially:

How can the role of surveillance in higher education be interrupted, reduced or reconfigured through speculative storytelling and co-design?

What questions, narratives and issues will shape research in the ethics of data-driven higher education?

A third question developed along with the Data Stories creator:

What would people publicly imagine about surveillance if they were free to do so?

The remainder of this paper addresses the third of these questions, and indicates potential research trajectories that can follow from these public imaginations. Our analysis draws on sensibilities that underpin networked learning approaches: as reader-researchers we see the collection of stories as itself a network, as different experiences and imaginaries are juxtaposed in the act of reading. As we read, what we encounter is not a sequence of independent texts, created by different authors; instead, the stories are already networked by the initial prompt questions, which lead the authors in particular directions. As we read and analyse the stories, we engage in a process of recognising echoes and similarities created by these shared starting points, as well as differences and digressions that result from the varied (but to us, unknown) contexts and experiences of the authors.

Our reading and analysis of the stories thus creates an additional network of characters, narrative arcs, contexts and concerns. The published stories on the site at the time of writing are characterised by an interplay of present concerns and potential future issues, trajectories and imaginings. The main characters in these stories tend to be individual students or academics, but there are also stories told from the perspective of a student union, a cleaner, a director, and several ambiguous characters experiencing aspects of surveillance culture in or beyond a contemporary or imagined university. Many of the platforms are familiar in these stories – learning management systems, online exam proctoring services, productivity or collaborative software, student request management systems – but some of the technologies, data forms and data uses are novel. Characters in the stories experience neuro- and bio-scanning, health & wellbeing metrics and measurements, DNA-driven decision-making, competition for lecture views, and a mirror that quizzes students about their first year experience. We choose these four because they illustrate recurrent themes within the wider pool of stories about the networking of what might be thought of as non-academic (or even academically-irrelevant) data into technologies for personalising learning, and a sense of loss of control as technologies network data across and between systems and purposes.

For the most part, ways of understanding surveillance in these stories tend toward the dystopian, with a sense of technology developments impacting the university that are undesirable but unstoppable – more on this below. At the same time, the ways people are imagining the future of higher education allows us to explore networked learning principles of relationships, connection, collaboration, and the complexity of the assemblages of technologies, infrastructures and actors that constitute learning settings. We draw here on four stories that shed light on these complex interactions, exploring the nature of connection and collaboration, the datafication of emotion, and the individualisation of learning that may come with increasing monitoring in future digital university settings.

In the story "DNA-fueled universities",[2] the protagonist, a student called Kari, reflects on the role of DNA sampling and analysis in a future university system. From the application process onwards, DNA plays a role – though what, exactly, the role constitutes is not made explicit. Kari guesses that it is used to personalise her own and others' experiences beyond their expressed goals and preferences, identifying the right 'fit' of university, campus experiences, roommates and even meals. This personalisation works for her – she describes the 'perfect match' she found in her roommate, house, meal plan and overall university experience. At the same time, she describes 'deep personalisation' as feeling invasive and restrictive, and observes how it 'tormented' some of her friends with its decisions on their behalf. Above all, it seems to create a feeling of doubt about the limits of self-knowledge and perhaps even free will – casting a shadow on the notion of the 'perfect match' in a way that is potentially damaging to relationships that are generated through the datafication of self.

Datafication takes on an even more sinister role in "William Stone P267",[3] where the main character, Will, is subject to intensive online monitoring of his involuntary reactions, posture, body temperature, heart rate and other metrics in test conditions, all aimed at scoring his social-emotional learning and other capacities alongside his knowledge. The results of this "classification day" testing will have important consequences, though these are not spelled out in the story. In response to this monitoring, Will hones "an ability to fake his feelings", including by leveraging embarrassing or happy memories at appropriate moments. While apparently successful, this self-hacking comes at great personal cost to Will, who must banish 'anger, regret and exhaustion' in order to perform appropriately, and can only see other students as competitors for the coveted 'P' classification.

Other imagined consequences of intensive monitoring and individualisation are seen in a story set in a future where teachers' lack of ability to fully know their students in an evidence-based way is justification for their removal from all but "innocuous" tasks. Like the DNA story, this is a future characterised by personalised education that gives students "what (it calculates that) [they] need", and here it is made explicit that those needs are of interest only "in order to satisfy the needs of society" ("Remembrance"[4]). The narrator is a teacher, kept around to provide a "human touch" in a system that is "still improving" in its ability to deliver personalised teaching to each student. They trace a trajectory from the pandemic pivot to online teaching, to the automation of student profile-building, to a system in which students are "pretty transparent", while algorithmic processes are obscured.

The final story we consider here is a reflection on what might be current as well as future practice – the use of online collaborative work spaces. The narrator here describes feeling responsible for knowing "who has access to what – but this became impossible to manage properly. No-one knew who could 'see' what, and what is

[2] http://datastories.de.ed.ac.uk/datastories/view/165

[3] http://datastories.de.ed.ac.uk/datastories/view/186

[4] http://datastories.de.ed.ac.uk/datastories/view/187

Microsoft doing with all this data?" ("Microsoft Teams and the cost of collaboration"). Matters of visibility, responsibility and the difficulties of managing privacy and access in 'black boxed' digital environments foreshadow the fears expressed in the other three stories.

These four speculative stories give a rich picture of the kinds of concerns and possibilities people anticipate in future educational settings. The future told through these data stories has clear connections with fears expressed about loss of control in the present. However, these fears are not separate from efforts to create positive learning experiences with and for students in networked environments. In these stories we can see frustration and anxiety but also, in telling and sharing them, glimpses of different positions and relationships that could exist. The telling of stories is an active rejection of digital resignation (Draper & Turow, 2019). That they tend towards the dystopian is perhaps not a surprise given the current moment and mood around surveillance and datafication, but dystopian imaginings are not the same as resignation and not the opposite of hope, as Priyadharshini has argued:

> the affects of dystopia do not work in predictable ways – they seem to indicate that hope and despair are not clearly separable in the monstrous, and that there is something to be gained from knowingly engaging with such visions of the future. (Priyadharshini, 2019, p. 7)

For this reason, we see Participatory Speculative Fiction as beneficial in exploring controversial and difficult topics. By tapping into complex experiences of surveillance and monitoring through a creative and speculative approach, shared understandings and new possibilities come to the surface, and from there, a better chance for collective action around data practices. One way this might emerge in our particular context is through the development of a higher education surveillance observatory. We suggest there is a need for such an observatory, through which surveillance itself can be monitored, productive approaches can be identified, and methods of resistance exchanged. Our vision involves the collection and sharing of speculative stories, as well as the collection and aggregation of facts and accounts of practice and policy. The fictions being created through our project are a first stage of co-design, allowing the articulation of key themes, concerns and practices that will serve as organising principles for the Observatory's structure and functionality.

Conclusions

Like most speculative fiction, the scenarios described in the stories are likely to have grown from the seeds of experiences, here ones that are germinating in the contemporary university. In these stories, near-futures are being imagined in which academic (staff and student) identities have been disrupted and dislocated; in which trust is replaced by knowledge gained through surveillance; and in which personalisation may stifle and normalise as well as create ease and wellbeing. All of these tensions and disruptions have resonance in the present, and, as Lyon (2017) notes, "cultures of surveillance, whether critical or complacent, are socially constructed and can thus

be challenged and reconstructed" (p. 835). Our argument in this chapter is that, if we wish to influence the direction of growth and change of surveillance cultures in higher education, we should find ways to make these contemporary experiences and the factors and conditions generate them more visible and themselves open to scrutiny. By giving space for accounts of how personal, educational and institutional values intersect, projects like Data Stories can allow people glimpses into different positions and relationships that could become possible (for better or worse). Collective action, in turn, can be supported through sharing such glimpses and the worlds they reveal.

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Chapter 3
Networked Learning in a Postdigital-Biodigital Age

Petar Jandrić and Sarah Hayes

Abstract Networked Learning (NL) has developed predominantly in university settings, yet much of the research across decades has implicit links with broader global concepts, such as bioinformation, biodigitalism, postdigitalism, critical posthumanism and viral modernity. In this chapter, we explore these implicit connections as an important, less recognized part of NL. We surface some postdigital-biodigital challenges in NL by revisiting relevant histories, concepts, and definitions and noticing where there are connections, particularly when NL and Postdigital Science and Education have developed in the same *Zeitgeist*. Despite diverse histories, these areas of research have resulted in different, yet often overlapping theories, approaches, and ethos. After examining a number of cross-cutting areas of interest, we ask why a focus towards postdigital-biodigital challenges in NL is worthwhile, and indeed, why now? We perceive NL to implicitly hold a long history of deep and successful engagement with postdigital-biodigital challenges in theory and through the concept of convergence. Convergence is an important and sustained concept in NL that can break down perceived barriers to developing cross-cutting research in the areas discussed throughout this chapter. It is therefore timely to bring to light explicit bioinformational connections, to help focus our research efforts on NL in a postdigital-biodigital age.

Keywords Networked learning · Postdigital · Bioinformation · Biodigital · Convergence · Biology · Information · Society

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Introduction

In 2021 the Networked Learning community undertook an important exercise of self-reflection. Early in the year, a group of about a dozen core members of the community wrote the article titled 'Networked Learning: Inviting Redefinition' (Networked Learning Editorial Collective, 2021) and launched an open call for responses. 40 contributors from 6 continents working across many fields of education responded to the call, resulting in the article titled 'Networked Learning in 2021: A Community Definition' (Networked Learning Editorial Collective et al., 2021). This pair of articles revisited, updated, and brought together various understandings of Networked Learning dating from the decades-old landmark definition (Goodyear et al., 2004) to the latest debates in the field (Öztok, 2021).

These articles have attracted considerable attention and have achieved their goal to "stimulate democratic discussion about NL and to prompt some much-needed community-building" (Networked Learning Editorial Collective et al., 2021, p. 327). However, any attempt at defining a wide field or intellectual tradition such as Networked Learning is associated with some challenges. Listing the article at the third place of their Top 10 Journal Articles from 2021, Dublin City University's National Institute for Digital Learning (2022) emphasizes that the articles show "how difficult it is to define the undefinable and how our search for common definitions and to pin down our language can inadvertently narrow thinking and foreclose on different perspectives". We hope that 'Networked Learning in 2021: A Community Definition' (Networked Learning Editorial Collective et al., 2021) has managed to avoid the trap of such narrowing, yet we do not want to ponder that further. Instead, our attention is firmly on opportunities arising from the definition – instead of looking at concepts and ideas well elaborated already in the definition, we decided to focus on those concepts that could benefit from further elaboration.

Deeply invested into our current work in the area of bioinformation (Peters et al., 2022; Jandrić & Ford, 2022), we decided to focus on postdigital-biodigital challenges for Networked Learning. These include implications from new systems biology and digital technologies and a broad "technoscientific convergence that is taking place with biodigital technologies in the postdigital condition" (Peters, Jandrić, and Hayes, 2021b, p. 1). Looking at the definition article, we found that the Networked Learning community takes these questions seriously and offers to

> undertake critical work in promoting connections through ecological learning designs that reflect this new context. … Such contributions would extend the links that NL has established with critical pedagogy and ecologies of learning (Bozkurt, this paper) and 'bring the importance of learning to connect to the fore [i]n order to develop more cohesive and sustainable societies' (Carvalho, this paper). (Networked Learning Editorial Collective et al., 2021, p. 357)

The community further realizes that new biodigital challenges importantly "intersect with NL's focus to social justice and equality" and concludes that "[i]t is therefore time to better theorise the connections between developments in technology,

inequality, and education, while also striving to actively design technologies that facilitate more equitable futures for all" (355).

The Networked Learning community has a long history of engagement with biodigitalism. Therefore, it is hardly a surprise that the community definition sees biodigitalism as an intrinsic and important part of Networked Learning. Yet as we will elaborate further in this article, it is also fair to say that a lot of biodigital work in Networked Learning is implicit, rather than explicit. Based on these starting points, this article surfaces some postdigital-biodigital challenges in Networked Learning.

Histories, Concepts, and Definitions

Historically, Networked Learning is a fairly recent development in the long history of digitization. Asking the question "How has the concept of digitalization travelled throughout academic discourse during the period 1920–2020?', Katarina L. Gidlund and Leif Sundberg have identified the following trends:

> First, we have identified how the current use of digitalization has travelled, from specific contexts (medical use and information conversion) to a more general use after the turn of the millennium. Second, we identified a pattern of convergence during the last decade, where digitalization is associated with narratives of digital transformation. (Gidlund & Sundberg, 2022)

Both trends identified by Gidlund and Sundberg (2022) can be clearly seen in the development of Networked Learning.

"Networked learning crystallized in the late 1990s by distinguishing itself from developments in digital education that were undermining human connectivity—developments that threatened to reduce education to the production, delivery and consumption of 'content' ('online materials')." (Networked Learning Editorial Collective, 2021, p. 315) In one of the first available definitions, David McConnell (1998) wrote: "[n]etworked collaborative learning (NCL) is therefore the bringing together of learners via personal computers linked to the Internet, with a focus on them working as a 'learning community', sharing resources, knowledge, experience and responsibility through reciprocal collaborative learning."

In the same year, Nicholas Negroponte (1998) wrote his famous Wired article 'Beyond Digital' and claimed that "the digital revolution is over. . . . Its literal form, the technology, is already beginning to be taken for granted, and its connotation will become tomorrow's commercial and cultural compost for new ideas. Like air and drinking water, being digital will be noticed only by its absence, not its presence." Negroponte's article served as a point of departure for Kim Cascone (2000) and Pepperell and Punt (2000) who, independently of each other, published first definitions of the concept of the postdigital in the context of arts. (For a detailed account of this history, see Cascone & Jandrić, 2021.)

Since these early days, Networked Learning has developed predominantly, though not entirely, in university/research settings. Occasionally broader

professional networks beyond academia are referenced, but this is a relatively recent development. Since 1998 the biannual Networked Learning Conference serves as a meeting point for researchers in the field, and conference proceedings have published some major related works. 2014 marks publication of the first book in the then-new Research in Networked Learning book series, which, publishing approximately one volume per year, has become a major source for Networked Learning research. The postdigital perspective has a ratherdifferent path of development. It began in a wider range of settings such as art exhibitions, through popular music, architecture, design, and so on, with an occasional – but far from systematic – academic appearance. Founded in 2018, the *Postdigital Science and Education* journal and book series have begun a community effort of synthesizing, systematization, and development of postdigital work as a theory and research approach including university settings. This though is increasingly now recognised across different sectors in the community too (Hayes et al., 2021) and has been expanded via new authors from industry, business, councils and charities, as well as from academia (Hayes et al., 2022).

Networked Learning and Postdigital Science and Education have developed in the same *Zeitgeist*. Consequently, their variable histories have resulted in different yet often overlapping theories, research approaches, and ethos. For instance, the Networked Learning community has always been strongly focused on defining the field, culminating in two definitional articles that inspired this paper (Networked Learning Editorial Collective, 2021). In opposition, Jandrić and Ford (2022) argue that "one day, probably, our postdigital condition will be condensed in concise encyclopaedia entries and routinely explained by undergraduates. One task is to ensure this does not happen, and that the postdigital remains—for as a long as it is productive—a concept that constantly resists any final definition."

Indeed, as Sian Bayne cautions in her contribution to 'Networked Learning in 2021: A Community Definition', "[t]o define a field is necessarily to put boundaries around it, to determine which writings, conversations, people are 'inside' and which are 'outside' … [t]his is inevitable, and not a reason for choosing not to define" (Networked Learning Editorial Collective et al., 2021, p. 333). Whilst we already mentioned some early attempts at defining postdigital, there has since been more resistance to containing the concept. Thus, whilst there are good reasons for and against definitions, any broader discussion of these is well beyond the scope of this paper. For our purposes it is sufficient to say that the recent definitional articles of Networked Learning have inspired the writing of this article, thus contributing to further development of the field.

This article's topic concerns bioinformational connections, which have a much longer history than Networked Learning or Postdigital Science and Education. While this history could also easily be a research topic in its own right, we use it to quickly contextualize our research in the field.

The Great Convergence

For the most part of human history, physics and biology have followed separate development trajectories. In the eighteenth century, for instance, Isaac Newton focused on "a mechanical approach [that] analysed the physical universe as a great machine" and "the dynamical approach [that] concentrated on the mathematical relationship between quantities that could be measured" (Science Encyclopedia, 2022). At the same time, Carl Linnaeus developed his taxonomy of living species. In the early twentieth century, physics developed insights into laws governing matter, motion, and energy, resulting in many applications including the development of the computer. At the same time, biology had progressed from its nineteenth-century focus on cells towards molecular biology; a field of study enabled by various tools developed by physics such as X-ray diffraction and electron microscopy. Following the development of computers, sometime in late twentieth century, biology research had become mutually constitutive with information technology.

This brings about the so-called Great Convergence between biology and information, which has three important consequences. First, the Great Convergence "has not arrived from a sudden or artificial blend of the 'soft' or 'moist' *bios* and the 'hard' or 'cold' *techne*; instead, *techne* is an inherent feature of *bios*. To various extents, biology is digital information and digital information is biology; one cannot be divorced from the other." Second, "[t]he ability to turn biology into digital code, and then to return digital code back into biology" enables "tinkering with and actively transforming living organisms" (Peters, Jandrić, and Hayes, 2021; see also Peters et al., 2022). Finally, these developments open up many social and ethical issues. For instance, bioinformational achievements such as vaccines are mutually constitutive with sociology and psychology of vaccinations (MacKenzie et al., 2021); governments and international institutions keep a strong legislative grasp on the development of gene editing technologies to avoid negative consequences (Peters et al., 2022).

Biology, information, and society have always been interconnected. A simple, pre-digital example is a human being (biology) reading a book about democracy (information) and applying it at a ballot (society). Yet the Covid-19 pandemic, and its numerous challenges, from tracing infected persons through Covid-passports to anti-vaccination movements, have complicated and intensified these relationships in our widely digitised society. For each of us as individuals, these are changes that affect our positionality in postdigital society (Hayes, 2021). Some people have greater digital access than others to take advantage of related health or education benefits that emerge, whilst others may be positioned at a disadvantage when data is gathered on them. How individuals are placed in healthcare systems is rapidly changing, due to disruptive technologies, Internet of Things (IoT), artificial intelligence and biodigital convergence.

Narang (2021, p. 85) discusses examples of IoT in healthcare, such as 'hearables', which are new hearing aids that transform how those with hearing loss interact with the world, as they are compatible with Bluetooth and therefore can sync with a

smartphone. This allows a wearer to filter, equalize, and add layered features to real-world sounds. Such valuable benefits are not though necessarily available to those who are without the income to run a smart phone, pay for related data, or the ability or opportunity to learn the skills required, to interact with hearables. Then there are 'ingestible sensors' which are pill-sized and, when swallowed, monitor the medication in our body and warn us if they detect any irregularities. For a diabetic patient this can curb symptoms and provide an early warning. Or in the case of 'moodables', which are head-mounted wearables that send low-intensity current to the brain which elevates our mood (Narang, 2021: 85) there are clearly exciting possibilities, as well as challenges. Issues of data security and privacy for individuals needs to be balanced against the benefits of many organisations accessing healthcare analytics and tracking reports on patients. Although connectivity protocols are enabling new ways to spot and treat illnesses, integration of multiple devices across protocols requires a consensus across stakeholders. The human dimensions converge further with informational and societal concerns, as data-overload can also hamper decision-making by health professionals (Narang, 2021: 84).

These few examples, among many, demonstrate wide-reaching implications for the field of Networked Learning. Where once the focus on the 'network' may have largely involved devices, new ubiquitous computing technologies, wireless mobility and computer mediated communications, this often concerned the 'learning' of humans as they travelled and used various networks. With greater postdigital-biodigital convergence, there has been a considerable shift that requires a focus too now on how new technologies and their related data travel through people, and indeed how they in turn use humans. As such, we suggest that this presents exciting opportunities for new critical research agendas to develop in Networked Learning. These may involve reviewing ways in which the 'network' is now understood and questioning what constitutes different forms of postdigital-biodigital data-driven networks that now impact on learning. It could in turn generate dialogue on what human connectivity in education now means in this wider context. There are links to be made too with the capabilities of Artificial Intelligence systems such as ChatGPT and the multimodal release by Open AI of GPT-4,[1] which is trained on enormous amounts of data scraped from the Internet to mimic human responses to questions. When such systems will also make up information when they do not know the exact answers, new definitions may be helpful to broaden who, and what, is now involved in Networked Learning.

Preliminary Definitions

In the third decade of the twenty-first century, various aspects of human lives, including teaching and learning, are situated at the intersections between biology,

[1] https://www.theguardian.com/technology/2023/mar/14/chat-gpt-4-new-model

information, and society (Jandrić, 2021). Current research in the field is scattered across publications and its language is fairly inconsistent. Based on our previous research in the field, we now provisionally define the main terms used in the rest of this article, mindful too of our earlier comments on the value of some flexibility where definitions are concerned.

Bioinformation refers to a scientific convergence where "biology as digital information, and digital information as biology, are dialectically interconnected" (Peters et al., 2021a).

Biodigitalism is a wider perspective, that is "[t]heoretical and practical (praxis); scientific and technical (technoscience); analogue and digital (postdigital); biological and informational (bioinformational); and political and economic (bioinformational capitalism)" (Peters et al., 2021a).

Postdigital "is a wide-open position or perhaps even a worldview which encompasses various reconfigurations between technologies and humans. This applies to all kinds of technologies, including but not limited to biodigital technologies. . . . [t]he biodigital is an important aspect of the postdigital idea, but it is far from the only one." (Peters et al., 2021b).

> Viral modernity is a concept based upon the nature of viruses, the ancient and critical role they play in evolution and culture, and the basic application of understanding the role of information and forms of bioinformation in the social world. The concept draws a close association between viral biology on the one hand, and information science on the other – it is an illustration and prime example of bioinformationalism that brings together two of the most powerful forces that now drive cultural evolution. (Peters et al., 2020).

Taken directly from our recent works, these definitions are only indicative; rather than providing in-depth analyses, they merely serve to establish what we mean by defined concepts and build background for our research in this paper.

Postdigital-Biodigital Challenges in Networked Learning

Since its inception, the Networked Learning community has importantly cherished the values of openness and free access. The proceedings of all Networked Learning conferences and books in the Research in Networked Learning book series are available online, so this large body of research is easy to access and explore. Our first attempt at looking at postdigital-biodigital challenges therefore consisted of a simple search using relevant keywords such as bioinformation, biodigital(ism), biology, postdigital, and so on. This search has yielded very limited results, implying that a lot of postdigital-biodigital work in networked learning is implicit, rather than explicit. Since our 'brute-force' attempt at identifying postdigital-biodigital approaches in Networked Learning failed, we returned to definitions and theories.

Postdigital-biodigital can be found already in the first definition of networked learning:

> We define 'networked learning' as learning in which [information and communications technologies are] used to promote *connections*: between one learner and other learners, between learners and tutors; between a learning community and its learning resources. Some of the richest examples of networked learning involve interaction with on-line materials *and* with other people. (Goodyear et al., 2004, pp. 1-2)

Speaking of connections between a community and its resources, of interactions between digital materials and people, this definition exhibits a clear focus to postdigitalism-biodigitalism. Two decades later, Dohn et al. (2018) and De Laat and Dohn (2019) identified four understandings of Networked Learning, one of which is "an emphasis on connections between (human and non-human) actants – understanding learning situations as entanglements of people and things" (Networked Learning Editorial Collective, 2021, p. 316). Similar ideas can be found across a range of definitions and theories of Networked Learning, yet implicit reference to postdigitalism-biodigitalism reaches way beyond definitions. In what follows, we expand our search for postdigitalism-biodigitalism in Networked Learning research more generally.

Critical Posthumanism

A lot of Networked Learning research, especially that arriving from Edinburgh University's research group led by Siân Bayne, takes a critical posthumanist approach (see Jandrić, 2017, Chap. 9).

> Posthumanist philosophy constitutes the human as: (a) physically, chemically, and biologically enmeshed and dependent on the environment; (b) moved to action through interactions that generate affects, habits, and reason; and (c) possessing no attribute that is uniquely human but is instead made up of a larger evolving ecosystem. There is little consensus in posthumanist scholarship about the degree to which a conscious human subject can actively create change, but the human does participate in change. (Keeling & Nguyen Lehman, 2018)

Indeed, (human and non-human) agency is a prominent question that situates Networked Learning research in the broad area of sociomaterialism. However, Networked Learning is not a passive recipient of these theories; over the years, Networked Learning research has significantly contributed to theory and practice of sociomaterialism and critical posthumanism beyond its immediate focus to learning.

One such example arrives from the works of Chris Jones, who argues that the Networked Learning

> outlook remains broadly sociomaterialist in that it continues to conceptualise knowledge and capacities as being emergent from the webs of interconnections between heterogeneous entities, both human and non-human. However, it differs from the strong readings found in ANT and post-humanism in that the author argues that all actors cannot be treated as completely symmetrical for research purposes because of the particular access that we have to accounts of experience from human actors. (Jones, 2018, p. 51)

Indeed, Actor Network Theory (ANT) is often used in networked learning research; in turn, insights developed in the context of Networked Learning have significantly influenced ANT in works published beyond the Networked Learning community

(e.g., Royle, 2021). With such a flow of understandings crossing theoretical boundaries it is timely that Braidotti (2019) has called for a theoretical framework for the critical posthumanities to incorporate new fields of transdisciplinary knowledge. Networked Learning is well positioned to contribute to this and at the same time to develop any more explicit interconnections with bioinformation, biodigitalism, postdigitalism and viral modernity.

Learning Spaces

Another significant area of Networked Learning research inseparable from the postdigital-biodigital challenge are learning spaces.[2] The acknowledgement of 'in between' spaces and their importance in changing patterns of learning both online and offline, but also in classrooms, buildings, campuses and the city are viewed by some in terms of a 'networked learning landscape' (Nordquist & Laing, 2015). Multiple interconnected aspects of life align with changing curricula. We would add to this some considerations of converging disciplines across curricula too, as these alter in postdigital-biodigital society. It becomes important, as we discuss changing learning spaces, to also consider the role of places, and indeed time. Networked Learning takes a holistic approach in seeking to understand what occurs for individuals who are learning across complex and dynamic contexts. Time in these spaces can no longer be considered in only linear, commodified patterns, which in turn requires new forms of writing educational policies that do not separate technology from human labour, in all of its intimate spaces and forms (Hayes, 2015).

Language and Terminology

Language and terminology, underpinned by global, neoliberalist values, has also been an ongoing concern for Networked Learning scholars. What is assumed and written in policies for technology, as applied in educational contexts, has human and material consequences that are realised in workloads and health issues if the time and labour involved is not acknowledged. Uncovering such forms of deception through linguistic analysis is one way to explicitly "restore our human visibility" (Hayes, 2016). This becomes important amid the realisation that many of our global concerns about sustainable means of production in industry are echoed in practices within increasingly marketized education. Yet change could be on the

[2]Latest research in the field can be found in *Postdigital Science and Education, 4*(1), which is a Special Issue on 'The Postdigital Learning Spaces of Higher Education', edited by prominent members of the Networked Learning community, James Lamb, Lucila Carvalho, Michael Gallagher, and Jeremy Knox. https://link.springer.com/journal/42438/volumes-and-issues/4-1. Accessed 28 January 2022.

horizon as the neoliberal economic model becomes challenged by 'advanced biodigital developments and principles of bioeconomy'. These require education based on environmental self-renewal, rather than consumer consumption' (Peters et al., 2021b). Additionally, any shift in economic ethos and practices requires too sustainable education and indeed policy that discusses the diverse positionality of humans honestly in postdigital-biodigital society (Hayes, 2021).

Why Focus to Postdigital-Biodigital Challenges in Networked Learning? And Why Now?

Networked Learning is a philosophy, a research approach, a rich set of diverse practices, an "educational paradigm" (Jones, 2018), and much more. However incomplete, our overview of Networked Learning research suggests a long history of deep and successful engagement with postdigital-biodigital challenges in theory (critical posthumanism, sociomaterialism, learning spaces, linguistics, etc.), practice (ANT etc.), and definitions old (e.g., Goodyear et al., 2004) and new (Networked Learning Editorial Collective, 2021; Networked Learning Editorial Collective et al., 2021). Explicit references to the postdigital-biodigital challenges in the theory and practice of Networked Learning are scarce, yet implicit references are almost omnipresent. We would go as far as to say that postdigital-biodigital challenges lie at the very heart of Networked Learning, and that the Networked Learning community has made a considerable global contribution to researching these challenges. So why 'discover the wheel' and focus to things that are already here? And why do that now?

Scholarly research is always closely related to its *Zeitgeist* – and these days, our *Zeitgeist* changes in a blink of an eye. Looking for example(s), the archive of books of proceedings following 13 Networked Learning Conferences[3] does not merely present the development of Networked Learning research; it also displays different interests, and different foci, of the community in different historical periods. In 1998 the community was focused to lifelong learning; in 2002 there was a lot of talk about communities of practice; 2010 surfaced a plethora of issues related to globalisation, interculturality, and international development; 2016 was felt as the right time for reflection and 'looking back – moving forward'. Since 2020, obviously, the (narrowly defined) topic of the day are various questions arising from the Covid-19 pandemic, and looking more generally, the postdigital-biodigital challenge. As the community, and indeed the whole world, struggles to make sense of our pandemic moment, it is important to emphasize that this research does not start from scratch and there is a lot of excellent earl(ier) Networked Learning research that can help and support our efforts.

[3] See https://www.networkedlearning.aau.dk/past-conference-proceedings/. Accessed 24 January 2022.

Convergence

One such early example is the notion that Networked Learning itself "can be considered the outcome of convergence" (Jones & Steeples, 2002, p. 3). Perhaps this was somewhat prophetic in nature when, 20 years later, we can notice and discuss "the technoscientific convergence that is taking place with biodigital technologies in the postdigital condition" (Peters et al., 2021b, p. 1). Today's research arrives under various names and labels such as bioinformationalism, biodigitalism, postdigitalism, viral modernity, and others. These new (and newly popularized) terms are not mere linguistic exercises, as they point towards previously unseen or much less relevant phenomena. Let us quickly examine what is brought by concepts defined at the beginning of the chapter to notice longstanding connections with earlier discussions of convergences of telecommunications, digital computer and information technologies, distance and place-based learning and resulting hybrid forms (Mason & Kaye, 1990).

The concept of bioinformation has a long historical tail: more recently, it has already been researched well beyond Foucault in fields such as mobility studies (Traxler et al., 2021). Yet the introduction of Covid-passports with citizens' biodata has opened up a plethora of questions at the intersections between bioinformation, privacy, freedom, and human rights (Zuboff, 2019). While we could research these developments without using the word bioinformation, the concept does focus our attention to these new developments and concerns.

Biodigitalism expands this focus in various directions, most notably to recent transformations sometimes called bioinformational capitalism (Peters, 2012). Indeed, social science research into Covid-passports must acknowledge the fact that copyrights and production lines for most currently available vaccines belong to the corporate sector. While this does not imply, by any means, validity in this or that Big Pharma conspiracy theory, critical research must, among other leads, also follow the money and criticize the social system (Peters, 2020).

Postdigitalism speaks of general relationships between humans and technologies and is well-suited for the bioinformational / biodigital mesh-up between the digital and the analog. Asking important questions such as those pertaining to human nature (Savin-Baden, 2021), postdigitalism links questions of our day to eternal (human) concerns.

The concept of viral modernity is of a different order of magnitude. Viral modernity can hardly say anything about ontology or epistemology, as it predominantly focuses to concordances between the 'behavior' of information and viruses. Yet the question of post-truth and fake news, which is bioinformational, biodigital, and also postdigital, is a burning issue of today – and the concept of viral modernity, amongst others, can help us shed a fresh light on it (Peters et al., 2020; Peters & Besley, 2021).

Conclusion

This paper shows that Networked Learning has always had a strong yet implicit focus to postdigital-biodigital challenges. With the advent of the Covid-19 pandemic, however, these challenges have been brought to the fore and have developed in various practical directions such as Covid-passports that illustrate our biodigital encounters. Then there are the Open AI systems of ChatGPT and its multimodal release of GPT-4 that illustrate bioinformation and viral modernity. Networked Learning has a lot to offer to current research in these and the other fields we have discussed; listing its main contributions, and linking them explicitly with the challenges of our day, will be of practical help to researchers. The role of convergence is an important and sustained concept that can help in breaking down perceived barriers to developing cross-cutting research in any of the areas discussed in this paper: "The use of networked information technologies has blurred the boundaries between the methods used in both forms of education and the clienteles they address" (Jones & Steeples, 2002, p. 3).

Today's popular concepts connected to convergence, such as bioinformation, biodigitalism, postdigitalism, critical posthumanism and viral modernity – many of which have arrived well after Networked Learning – are at the same time closely linked to, and distinct from, Networked Learning. As de Laat and Dohn wrote (2019: 19) in a recent article, "the question *Is networked learning postdigital education?* is far from rhetorical, and the answer certainly is not no. Neither is it, however, a clear yes" (emphasis from the original). Definitional questions remain well beyond the scope of this article, yet our research indicates that these concepts do help us to focus our research efforts and should be embraced in the theory and practice of Networked Learning research.

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Chapter 4
Open Is Not Enough: Designing for a Networked Data Commons

Anna Wilson, Hannah Hamilton, Greg Singh, and Pat Lockley

Abstract Recently, researchers within the Networked Learning (NL) community have tried to (re)claim NL's roots in critical pedagogy and (re)assert its commitment to social justice. However, NL has also been criticised from within for not adequately or explicitly addressing power dynamics and structural inequalities. There is a perception that NL needs to network itself with more emancipatory agendas and movements to develop a more political and ethical agenda of its own. In this chapter, we attempt to network Networked Learning with Open Data through the concept of a networked data commons, using the example of open data relating to waste and waste management in Scotland. We explore some of the challenges of designing technologies for Open Data and reflect on how these challenges relate to the need for a design approach that explicitly recognises the different kinds of lives and persons that may co-operate through a convivial technology. In this context, we plug NL into a theoretical and methodological design assemblage that connects concepts of openness, data literacy, (de)coloniality, and participatory. Finally, we consider how the approaches we have been developing might benefit research that informs the design of networked learning technologies.

Keywords Open data · Commons · Network · Decoloniality · Phenomenography · Values · Convivial technologies · Design

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Introduction

Recently, researchers within the Networked Learning (NL) community have tried to (re)claim NL's roots in critical pedagogy and (re)assert its commitment to social justice (Networked Learning Editorial Collective, 2021a, b). However, despite these avowed intentions, NL has also been criticised from within for "fail[ing] to take account of emancipatory struggles and political imperatives in society more broadly" (Networked Learning Editorial Collective, 2021b, p. 328). A tendency to fixate on collaboration, co-operation and collective inquiry, trusting relationships, shared challenge and so-called "convivial technologies" (Networked Learning Editorial Collective, 2021a) risks "a collapse into pure process, a fetishization of interaction for its own sake, even a new version of what Biesta (2012) calls 'learnification' (Networked Learning Editorial Collective, 2021b, p. 328). The suggestion is made to put NL "to work . . . to allow the concept of NL itself to become 'networked': to make connections, to interrelate, to transform, mutate, and hybridise in response to the pressing issues of our time" (Networked Learning XE "Networked learning" Editorial Collective, 2021b, p. 359).

This chapter takes the notion of "convivial technologies" (Gauntlett, 2013; Goodyear, 2020; Illich, 1973; Singh, 2018), where the root meaning of *living-with* is as important as the connotation of being fit-for-a-feast, and applies it to the context of designing a networked data commons. We align ourselves and our thinking with Illich's (1973) assertion that:

> People need not only to obtain things, they need above all the freedom to make things among which they can live, to give shape to them according to their own tastes, and to put them to use in caring for and about others. (para. 5)

In this perspective, convivial tools are devices and technologies that people can work with to achieve these goals, in contrast with industrial tools that have affordances and uses prescribed by designers or expert others. The research described here emerges out of work the authors have engaged in as part of the Data Commons Scotland project, which attempted to design an open data-based informal digital learning environment that could be a place where knowledge can be shared and circulated and where people encounter knowledge in ways that enable them to think, understand or act differently. In the following, we plug NL into a theoretical and methodological design assemblage that connects concepts of openness, data literacy, (de)coloniality, and participatory design into new formations that will allow these concepts to mutate and hybridise into something closer to the social justice ideals and convivial tools that NL aspires to, thereby transforming the active space of NL as a field to engage questions of conviviality more proactively.

To set the scene, we first explore some issues relating to Open Data and the Open Data movement. We then draw on concepts from the recent decolonial turn in critical digital studies and the related field of human-computer interaction (HCI) research and design, and consider the ways in which designers of convivial technologies must resist colonising tendencies. We show that aspects of the coloniality that has been identified as underpinning corporate Big Data and technical design practices are also

present in and reproduced by Open Data narratives and practices. In order to resolve some of these implicit colonising (and sometimes paternalistic) tendencies, we need to go beyond the simple and singular notion of *open* data to develop more nuanced, context-dependent conceptions of multiple sociotechnical data-human assemblages. We mobilise De Angelis's (2017) description of a commons as an (eco)system comprised of common goods, commoners and social relationships as a way of conceptualising these assemblages, and suggest ways in which core concepts from NL can be adopted and adapted in thinking about their design. We then apply these ideas in relation to the design of a networked data commons intended to serve the particular purpose of increasing the circulation, production and valorisation of data relating to waste management (including recycling and diversion through reuse) within Scotland.

Open Data, Data (De)Colonialism and a Networked Data commons as a Convivial Technology

Data come in many forms, from the bioinformatic data encoded in genes and expressed by proteins to data constructed by people and machines to measure, categorising or otherwise analyse with the intention to describe, explain and/or predict. The Open Data movement concerns itself with this latter type of data and thus in the remainder of this paper, we use the term data in this way. Open data are most often quantitative, e.g. statistical data, geographical information systems or other location data, digital footprint data, or other individual data records such as health and education data.

While it is likely that most people are now generators of these kinds of data,[1] many remain excluded from the production and evolution of both digital technologies and data sets or collections. Control of these processes lies predominantly in the hands of large corporations and governments. For many, relationships with data in particular are characterised by an imbalance of power, and the ubiquitous generation and use of data may seem a threat to agency and empowerment rather than an opportunity. Efforts have been made to counter this through both the Open Data movement (see, e.g., Davies et al., 2019) and participatory and co-design movements (see, e.g., Simonsen & Robertson, 2013); however, more recently, critical digital studies have begun to undergo a "decolonial turn" (Alvarado Garcia et al., 2021; Couldry & Mejias, 2021; Cruz, 2021), which attempts to articulate and resist the re-productive tendencies of existing data and HCI practices.

[1] It is estimated that in November 2022, over 6.6 billion people use smartphones – >83% of the world's population – see https://www.bankmycell.com/blog/how-many-phones-are-in-the-world

Open Data and Its Discontents

The Open Data movement has long sought to make data more accessible in order to foster economic and social well-being (Shirky, 2010), as well as business innovation and productivity (Jenkins et al., 2013). Open Knowledge International links data and knowledge through their definition of Open Data: "Knowledge is open if anyone is free to access, use, modify, and share it – subject, at most, to measures that preserve provenance and openness" (Open Knowledge Foundation, n.d.). Open Data advocates assert that making data openly available will create new opportunities for economic activity, improve transparency and governance, and empower people to live in more creative and sustainable ways through increased knowledge. Within this perspective, data are described as:

> a public good that enables the creation of a wide range of products and services. All sectors of our economies, at the local, national, and global level, rely on it. Roads help us to navigate to a destination; data helps us to navigate to a decision. (Dodds & Wells, 2019, p. 260)

The Open Data movement has been at least partially responsible for local, national and international agreements that commit governments and organisations to publishing data openly, such as the Helsinki Region Infoshare (Helsinki Region Infoshare, 2011), the Scottish Government Open Data Strategy (Scottish Government, 2016) and the G8 Open Data Charter (G8, 2016). As a result, large quantities of data are now being produced by many organisations and published openly online. Yet despite several years of effort, the extent to which these data are genuinely open to critical and creative interaction remains limited. It may be that it is too simplistic to assume open publication of data will automatically lead to increased and democratised data use (Janssen et al., 2012). Data may be hard to find, use or trust (Meijer et al., 2012), leading to what has been described as the myth of public reuse of government data (Hellberg & Hedström, 2015). Even strong supporters of the Open Data movement recognise that there are problems: "at the moment, too much of our data infrastructure is unreliable, inaccessible, siloed, or can only be used if you can afford access" (Dodds & Wells, 2019, p. 261). As a result, "[d]ata innovators struggle to get hold of data and to work out how they can best use it, while individuals do not feel that they are in control of how data about them is used or shared" (ibid.).

More fundamental critiques have also been levelled at both the practical enactment of openness and the movement's political and philosophical underpinnings. Kitchin (2013) outlined four critiques of Open Data, including two at the level of practical enactment, in relation to funding and sustainability, utility and usability; and two at the level of politics and philosophy, in relation to "the politics of the benign and empowering the empowered" (n.p.) and an inherent neoliberalisation and marketisation of public services. We can connect these critiques to some of the issues identified above; funding and sustainability may be part of the reason for infrastructure unreliability, utility and usability clearly depend on access, the reference to "data innovators" suggests Kitchin's empowering of the empowered, and the discourse of innovation links strongly to that of neoliberalism and marketisation.

Perhaps because the Open Data movement has historically drawn on elements of both technological libertarianism and neo-Marxism, the concept of Open Data has a sometimes tense and ambivalent relationship with notions such as private ownership and the market. As Lund describes, there is:

> a central ideological lacuna in absent discussions of unconditionally opened-up resources that strengthen the accumulation cycle of capital. This logic favours the negative freedom of closed business models in the competition with open ones that could foster more positive notions of freedom, although open business models are generally advocated and commons are mentioned as desirable. In a dominant ideological formation, openness is used to promote its opposite in the economic field. (Lund, 2017, n.p.)

It is concerns such as these that lead Lockley to ask if "openness tend[s] towards serving a hegemonic public while claiming to work for everyone?" (Lockley, 2018, p. 146) and to suggest that "open" has come to "[function] like 'green', 'fair trade' and 'free range' as both a marketing term and an exclusionary term" (ibid.). While perhaps better than nothing, openness, as it currently stands, seems to be no guarantee of a democratising, let alone convivial, capacity.

Digital and Data (De)Colonialism

Narratives and critiques of openness have circulated within critical digital studies for some years now, but it is only recently that the field has started to take a decolonial turn. This has begun with a recognition that data and digital technologies may enact new forms of coloniality in the form of data practices, and particularly Big Data practices. Critiques of coloniality have largely focused on proprietary data (what might be thought of as *closed* data) and the acquisitive and exploitative actions of corporations. In their recent work, Couldry and Mejias:

> insist on an explanatory model for Big Data practices in which colonial extractivism remains a real, not metaphorical, feature of capitalist accumulation . . . the extraction of value through data represents a new form of resource appropriation on a par with the landgrab (the seizure of land, resources and labor) that kicked off historical colonialism (Couldry & Mejias, 2021, p. 3)

Thus the trope of data as "the new oil" is instead replaced with data as the new Dark Continent; data practices are seen to divide and striate rather than bring together in conviviality. But digital coloniality does not just reside in data harvesting or extraction practices; it is also potentially present in the ethical-political agency of sociotechnical systems (Introna, 2014; Wilson & De Paoli, 2019; Winner, 1980). In the field of HCI, a recent manifesto aims to help HCI researchers and designers avoid coloniality, and to open up the discipline so that it can operate in a 'world of many worlds'. (Alvarado Garcia et al., 2021, p. 8). Stressing the importance of "land" (understood both literally and metaphorically), the authors of this manifesto recognise the complex ways in which designers of sociotechnical systems embody their own relationship with land and territory, which "shapes our way of making sense of

and being in multiple world(s), as we are walking contradictions … [and which] materializes itself in our everyday life experiences, expressing itself in ever-changing questions of belonging and identity" (p. 4). This leads to a further awareness of the complicity of designers in both extractivism and in the design of systems that perpetuate particular political and power relationships, and (exploitative) forms of work, "unknowingly reproduce[ing] standards and processes that follow a capitalist logic (problem solving, evangelizing UX, designing for universalism, etc)" (p. 5), or in other words, perpetuating forms of being together that deny some the chance to live to their full potential in order to maximise the benefits to others. In a move that essentially asks HCI professionals to reflect on and critique assumptions about the 4W1H/5W1H design processes, the manifesto urges people working in the field to follow five pathways to decoloniality: Understanding The Why, Reconsidering The How, Changing The For Whom, Expanding The What and Reflecting on The What For (p. 4).

Cruz (2021) makes some similar points in relation to the Philosophy of Technology. Asserting that "Western Modernity keeps imposing itself through a triple mutually reinforcing and shaping imprisonment: coloniality of power, coloniality of knowledge, and coloniality of being" (p. 1847), Cruz suggests that "technical design has an essential role in either maintaining or overcoming coloniality" (ibid.). He goes on to develop principles for both reflexivity and effective co-production with usually marginalised/subalternate communities – steps that seem to us to be essential to the design of convivial technologies. Cruz concludes that "[a]cknowledging and nurturing care (as labor/work, affect/affections, ethics/politics)" (p. 1862) should be sociotechnical design's first and non-negotiable principle.

Open Data Advocates: Decolonisers or Missionaries?

The decolonial turn in critical digital studies has, to date, tended to focus on the extraction of value from, and the disempowerment of peoples within, the Global South by companies that are largely based in the Global North (including the USA and China). However, it is not only people in the Global South whose data feed the mills of data-capitalism. Any people or communities who contribute to but are excluded from control of these processes might be considered marginalised or subalternate – inferior in status and power to those who both control and profit from data, existing alongside, rather than living-with. These are precisely the problems associated with the openness enacted by the Open Data movement.

As noted above, positive narratives of Open Data often include "data innovators" and other holders of specialist, expert knowledge who hold the keys to activating that value. As some of the advocates of Open Data suggest, "the success of open data efforts is heavily dependent on the existence of an ecosystem of actors focused on driving the use of data through all aspects of society" (Dodds & Wells, 2019, p282). Implicit in this is a belief that this "ecosystem of actors" knows what is best for society and has the right to "drive" whatever they believe this to be through society.

There is no acknowledgement that a lack of enthusiasm for (and even resistance to) increased data uptake and use may be valid, or may be related to the ethical-political values embedded in and enacted by Open Data-based sociotechnical systems. Indeed, as Lockley points out, "in every form of openness we have seen a tendency to an apolitical, almost ignorant nature, and a tendency to production from the global North" (Lockley, 2018, p. 159). The togetherness that this promotes is one in which we all seek to profit, and to profit from data.

Similarly, solutions to the problem of trust (both in data and in the use of data) that have been proposed from within the Open Data community assume an uncomplicated and uncontested set of ethical-political, as well as use and exchange, values. Although there is a welcome acknowledgement that increasing levels of trust requires that the "the whole data ecosystem … build ethical considerations into how data is collected, managed, and used in order to ensure equity around who can access and use data and how the benefits are distributed" (Dodds & Wells, 2019, p. 267), little attempt has been made to explore (let alone challenge) precisely whose ethical considerations (and therefore judgements about values and valorisations) might come in to play. Indeed, although there is some recognition that there is more than one type of value, this has tended to be limited to the duality of use and exchange values, rather than ethical, political, social, aesthetic or other types of value. There is also little recognition of the cultural, geographical, and contextual contingency of value judgements and valorisations.

Thus, while proponents of Open Data may oppose the hegemony of Big Data corporations and closed government data – in the decolonial perspective, the new colonial powers – they often do so by encouraging more widespread diffusion and uptake of values and practices that characterise these powers. Even those Open Data projects that explicitly seek to decentralise data practices, such as Tim Berners-Lee's Solid project[2] or projects using distributed ledgers to achieve networked consensus have an explicit aim of giving data ownership back to individuals. When we think about how a commons is governed, the romanticism expected seems not to support the idea of a dictator.

Such efforts are also often characterised by what Lockley (2018) called Founding Fathers, a tendency that further embeds a somewhat paternalistic benevolence that is not far from the perspective of the well-meaning, *improving* coloniser (we brought them the railways, after all). Indeed, an open source project, such as WordPress (which claims to power over 40% of websites[3]) can change description from being a commons, to being a community, to being an ecosystem. The roles a person can take on in these descriptors are different, but within an ecosystem, some persons are inevitably eaten and/or die. Like many large, older, open source projects, WordPress is effectively controlled by one person – a trend has led to the term 'benevolent dictator for life'.[4]

[2] https://solidproject.org/about

[3] https://wordpress.org/40-percent-of-web/

[4] https://en.wikipedia.org/wiki/Benevolent_dictator_for_life

Whatever form the open data system takes, people are generally encouraged to become more data literate: to be educated into the data practices that allow Big Data corporations and similar actors to grow in power and profit. They are encouraged to find ways to extract economic and political value out of the data that have (graciously) been made available to them. That is, data literacy is framed within a broader Open Data advocacy discourse that embodies *libre* notions of choice in relation to the use and reuse of data; however, the conditions of that choosing are limiting and circumspect. People are encouraged to take corporations and governments on at their own game, rather than to play a different game altogether. Thus despite good intentions, some Open Data advocates might be compared to the missionaries of the recent Western colonial era, attempting to bring enlightenment to the ignorant and benighted, rather than learning about and from their perhaps different perspectives on the potential values of and relationships with data – that is, their own data cultures.

In contrast, it has previously been argued that designs for sociotechnical systems could (and perhaps should) start by recognising a plurality of values (Wilson et al., 2018). A crucial element of *decolonial* and *convivial* sociotechnical design approaches would therefore surely be to recognise not only that the perspectives of the usually marginalised or subalternate matter and can be understood, but also that they are themselves plural. Approaches that avoid (or at least attempt to avoid) slipping into binaries of us-and-them, of majority-and-other, need to be developed.

A Data Commons as a Learnable, Networked Assemblage

A more productive and less colonial approach to democratising data and developing data systems that allow for and promote difference-respecting conviviality may thus need to start by recognising that value, of whatever kind, is an emergent property of human-data-practice assemblages held together by social/sociotechnical relationships that depend on a range of different kinds of value. Such assemblages can be compared to contemporary conceptions of *commons,* in which culturally and contextually contingent but critically important social relationships and values are central features.

De Angelis (2017) describes a commons as an assemblage of common goods, people and the relational values that connect them. In his view, the common goods that define and are cultivated within a commons have "a use value for a plurality" but that simultaneously a plurality must "[claim and sustain] the ownership" of those common goods (p. 31). Common ownership is claimed and sustained by

> the creation of relational values, that is, values that select the 'goods and bads' of social action while at the same time sustaining and (re)producing one another, social relations, social practice and the ecology in which social practice is embedded (De Angelis, 2017, p. 31)

A commons as a whole is then a social (or sociotechnical) system of commonly held resources and a community of subjects who "engage in communing" (p. 90), controlling the system so that the resources are sustained and the community is reproduced. Importantly, communing is defined as "doing in commons that has a direct relation to the needs, desires and aspirations of the commoners" (ibid.) and as "a social process embedded in particular values that defines a sharing culture in a given time and context, through which they reproduce resources and the community that comprises them" (p. 104). That is, the relational values that connect up the components of the commons assemblage are related to the different ethical-political values held by the commoners. It is important to note that these are *created* through the interactions between commoners and common goods within the commons, rather than pre-determined or externally imposed. In the context of a data commons, this allows for values and valorisations of data to emerge through interactions with data, rather than inhering in the data themselves.

The concept of commons offers a way of recognising both the critical importance of different values and valorisations of data, and their contingent, emergent nature. However we also wish to avoid the "romanticism of the commons" (Lockley, 2018, p. 155); a commons is not an intrinsically democratising or emancipatory assemblage, as its nature and evolution will be determined by dominant values and valorisations. A commons in which commoners act to sustain their community by excluding anyone with different culture or values will be an exclusionary, xenophobic and potentially racist commons. In the context of a deliberately designed data commons, we (the designers) have the opportunity to design features into the system that encourage, constrain or discourage particular values and valorisations; we set out to find ways to design a system that is convivial without erasing difference.

Networked Learning in a Data Commons

Perhaps the importance of the notions of relational values, commoners and communing, and learning through connectedness (Networked Learning Editorial Collective, 2021a) can best be realised through the development of convivial technologies that enable a broad range of students to be producers (Carmichael & Tracy, 2020; Neary & Winn, 2009). In their exploration of the role of open, linked data in NL, Carmichael and Tracy (2020) describe student production as "participation in the co-production with others of new material, digital and knowledge artefacts and networked assemblages" (p. 120). Replacing student with the more general term learner, there is a connection that can be made between the data commoner who produces and sustains a data commons through interactions with data and other commoners, and the learner who co-produces through interactions with resources and other learners. Both are critical actors in the effort to achieve conviviality.

However, these NL ideas need to be plugged into (or refracted through) additional conceptions, in order to avoid normalising and totalising conceptualisation of value.

For example, within the NL community, it has been suggested that "new forms of production, including the production of knowledge, be reoriented towards the use value, rather than the exchange value, of what is produced, resisting the tendency . . . for relationships between suppliers and users of knowledge, particularly in digital environments, to assume the same forms as has existed around other forms of commodities" (Carmichael & Tracy, 2020, pp. 118–9). As well as reinforcing a relatively narrow conception of data as commodifiable and therefore inherently quanitifable, this echoes the limited conception of value and valorisation identified in our discussion of Open Data above, as well as reinforcing categories such as supplier, user and commodity. Indeed, Carmichael and Tracy (2020) themselves note McLaren and Jandrić's (2015) critique suggestion that educators (or in our case, sociotechnical system designers) need to recognise and resist the appropriation of technological developments by capitalism, and to develop alternatives.

Carmichael and Tracy (2020) suggest that where Open Data are used in a networked learning assemblage, there is a need to better understand literacies in the context of both data production and data consumption. This may be an important distinction in considering the design of a data commons, where commoners create and share, as well as make use of, data. Here, we understand digital literacies as situated, nuanced and networked practices (Gourlay & Oliver, 2016), not as a set of technical statistical, numerical and representational skills.

The Data Commons Scotland Project

All this begs the question: how can those with privileged access to funding, data, expertise and time (e.g. academics, data scientists, IT professionals, UI/UX specialists) design a sociotechnical data ecosystem that creates or enacts a networked, decolonial and convivial data commons? We believe that this requires the recognition that data commoners are essential to the maintenance and production of the commons, and that potential commoners will need and want to make sense of data on their own terms, in ways consistent with values of all types (political, ethical, aesthetic as well as use and exchange) as they emerge and evolve within the commons. That is, we require technologies that not only facilitate conviviality between people, but also between people and data.

In the Data Commons Scotland project, we have been exploring the question of how to design such a system in practice. Recognising both the importance of relational values to a commons and the non-value-neutral character of technology, we start with an explicit articulation of the values that we, as designers, bring to the project. We value equity and sustainability above economic productivity; we value knowledge sharing but at the same time value being able to put limits on what is shared; we value a plurality of perspectives as a way of enhancing our own understanding as well as that of others; and we value capacities to exercise judgement, make decisions and take actions that align with our values. As a result, we aim to create a sociotechnical system that not only enables access to, but actively

encourages increasingly sophisticated and critical use of, ownership of and production of (open) data.

We also recognise the plurality and contingency of commons and as such, recognise that principles for the design of one data commons will depend (to a greater or lesser extent) on the "topic" or focus of the commons and the nature of the data that pertain to this topic – that is, on an initial category decision that identifies what will count as data-of-interest. For Data Commons Scotland, we have chosen data on Scotland's waste, including diversion of waste through recycling and reuse. We have chosen data from the waste sector for the following reasons: (i) waste data may be produced and published by many actors (e.g. government, companies, public authorities, third sector organisations and individuals); (ii) a focus on sustainability, the reduction of pollution and the circular economy is consistent with our own values; (iii) waste data may have a range of values or be valorised in different ways by different people, including (but not limited to) value as a means of better understanding our environment and society, value in terms of holding waste producers and/or authorities to account and value as a potential expeditor and even creator of circular economic activities. Our challenge is to find ways to connect disparate sources of data together as linked common goods in a networked commons designed to be inclusive to non-experts; and to design a sociotechnical system that not only meets the existing needs of multiple users, but also recognises and builds on their capacity for learning – a truly convivial technology.

Designing for Conviviality Means Designing for Many Users

The first step in designing a convivial tool that might support and sustain a data commons must be an exploration and attempted understanding of the different actors who might animate it. We began our co-research and design by engaging with a range of potential contributors to or actors within the putative commons. These included people and organisations that already publish data relating to Scotland's waste stream: at present, predominantly SEPA, the Scottish government statistics unit and local authorities. They also included people and organisations that do or might productively interact with waste data, such as waste data specialists, local government, recycling companies, environmental consultants, teachers, librarians, third sector organisations, environmental activists and private citizens with no particular prior interest in waste. To ensure ongoing growth of the commons, we also consciously attempted to include people and organisations that might be able to add new data to what is already available – that is, to re-produce and create common data goods.

We drew on approaches from the traditions of participatory and co-design (Simonsen & Robertson, 2013), with in-depth, semi-structured interviews informing the creation of design personas and scenarios. One of us had previously developed a phenomenography-based approach to creating design personas and scenarios that

put ethical and political values at the centre (Wilson et al., 2018); we further refined this approach here to extend the range of value-types we included.

Initially, we conducted 29 interviews with a broad range of participants as described above. In addition, we engaged over a more extended period with three non-profit organisations working in the reuse sector. This co-design work has enriched and strengthened our own appreciation of the different relationships with and valorisations of data that such organisations (and people more generally) might have. In all three cases, individuals in coordination or management roles identified significant ways in which the collection and presentation of data about their own organisation's activities is important to them. In a somewhat ironic echo of academic life, the biggest driver here is funding, and particularly short-term, project-based grants. Two of the three organisations have no core funding and one has only limited ongoing funding; all must therefore continually engage in funding-seeking activities. In the contemporary era of accountability and transparency, engaging in something that is in some ways self-evidently worthwhile as a social and community good, such as reducing food waste and providing a community food service, or reducing the disposal of furniture and white goods in landfill and simultaneously making such goods available cheaply within the community, is no longer enough. Instead, organisations such as these must *account* for the economic and social good they create, and increasingly also the CO_2(e) emissions they avoid. There is an imperative to count and weigh, to apply carbon-equivalence formulae, and to serve up numerical data to potential and existing funders.

In total, we conducted 32 interviews that were intended to explore what people would want and value, as well as pre-existing capacities, in relation to a digital platform focused on Scotland's waste data. The "data" generated in the interviews are inevitably refracted through our own understanding and value-relationships. These data were analysed by two of the authors (ANW and HLH) using the methods of phenomenography (Åkerlind, 2005), which explicitly embraces variation rather than seeks to define typical or average experiences and understanding. This approach was chosen in an attempt to retain the plurality of experiences of and attitudes to both waste and data that the interview participants expressed. We thus sought to allow what might otherwise be considered the subalternate perspectives of people who are not and, importantly, *do not wish to become* data or waste experts to be active design considerations.

The interviews revealed a range of perceived, anticipated and imagined values or valorisations of waste data and interactions with such data. Interestingly, discourse about the potential economic exchange or use value of waste data was almost entirely absent. Instead, interviewees described accessible data on Scotland's waste as being of value in order to expand one's own knowledge; acquire knowledge to inform one's own decisions and practices relating to waste and resources; acquire knowledge to persuade others to change their practices; to improve existing waste management processes; to create novel processes and solutions; to hold authorities to account; and to empower others to hold authorities to account. For some, though, the dangers of unintentional misinterpretation and even intentional misuse or misrepresentation outweighed the potential values of data use.

Our third sector organisation participants, in particular, expressed ambivalent and sometimes tense value-relationships with their own data, as unfavourable power dynamics forced them into particular and often performative behaviours. Despite this, all three organisations displayed a genuine desire to collect and curate their data "well", so that the data they acquire and re-present communicates the various goods they believe they are achieving, as well as in order to demonstrate carbon-reduction commitments that are conditions of their funding. In this sense, parallels can be drawn with the NL concepts of students as collators, assessors and producers of knowledge resources. Staff and volunteers with varying degrees of confidence and interest in data and digital systems are already enrolled in "hybrid set[s] of reconfigurative practices . . . the creation and coordination of socio-material assemblages, involving acquisition, curation, destruction and creation" (Carmichael & Tracy, 2020, p. 128) of texts in the form of paper-based records, spreadsheets, and digital documentary reports.

As is conventional in phenomenographic-inspired research, the analysis was synthesised into an "outcome space" (Åkerlind, 2005), in which experiences and understandings relating to waste and open data are represented by a series of different dimensions, within which we observe qualitative variation. The dimensions we identified included some that related to personal ethical-political stances and perceived capacities including values, sense of agency and aims; some that related to trust; some that related to data use; and some that related to perceptions of the potentials of Open Data. Comments and discussions within the interviews suggested varying degrees of awareness and nuance within each of these categories, which we characterised as ranging from no or very limited awareness of issues; awareness but with an assumption that simple solutions could be found, often at the level of the individual; recognition of some complexity but a belief that we already have the knowledge to find solutions; a belief that creativity and innovation are needed to develop new knowledge and solutions; to a recognition that structural issues need structural solutions. In some dimensions, we also saw that awareness of complexity sometimes leads to a focus on risks. Table 4.1 shows an extract from the complete outcome space to illustrate this variation.

These findings re-emphasise the challenge of designing in the face of tensions imposed by the knowledge and agency-seeking valorisations expressed by all our participants, and the competitive and new managerialist contexts people may find themselves in, particularly if they work in EPA, local authorities or the third sector. In order to shape the design process, we created six personas and associated scenarios[5] that reflect the complexities of potential waste data commoners lives and, in particular, their values and interests (Wilson et al., 2018). Recognizing that our interviewees sometimes expressed simultaneously utilitarian, optimistic and sceptical perspectives on both data and openness, the scenarios emphasise that engagement with the platform might be driven by more than one interest, and that

[5] The personas and scenarios can be accessed on the project's website at https://campuspress.stir.ac.uk/datacommonsscotland/resources/

Table 4.1 Extract from the phenomenographic outcome space showing variation in relation to sense of agency, aims and values, the potential power of open data, and potential difficulties with making data open

Dimension of experience / variation	No or very limited awareness of issues / factors, focus on individuals	Aware of some issues but imagines simple solutions (often through more information or badge of authority)	Aware of some issues and imagines solutions may not be straightforward but can be achieved with existing knowledge	Need for new mechanisms / incentives for good behaviour	Need for creativity and innovation	Structural issues need structural solutions	Awareness of complexity leads to focus on risks
Agency and change	Change could be achieved if individual people just acted better	Change can be achieved through better information provision (to individuals, to communities)	Change achieved by restructuring existing practices so that people have to act differently	Change can be achieved through incentivising good behaviour and dis-incentivising bad behaviour	Change can be achieved through creativity / new ways of thinking	Change can only be achieved with political effort / wholesale change	
Aims/values	Pursuing individual interests; Learning new things/skills (personally)	Wants practice to change at the level of individuals, blames people for poor environmental behaviour, doesn't directly refer to what they themselves can do to make this happen	Tries to change practices/processes through use of information (research, transparency) – change what people know		Tries to change practices/process through use of creative activities – change how people think	Tries to *empower* communities	

Potential power of Open Data / why data should or should not be Open	No explicit reason, general but unspecified hope for good, raising awareness / improving knowledge for its own sake	To improve people's behaviour	To improve work processes / relationship (general and targeted)		To allow creative solutions / innovation (general and targeted)	To empower people / allow them to hold others to account	Don't make Open because of danger of misinterpretation / misuse
Difficulties with Open Data	Accessibility	Presentation	Logistical / technical	Age, reliability, too many sources etc		Structural / political issues mean it's done badly	Trust and privacy / confidentiality challenges

the platform itself should be designed to encourage increasingly critical and creative engagement with data. They describe how different people may hope to interact with a platform supporting a waste data commons in different ways, as well as providing examples of encounters they may have that would make this process easier or more of a challenge. They deliberately avoid stereotyping by focusing on contingent interactions, whilst retaining the centrality of the characters' values and sense of agency. They thus provide necessary input for the design of a convivial tool that enables commoners to share and increase multiple types of value. They serve not only as a set of design reminders of whom we are designing for, but also context-specific illustrations of the diversity of ways in which waste data commoners might live-with waste data and each other. The challenge, now, is to find or create technologies that can bring our design imaginations into being.

Implications for Networked Learning Tools

Networked Learning, as a movement, seeks to design spaces in which people can learn together while retaining and valuing difference. As such, it relies on the technical capacity to develop convivial tools.

In this chapter, we have described a project that responds to the call made by Gourlay in her contribution to the Networked Learning Editorial Collective's (2021b) recent work, by exploring a potential learning setting "in terms of the actual, situated, more-than-human 'mess' of specific contexts, disciplinary content and cultures, and also the wide diversity of ways of engaging" (p. 328), including the possibility of reluctance and avoidance.

We have described how our approaches to the design of a networked data commons emphasise the importance of designing with and for a plurality of contingent perspectives and experiences – that is, designing for conviviality. Echoing Carmichael and Tracy's (2020) findings in relation to students, we see that the "digital literacies" needed by our participants are not only situated social practices, but are also practices "shaped by their own concerns, intentions and existing network relations" (p. 130). We also see that there are very real tensions that we need to face up to, for example relating to the conflicting drivers for publishing data or keeping them private, especially when data may be exploited to put forward particular arguments or when they have become a critical financial concern, displacing human judgements about the ethical, political and cultural values of their projects. We suggest that any convivial, networked commons must be designed with such an explicit recognition and indeed appreciation of such differences. While we cannot claim that our approaches to generating design input guarantee success, they at least keep plurality and values visible and central. We therefore hope that others will be able to adopt and adapt the practice of creating values- and capacities-centred design personas and scenarios to inform the design of other networked learning spaces.

Beyond this, we suggest that if NL is to fulfil its practitioners' ambitions to develop educational spaces, practices and systems that work towards sustainable,

socially just futures, it needs to look carefully and critically at the technologies that it uses. Just as conventional approaches to Open Data embed and enact particular valorisation choices – including judgements about what counts as "relevant" and what counts as "data" – so to do other technologies and tools. NL rightly celebrates the ability to connect and, implicitly, the state of connectedness. But many of the technologies that have developed to enable the formation and maintenance of connections, such as social media, e-commerce and even support group platforms and features such as reputation and recommender systems enact deeply capitalist, competitive, individualistic and colonising practices (Wilson & De Paoli, 2019; Wilson et al., 2023). Those designing and facilitating NL spaces will need to be alert to such often-hidden influences and agencies, and to work as a community to create and share alternative approaches and tools.

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Chapter 5
Tipping the Canoe: What Can Be Learned from a Postdigital Analysis of Augmented and Virtual Reality in Networked Learning?

Marguerite Koole and Annie Beaumier

Abstract In this paper, the authors use a postdigital lens to examine augmented (AR) and virtual reality (VR) as tools for networked learning. The postdigital perspective suggests that the 'digital' is so pervasive that it is no longer considered novel or noteworthy; rather, it is so embedded in our day-to-day lives that it now evades notice. This examination draws upon the concepts of analogue and digital to explore ontological and epistemological characteristics of AR and VR as well as how media and materials may shift on a continuum or manifest both characteristics concurrently. Two vignettes are used to create a shared context and atmosphere from which to consider the pedagogical use of these technologies. One vignette describes a VR app that invites the learners into a canoe where they are immersed into a lesson about Indigenous constellations; the second describes an AR app in which the learners direct their smartphones up at the sky also to learn about constellations. The authors discuss the analogue and digital characteristics as well as the freedoms and constraints relative to sites of learning, activities, learner configurations, and representations of learning. In making the human-technology relationship more perceptible, it is possible to design for learning.

Keywords Augmented reality · Virtual reality · Postdigital · Networked learning · Analogue · Digital · Datafication

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Introduction

There is little if any writing published on augmented reality (AR) and virtual reality (VR) in networked learning (NL). This may be the case because these technologies are often used by individuals in isolation or in face-to-face, classroom settings. Multiple individuals can gather within a VR environment; however, each needs to wear a headset and wield one or two hand-controller devices. AR, on the other hand, often involves the use of a hand-held device that will allow images, text, video, or audio to be displayed when the camera detects a "trigger" image. Although learners can gather around a hand-held device to experience AR together, it is difficult to collaborate in an AR environment by distance. In this paper we explore the characteristics of AR and VR from a postdigital perspective. To begin, we offer two vignettes written to establish an atmosphere and provide shared AR and VR contexts. Next, we outline our understanding of NL and the postdigital approach. Within a postdigital lens, we then discuss how AR and VR technologies manifest analogue and digital features. As postdigital phenomena, we shift to an examination of freedoms and constraints with regard to the ontological and epistemological characteristics of these technologies. Finally, we raise some considerations for designing learning experiences that integrate AR and VR tools. Our analysis is intended to stimulate critical thought about and pedagogical applications for AR and VR in networked learning environments. A postdigital analysis can provide valuable insights into human-technology-environmental entanglements while surfacing hidden features and raising awareness of potential implications such as datafication. Analysis is an important first step before attempting to integrate these technologies within networked learning environments.

Vignettes

Before engaging in our postdigital analysis, we offer two vignettes. The two vignettes serve as illustrations. While reading the vignettes, one can imagine the learners' perceptions of 'reality' co-created by the people, setting, and technologies (the assemblage). In considering how the elements of the assemblage are networked together (i.e., how they interact and respond to each other), it is informative to consider that which is unseen such as the bits and bytes that are exchanged and processed physically and/or digitally. Throughout the interactions, the data which is generated and reduced requires a concerted effort to trace.

The first vignette describes a VR application (app); the second proposes an adaptation of the application for AR. In both cases, the goals include learning the names of Indigenous constellations and building sensitivity to Indigenous worldviews. While reading the two vignettes, one can ponder the following aspects: (1) the site for learning (i.e., where learning and interaction takes place); (2) the actions of the learners; (3) the (re-)structuring, or (re-)configuration of the learners in relation to

each other and the other elements in the learning assemblage; and (4) the representations of learning for assessment which are generated or reduced (i.e., that which is coded, decoded, recoded, degraded, created, repurposed, configured, or reconfigured).

Vignette 1 (VR)

Sprockety,[1] a small upstart company operating out of a small office in the research park near the University of Saskatchewan, developed a beautiful Indigenous storytelling VR app:

> *Once the learners are outfitted with headsets and hand controllers, the immersive VR experience begins. There is a canoe accompanied by the sound of a gentle breeze and waves lapping against the shore. As the learners gingerly step into the canoe and sit down, the stars appear in the twilight sky. Turning their heads, the learners can look all around towards the horizons. To the left is the nearest shoreline. To the right, the water reaches beyond the horizon. Having had some time to familiarize themselves with the virtual topography and the feel of the controllers, a light appears in the surrounding water. The canoe suddenly lists as the pair of learners lean over almost simultaneously to gaze into the water. They squeal with a mix of delight and disbelief while coordinating their actions to right the watercraft before carefully peering into the water again. "You lean over the right and I'll lean over the left," one says to the other. While the learners are trying to discern what is in the water below, a spirit appears in the form of an old man, an Elder. The man begins to speak. His gentle, wise voice mixes almost melodically with the sounds of the water. He begins to describe the constellations. He provides their Indigenous names and recounts stories of their origins.*

Vignette 2 (AR)

Although there is no canoe to tip over, an AR app can also teach learners about the constellations through storytelling. While learners can become immersed in the virtual world to the extent where they shriek with delight, feeling as if they are going to capsize their canoe, the experience with the AR app is qualitatively different in its less immersiveness. Using the AR app, the learner must consciously and deliberately manipulate physio-electronic aspects of their devices:

> *The learners turn on their smartphones and navigate to the constellation app. After the app opens, it geolocates the phone using global positioning information. The app accesses date and time information to ensure correspondence to the correct season—after all, different stars are visible in different locations depending on the time of year. At the same time, it uses directional information and the accelerometer, so it can provide instructions to each learner*

[1] Sprockety is no longer in operations and their VR application is currently inaccessible. We have taken some creative liberties with the vignettes in order to highlight potential aspects of VR and AR experiences.

such as telling them to turn left or right and up or down. Once the app is fully operational, the learners can hold their devices up to the sky. Viewing the night sky through the camera, the app guides them in locating the North Star, Venus, and other key astronomical bodies—each time asking the learners to tap the screen when located. This process of triangulation helps the app overlay the constellation map accurately. The learners move as directed by the smartphone to locate the first constellation. As each learner reaches a particular location on the constellation map, it triggers the display of a video of an Elder who recounts the name and story of the constellation. Once the video finishes playing, the learners shift their smartphones scanning for another trigger point. Each time they shift and reach a different constellation, they trigger a new video.

The two vignettes offer similar learning content and learning goals; however, the use of the two technologies shapes a different learning space and mindset. In each scenario, the learners see and engage with the world through digital data (Gray, 2016). As the learners engage in the VR or AR environments, they interact with the data. Every decision they make triggers additional interactions further co-creating the AR/VR experiences, but also leaving behind a trail of digital footprints that can be tracked and harvested. Similar to many of the facets of the world around us, our learning environments and our behaviours within them are increasingly being reduced to data. Algorithms are being honed in order to detect patterns and ostensibly measure learning and improve progress. Datafication reduces and abstracts behaviour according to criteria pre-determined by social, cultural, political, and economic aims of those creating the algorithms. Williamson (2019) offers an excellent example of datafication in education:

> . . . when a child enters a database, she is chopped up into data points, turned into bits, aggregated with other data, evaluated against norms and so on. Over time, as more data becomes available from the student's activity, it becomes possible to generate a data profile of her skills, progress, abilities, and knowledge—often known as a 'student model'—which can be compared with regularities in massive datasets. Sometimes these profiles are called 'data doubles,' as if they represent a digital shadow version of the profiled individual. But, importantly, the data can always be called up and arranged differently—data doubles are really data multiples (Finn, 2016). When one of these data multiples gets selected as the student model, it becomes a make-believe substitution which can then be used to inform how the teacher approaches that student, or how an algorithmically personalized learning program assigns her tasks. As such, the substitute profile built out of the data takes an active ontological role in shaping the 'real life' of the student—a process that could always have been done otherwise, with different real world results. The data play a part in 'making up' the student. (p. 218)

The above example shows how datafication can play a role in the manufacturing of 'reality'. The data that is curated and interpreted—both biased processes—can create an understanding of who the learner is and what they know. Many different types of data can be recorded. For example, while interacting with the AR app described above, the server may be set up to record the geolocation of the learners and which videos are triggered among other information such as duration of interaction. The server for the VR app may record the sequence in which the learner explored virtual environment. "Datafication involves the progressive transformation of social and material elements and activity into digital data, followed by the treatment of that data as equivalent to its original source" (Fawns et al., 2021, p. 67). Although advocates

of datafication argue that it is neutral and objective, Williamson argues that it is socially, culturally, and politically determined. He argues that it is always socially situated with varying levels of acceptance depending on cultural expectations for privacy. Economically, datafication is often viewed as a source of "intelligence into learning processes" (p. 222). It is co-governed by "law, ethics, and politics" (p. 224). One of the dangers of datafication—without critical examination—is that it can lead towards an instrumental view of education (Fawns et al., 2021).

A critical, postdigital perspective can assist in raising awareness of underlying algorithms, data collection, data use, as well as raising awareness of how interactions with data shapes possibilities for action (Bowker, 2013). As Pischetola and Dirckinck- Holmfeld (in Gourlay et al., 2021) write, technology is not neutral but "embedded with values [and it is important to] explore how interactions with technologies entail a different quality of value, material texture, information, aesthetics, conviviality, and environment to which we couple our bodies and brains in a relational designed NL practice" (p. 338). Reflecting upon the vignettes, one can ask what/whose values have been embedded into the AR and VR assemblages.

Networked Learning and the Postdigital

Last year, the Networked Learning Editorial Collective (NLEC, 2020) invited a redefinition of NL. Their article reviews the historical bases and early definitions arriving at the description of NL as "involving processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies" (p. 319). In reconsidering the definition, the NLEC recognize the dangers of binary conceptions of information and communications technologies—a recognition they attribute to the "postdigital lens" (p. 318). The notion of 'convivial tools' is also interesting:

> Convivial tools are those which give each person who uses them the greatest opportunity to enrich the environment with the fruits of his or her vision. Industrial tools deny this possibility to those who use them and they allow their designers to determine the meaning and expectations of others. Most tools today cannot be used in a convivial fashion. (Illich, 1973, p. 21)

In considering about the vignettes above, one might ask to what extent the learners are exercising their own vision or enacting the vision of the designers of the tools they use in networked environments.

Having emerged from the field of art, music, and aesthetics (Andrews, 2000; Cascone, 2000; Metzinger, 2018),

the postdigital refers to a philosophical perspective in which the 'digital' is so ubiquitous, it is passé; it has already happened (Cascone, 2000; Cramer, 2015). Through its pervasiveness, it becomes commonplace hardly drawing attention; it escapes the critical gaze. There is a not-so-subtle danger in its invisibility: "we risk

the agency of machines (programmed through neoliberal values) creating the platforms by which we exist" (Jandrić & Hayes, 2020, p. 293). The VR and AR vignettes illustrate how the learners might perceive 'reality' within different networked environments; to an extent, realities become 'blurred'. For example, while gazing over the edge of the canoe into the water, the learners sense the canoe is tipping over; however, an external observer such as a teacher would perceive two students wearing headsets and sitting on the floor. Within the learning assemblage, one can question the role of and validity of perception.

The postdigital lens can lead towards a view that the physical world and the virtual are no longer separate from human-social existence (Jandrić et al., 2018). Previous dichotomies of are no longer viable conceptualizations of the world. From a postdigital perspective, the world is a *blend* of dichotomies such as old and new, digital and analogue, virtual and physical. The world (or perceptions of the world) shifts easily between these dichotomies or manifests such characteristics concurrently (a *multiplistic* view). What was considered 'old' technologies can be repurposed and reconceptualized. Technology, once considered 'other', is an inherent part of the human lifeworld and co-creates experience. The realization that the digital is but an imperfect representation of reality re-establishes the value of and openness to that which is analogue. The postdigital can contribute to networked learning theory by offering a different sensitivity for conceptualizing how learners, materials, and digital co-create unique, non-replicable experiences or temporally constrained existences through the shifting between analogue and digital, the old and the new, and ontological and epistemological characteristics. Designing for learning within this mindset presents opportunities and challenges particularly in terms of assessment and even the very definition of 'learning'.

Analogue and Digital

The VR and AR vignettes can help illustrate the concepts of analogue and digital, which in turn, will help explain the concept of 'postdigital'. AR and VR learning experiences are not merely produced by digital technology. In fact, a common misconception is that computers and electronics are digital. Etymologically, the word 'digital' referred to the digits on one's hand: fingers. Fingers can be counted because they are discretely identifiable objects. According to the Oxford English Dictionary (2010), digital came to refer to "signals or information represented by discrete values of a physical quantity such as voltage". A clock that displays the time using discrete numbers is an example of a digital technology. Analogue, on the other hand, refers to phenomena characterized by continuous variability. A clock that displays time using hour- and minute-hands is analogue. The Oxford English Dictionary (2010) defines analogue as "relating to signals or information represented by a continuously variable physical quantity". There are both analogue computers, which process continuous data such as a thermometer or barometer (measuring temperature or atmospheric pressure changes in real-time correspondence to the

Table 5.1 Ontology and epistemology of analogue and digital

	Ontology	Epistemology	Example
Digital	Perfect (seemingly) representation and/or reproduction of a world.	Observed through discrete values such as numbers, bits, pieces.	A digital clock display, binary code (1s and 0s), a mosaic of tiles or pointillism.
Analogue	Correspondence to physical phenomenon/a.	Observed through continuity, continuous variability.	An analogue clock display, a thermometer, a barometer, a naturalistic painting.

Adapted from Beaumier and Koole (2022)

physical phenomenon), and digital computers, which process discrete data such as 0s and 1s (Analog computer: Features, examples and its comparison with digital computer, 2021). Beaumier and Koole (2022) outline the ontological and epistemological characteristics of analogue and digital phenomena (Table 5.1).

Admittedly, the analogue-digital dichotomy is, in itself, problematic because it is binary—unless it can be conceptualized as phenomena that can occur simultaneously or on a continuum. To this point, there are difficulties in categorizing current technologies. An electronic watch can be set to an analogue display or a digital display. The different displays can confer not only a different aesthetic, but differently nuanced information. For example, compared to a digital watch, an analogue watch provides additional visual information such as time ranges and can assist with quick, visual approximations of time. Ontologically, then, is an electronic watch digital, analogue, or both? Other phenomena such as light, depending on the apparatus used to view it, can appear as a particle or a wave. Ontologically, is light digital, analogue, or both?

The vignettes of the AR and VR applications described above help to illustrate and problematize the digital and analogue analogy. Both VR and AR exhibit digital and analogue characteristics. Both are reliant upon underlying computational processes involving digital code (1s and 0s). The VR vignette illustrates a representation of a world—albeit one that does not exist within the physical reality (i.e., without the aid of the headset and hand controllers). Aspects of the VR experience can be considered highly analogue because the sounds and visuals appear seamless and continuous to the learner. The AR application described above blends analogue and digital: viewing the night sky is highly analogue (continuous) while the triggered messages (whether video, audio, or text) may be considered digital components. As forms of networked learning, examination of AR and VR learning experiences can help researchers and practitioners consider and conceptualize different forms of inquiry and knowledge, interaction, processes and rhythms of interaction, as well as how digital/analogue 'shiftings' can co-shape convivial tools and environments.

AR and VR from a Postdigital Perspective

In common parlance, 'virtual' is viewed as something that is not real or almost real. It is commonly associated with computer-generated worlds. However, Metzinger

(2018) argues that virtual reality is much closer to our everyday consciousness than one might expect: "the conscious experience produced by biological nervous systems *is* a virtual model of the world—a dynamic simulation" (p. 3). Virtual and augmented reality devices are, after all, designed to work with our sensory-motor capabilities which are interpreted by the human brain. The brain is constantly interpreting sensory data and constructing representations of the world. Metzinger (2018) suggests that regardless of whether our perceptions are derived from a physical world or a computer-generated world, our brains strive towards an "integrated ontology" (p. 4). Although some VR applications might be highly realistic while others are more dream-like or hallucinatory, learners can become absorbed in virtual experiences developing a sense of presence and embodiment evoking reactions similar to those of real life. It, therefore, should not be surprising that the learners in the VR vignette above panicked when they sensed the canoe tipping over.

Chalmers (2017) defines virtual reality as "an immersive, interactive, computer-generated environment" (p. 132). "Immersion describes the involvement of a user in a virtual environment during which his or her awareness of time and the real world often becomes disconnected, thus providing a sense of 'being' in the task environment instead" (Radianti et al., 2020, p. 2). Chalmers (2017) offers five categories of VR: *immersive, non-immersive, interactive, non-interactive* and *non-computer generated*. *Immersive* environments are characterized by three-dimensional spaces in which a user can explore through the sense of vision, hearing, and sometimes touch. Radianti et al. (2020) define immersion as "the degree to which a user can modify the VR environment in real-time" (p. 3). Radianti et al. (2020) argue that people will perceive the level of immersion differently depending on (1) individual perceptions of isolation from the physical world in relation to (2) the type and quality of technology used.

Controllers, keyboards, mice, head-and-body tracking tools permit interaction. Interaction requires tools to support perception such as visual displays, speakers, and headsets. *Non-immersive* environments are often two-dimensional worlds displayed on computer screens. They may be referred to as virtual worlds such as SecondLife (https://secondlife.com/). Greenwald (2021) suggests that AR is related to this non-immersive category. *Interactive* refers to a type of environment in which a user's actions can affect objects or features within an environment. *Non-interactive* environments include passive simulations such as watching a linear video. While the VR vignette describes a somewhat passive storytelling experience, the sensory tools such as headsets, speakers, and visual displays are still necessary to experience the simulation; therefore, there is still some interaction in the canoe vignette. *Non-computer generated* refers to camera-generated environments; in other words, cameras record the environment and actions therein rather than creatively producing environments and interactions. Metzinger (2018) writes that AR "adds an environmental layer that is invisible for others, superimposing a new and additional set of priors onto the conscious subject's model of reality" (p. 14).

Beaumier and Koole (2022) provide additional insights into the ontological and epistemological nature of AR and VR (Table 5.2) regarding freedom and constraints in experience and learning with these technologies. While the VR experience in the

Table 5.2 Ontological and epistemological characteristics of AR and VR

	Ontological characteristics	Epistemological Characteristics
VR	Activities occur within digitally rendered environments. *Freedom* to alter the environment. (Example: the user perceives themselves to fly.) Space and locale are virtual and relative.	Virtual features can be superimposed and added to the environment. *Freedom* to alter perception of the environment (neither tethered to a physical environment nor laws of physics).
AR	Activities overlaid upon and *constrained* by physical environments and objects. (Example: the user cannot fly; avatars can.) Physical space and locale play an important role (Klopfer & Squire, 2008).	Virtual features can be superimposed upon the physical. Freedom to alter one's perception of the screen environment (yet the bodily experience remains tethered to a physical environment).

Modified from Beaumier and Koole (2022)

vignette is ultimately constrained by the underlying programming (software) and the need for a headset and handset (hardware), perceptually it offers potentially unlimited freedom to explore within a world from multiple angles, inside and outside. The learner may defy normal physical limitations because space is virtual. AR, meanwhile, remains much more tethered to the physical world; objects on screen may appear to defy laws of physics, but the human learner remains bound by them. For these reasons, the two technologies may be viewed on a continuum between freedom and constraint. Other non-immersive, virtual worlds also fit on this continuum. For example, in SecondLife, the user remains bound by physical laws, but their 2D avatar does not.

In re-examining the VR and AR vignettes at the beginning of this paper, there are certain freedom and constraints associated with each that render one more conducive to NL than the other. In VR, learners may participate together even though they are physically separated from each other. It is possible, for example, that with the right equipment, two learners from different geographic locations can sit in the VR canoe together and experience the learning activity. Co-experiencing a phenomenon can increase the learners' sense of co-presence. *Presence* within the context of VR may be defined as "the subjective experience of being in one place or environment, even when one is physically situated in another" (Witmer & Singer, 1998, p. 225). AR, however, is tightly connected to the physical environment. Learners from different continents will see a different configuration of constellations at a given time. Furthermore, when it is night-time for one learner, it might be afternoon for another. Therefore, collaboration between physically remote learners will require additional strategies; however, experiencing the same AR activity at the same time is difficult and the sense of co-presence will be differently nuanced.

Having examined the ontological and epistemological as well as analogue and digital characteristics of AR and VR, questions surface regarding datafication in AR and VR environments. In VR environments, for example, if the user has the freedom to alter the perceived environment, then can it be assumed that they have nearly infinite possibilities for action? If possibilities for action are near infinite, there might be implications for learning analytics and how to make sense of such data.

Programmers would have to make value decisions regarding with data points to harvest and interpret. In designing for learning in networked environments, the postdigital conceptions of analogue and digital ask designers to think more deeply about ontology and epistemology by 'shifting' between analogue and digital.

Design for Learning

With an understanding of analogue and digital characteristics of technologies as well as the freedoms and constraints as described in the previous sections, it is helpful for practitioners and designers to consider the sites of learning, activities, configurations of learning groups, and representation of learning (Table 5.3).

Sites of Learning

The spatial-temporal location in which individuals engage can impact how learning is experienced qualitatively. In comparing the VR and AR vignettes above, the learners in each case likely experience a different sense of embodiment and presence. In one case, the learners sense being seated in a canoe as the sights and sounds surround them; in the other, the learners are standing, looking up at the stars and following the directions in coordination with their smartphones. The VR app creates a sense of precariousness because the learners' movements can overturn the canoe with any sudden movements. The AR app, on the other hand, allows the learner to remain firmly standing on the ground fully aware of both the 'real' physical world around them and the screen space. The VR experience can be shared simultaneously by two people who might be separated by great physical distance. The learners using the AR app might coordinate their experience by telephone or physical co-presence.

In both vignettes, the learning experience is co-created by the people, technologies, and networks. By understanding the constraints and freedoms of different configurations of these elements, instructors can think about how they wish to orchestrate collaboration and sharing. Learners may be asked to broadcast their activities to other individuals synchronously or asynchronously. Learners from disparate physical locations may be asked to gather into one virtual site. Many of these decisions are related to the learning goals and technologies accessible to the learners.

Activities

In both vignettes, the learning goal is to gain a better understanding of the culture's worldview through knowledge of cosmology. The VR app was designed to immerse the learner into a different world and, thereby, foster and openness to new ideas and sensitivities. The VR app offers a somewhat passive experience in which the learner

Table 5.3 Designing for learning

	Analogue / Digital	Freedoms/constraints	Shifting
Sites of learning	What are the qualitatively similar or different nuances of (1) different sites of learning networked together (a mosaic of site) vs. (2) individuals converging into one virtual learning space.	What might constrain these convergences? How might these convergences expand freedoms? How does the learning assemblage co-shape networked-learning interaction?	Learners may be asked to broadcast their activities to other individuals synchronously or asynchronously. Learners from nearby or distant physical locations may be asked to converge into one virtual site.
Activities	Which aspects of the activity are analogue/digital?	What are the goals that guide the activity?	Critical analysis as a learning objective/goal: Learner can be asked to analyse the analogue digital characteristics of the activities to create greater awareness of how they are engaging with each other, the environment, and the technology.
Structure / organization	How might the class be organized in a way that is analogue (a unified group)? How might the class be organized to be digital (smaller groups or individual work)? How and when can the organization shift from one to the other?	What are the constraints within the structure of the learning organization? Are there social, physical, or political rules? How might organization of learning offer freedom for meaning-making, negotiation, and sharing?	Learners may be asked to shift between working with others and working individually. They can reflect upon the value of cooperation, collective action, and relationships in the learning process.
Representation of learning for assessment	What is a digital/analogue form(s) that conveys what the individual(s) has(ve) learned? Can the learners shift between analogue, digital, or both? What data (physical, temporal, bits and bytes) are valued as evidence of learning?	Does the nature, aesthetic, or experience of the activity change when shifting? Do those changes constrain how the learning activity can shift? What might constrain or free learners to create or share their representations? To what extent do alternative representations offer possibilities for action? What data can be extracted from the learning assemblage?	Learners can be asked to shift between coding, decoding, recoding, repurposing, and reconfiguring representations. They may be asked to reflect upon how materials may become depleted with repeated use (lossy formats being repeatedly sampled down, paper breaking down, etc.) and/or how new forms emerge through shifting. What can be learned from failures or detritus? And they might question how datafication is taking place and what that means for them personally. How is data extracted and contracted (reduced) to provide meaningful information about learning?

acquires knowledge by listening to stories along with some ability to choose which stories are narrated and when. Although the AR app has the same goal, there is less of an immersive experience. Once the AR app teaches the learner how to navigate and trigger narratives, the learner has greater control over which stories are triggered, when they are triggered, and in which order they are triggered.

When using particular technologies, analysis of the technologies can become an additional learning goal. For example, learners can be asked to analyse the analogue and digital characteristics of the activities to create greater awareness of how they are engaging with each other, the environment, and the technology. Learners can be asked to analyse the applications with regard to social justice and environmental impacts. By reflecting upon their use and struggles with the technology, discussions may reveal that the technology is too costly for many people because it requires specialized equipment and a computer with great processing power. VR also requires a large amount of space in order for learners to move freely. Some learners might be prone to dizziness from the visual equipment. Availability of VR and AR apps in language other than English can be challenging. In addition, learners may wish to investigate the use of energy and resources in the production and use of electronic technologies. Similarly, for the AR app, learners might also discuss cost, the need for higher quality personal devices with sufficient capacity to fully operate the application. In other words, are these technologies inclusive for learners of all socio-economic-cultural backgrounds?

Learner Configurations

Instructors might also consider how learners can exploit technologies for collaboration, which is an important aspect of NL. They might find ways to organize learners into analogue (i.e., unified groups) or digital configurations (smaller groups or separate individuals). It is also important to consider constraints of learner configurations in terms of social, physical, and political rules; for example, a class may need to establish rules of netiquette and turn taking. Furthermore, how might organization of learning offer possibilities for action, meaning-making, negotiation, and sharing? The instructor might then plan how and when these learner configurations and rules of interaction can shift and blend. Learners may be asked to shift between working with others and working individually. They can reflect upon the value of cooperation, collective action, and relationships in the learning process—all of which reflect key values in NL.

Representations of Learning for Assessment

In traditional, classroom-based learning and even many forms of online and blended learning, learners are often expected to demonstrate what they have learned through exams, essays, presentations, portfolios, and artefacts. Increasingly, such representations of learning are being quantified and used to provide “insights into the courses

and providers that perform best in terms of measurable learning progress" (Williamson, 2019, p. 216). While data points collected to inform teachers on student performance might be useful at one level, there is also the wholistic person whose overall 'learning' cannot be fully known through datafication processes such as learning analytics. Evaluation requires "discussion and dialogue because there is no absolute, value-free position against which evaluation can be calibrated" (Fawns et al., 2021, p. 71). Learning is fluid and dynamic as is evaluation of learning (Fawns et al., 2021). Using a postdigital perspective, teachers can ask learners to express their understanding through unusual, alternative formats to better understand the learners.

An interesting opportunity is to ask learners to consider creating digital and analogue representations—or blends thereof. For example, having access the VR or AR app as described in the vignettes, learners could be asked to depict what they have learned. They could choose analogue modalities such as drawing. They could shift their drawings from analogue to digital by collecting drawings from multiple learners and creating a mosaic on a wall (physical or virtual) or a video mosaic in which each drawing is presented along with narration. Learners may be asked to reflect upon how they experience the digital, analogue, and blended representations differently, which representations appeal to them, which representations they feel will help them remember the constellations or the better understand the culture's worldview. And, finally, learners can consider how their representations can become depleted through repeated use (such as when a .jpg image is repeatedly resampled and resaved, losing information each time.) Cascone (2000) argues that it is important to consider "concepts such as 'detritus,' 'by-product,' and 'background'...when visual artists first shifted their focus from foreground to background (for instance, from portraiture to landscape painting), it helped to expand their perceptual boundaries, enabling them to capture the background's enigmatic character" (p. 13). When technologies fail, perform in unexpected ways, or co-create unusual experiences, that which is normally imperceptible or unnoteworthy is raised to awareness. Additionally, through glitches learners might also become sensitized to how they and their actions are becoming datafied. Learners might question who determines what data is and what detritus is. They might also decide for themselves which data should be private and which data they might strive to preserve.

Conclusion

Using a postdigital lens to explore teaching and learning technology, at first, may seem to be an esoteric endeavour. However, we argue that the value of examining the ontological and epistemological, digital, and analogue characteristics of AR and VR is that it helps to make the human-technology relationship more perceptible. The above discussion of designing for learning offers various levels in which an analogue-digital metaphorical analysis can yield interesting and valuable questions and observations. One can examine how humans and non-humans are organized,

ways to represent understanding, places, and space for learning. In each case, one can ask if there is an analogue view or a digital view. One can reflect upon whether there is value to such views and for whom/what. One can ask who or what is included or excluded as one shifts configurations. One can question how learners, environments, digital, and analogue co-produce data and how extraction of such data can be abstracted rendering partial understandings of learning. Such datafication can also privilege different understandings based on algorithmic choices (Williamson, 2019). Knox (2019) writes, an "interpretation of the postdigital relates to a growing interest in surfacing the often-hidden material dimensions of the digital, such as the human labour required to produce and sustain technology, and the infrastructures and substances required to produce it" (p. 365). In a learning situation, whether face-to-face or networked, 'shifting work' can offer tangible benefits; that is, much can be learned from shifting between analogue and digital. Such shifting may surface failures, depletion of resources, and the emergence of new entities and data detritus. Not only will an electronic photograph (digital) lose information and become blurry through repeated sampling and saving, so will a paper photograph (analogue) as it is replicated repeatedly using a photocopier or pencil and paper tracing. What is important is noticing and questioning—rather than accepting the inevitability of datafication and that, somehow, it is measuring learning progress accurately. "By framing both 'transparent' digital technologies, and opaque datafied processes, as entangled in the social, economic, cultural and political landscape, we can better resist deterministic language and rhetoric" (Fawns et al., 2021, p. 67). Metaphorically, it is important to tip the canoe to see what sensitivities emerge and take note of them.

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Part II
Sustainable Learning Design

Chapter 6
Sustainable Learning Design: A Case Study of Eight Undergraduate Science Module Interventions

Mikkel Godsk, Rikke Frøhlich Hougaard, and Birgitte Lund Nielsen

Abstract This chapter presents the results of a case study of eight undergraduate science modules investigating factors for efficient and sustainable Learning Design interventions. Using a mixed-methods approach involving educator interviews, student activity data, screening of learning designs, module evaluations, and an efficiency assessment, a total of six factors related to the educator and student perspectives as well as the actualised learning designs are identified. The chapter concludes that the educators' consideration for the institutional cost-benefit perspective, their perceived usefulness of technology-enhanced learning and buy-in of its related pedagogy, the students' buy-in of technology-enhanced learning, a consistent networked structure with online activities, reflection exercises and feedback, and the scale and reuse of the design are significant factors for efficient learning designs. Furthermore, the chapter discusses three implication aspects of the identified factors for designing sustainable networked learning: the educator perspective on TEL, students' networked learning with technology, and the module organisation and institutional aspect.

Keywords Design for networked learning · Efficient Learning Design · Learning design · Technology-enhanced learning · Sustainable networked learning · Sustainability

Introduction

The ambition for educational technology and technology-enhanced learning (TEL) in higher education is continuously growing as the technology is seen as a means of widening access, maintaining quality, and supporting online education without

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dramatically increasing costs (Daniel et al., 2009). As a consequence, Learning Design is currently gaining footing as an effective educational development methodology (here referred to as capitalised) to systematically introduce educational technology and actualise its business and educational potential in higher education through an orchestrated design for learning process involving educators, pedagogical models, and other design aids (Bennett et al., 2014; Conole, 2013; Dalziel et al., 2016). However, as most research on TEL is focused on the effectiveness of the technology and thus ignoring the required efforts, there is a pressing need to investigate the balance between efforts and effects, i.e., the "efficiency" (Godsk, 2022; Goodyear, 2001; Noesgaard & Ørngreen, 2015), as well as to look for design and delivery factors that are important for making learning designs (uncapitalised or referred to as "designs") efficient and the delivery sustainable. Based on a large-scale Learning Design initiative at a science faculty involving science educators who have participated in a Learning Design workshop, designed, and implemented networked learning designs in their modules, this study answers and discusses the research question: What are the learning design and delivery factors for efficient and sustainable Learning Design interventions in science higher education? In the context of this chapter, "factors" is used as a wide concept referring to underlying conditions, such as the educators' and students' efforts and perception of TEL (Patton, 2015), "active ingredients", such as the characteristics of the learning designs (Nykänen et al., 2021), how the teaching was delivered, and other patterns that will explain why the learning designs became efficient and sustainable.

Background

The context of this study is a large-scale science faculty covering all traditional subject areas ranging from Science and Mathematics to Engineering and Computer Science. The faculty is research-intensive with an annual turnover of 341 m euros of which 44% originates from external research grants. 7053 students are enrolled across the programmes and there are 1731 members of the academic staff (2019). In 2017 the faculty introduced an ambitious strategy for TEL aimed to improve the quality of education by supporting students' preparation out-of-class, feedback, independence, collaborative and reflective competencies, and by giving educators insight into the students' learning outcomes and level of understanding. In addition to the TEL strategy, the educators involved in the study had module-specific or personal goals with technology, such as activating students in large-scale lectures, providing a clear module structure, or upscaling of enrolments.

To support the educators' use of technology in their teaching practice, a two-step Learning Design process was organised. The first step was a three-hour workshop that introduced the ambitions of the TEL strategy and the Learning Design methodology, the STREAM Learning Design model (Fig. 6.1; Godsk, 2013), and the potential of TEL illustrated by 4–5 local cases actualised across various programmes at the faculty and described according to the STREAM model. STREAM was

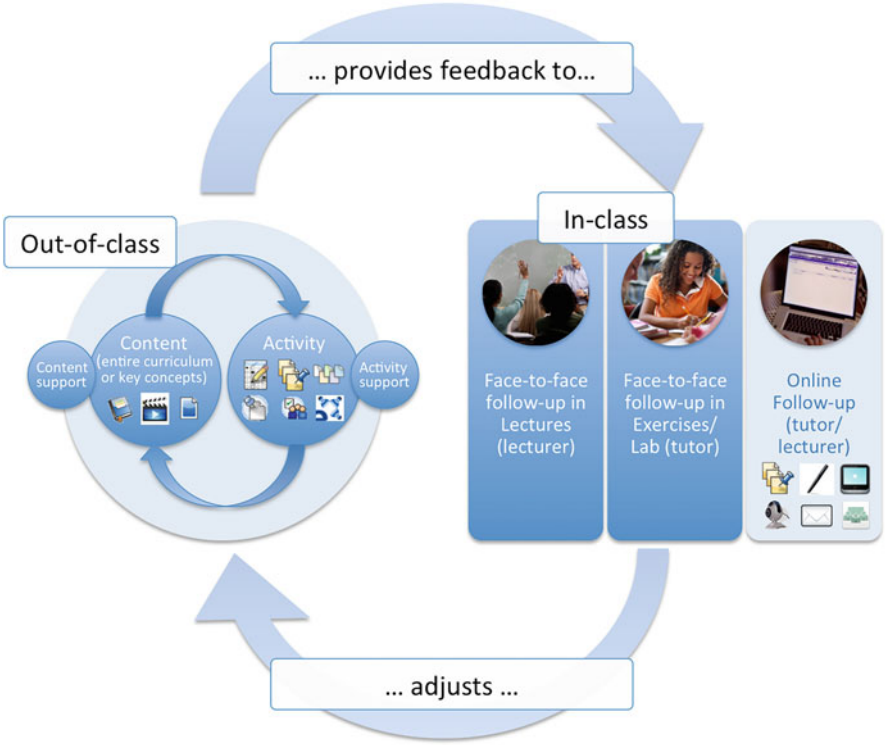

Fig. 6.1 The STREAM model

chosen as it provides a practical design framework to educators that promotes active technology-enhanced learning with feedback loops (Fig. 6.1; Godsk, 2013) and thus addresses issues often related to traditional science higher education of passive, one-way lectures, disconnected assignments and group work, and limited feedback (Handelsman et al., 2004; Knight & Wood, 2005). As STREAM is primarily built on the pedagogical strategies of Just-in-Time Teaching (Novak et al., 1999) and Flipped Classroom (Schell & Mazur, 2015), it is not a networked learning model per se. However, it does promote networked connections between the students, educators, contexts, and the learning resources in terms of linking students' online, out-of-class activity to the educator or automated feedback and in-class teaching as well as asynchronous online peer support (Goodyear, 2001; NLEC, 2021).

During the workshop, the educators shared experiences with TEL, clarified goals and key pedagogical features of their revised design supported by the Open University's "Course Features pack" (Conole, 2016), and provided a short description of their learning design and their intended use of technology. The goals, the top 10 prioritised module features, and other design characteristics were collected in the Quality Pyramid (Fig. 6.2).

Fig. 6.2 The Quality Pyramid for cases M1 and M2

The workshop was followed by an optional second step in which individual in-depth representations of the learning designs were developed using the "Learning Design Visual Sequence" tool (see Agostinho, 2011), and technical implementation and media production support was provided. After the workshop, ad hoc pedagogical, technical, and media support was provided as needed as well as an optional follow-up workshop one year later. Approximately, half of the educators participated in the second step of the workshop and made use of the subsequent ad hoc support for mostly handling technical issues.

Methodology

The research is based on a mixed-methods case study of eight module interventions. The modules were sampled by inviting all the educators of the science modules that have completed the structured Learning Design process starting December 2018 with module delivery during autumn 2019 (N = 18). Seven educators from eight diverse undergraduate modules accepted the invitation and were included in this study (see Table 6.1). Data sets were collected for the eight interventions on the efforts and impacts associated with the design and delivery, the characteristics of the actualised learning designs, the educators' perception of TEL and the intervention, and the students' perceived learning outcome and preference for TEL.

As the STREAM model was used as a consistent framework to present pedagogical ideas during the process, it was a useful starting point for analysing the actualised learning designs and associating this with the effects of the module delivery. The analysis was carried out by deriving the features of STREAM and

Table 6.1 The STREAM assessment rubric

Item	Description	Scale
The major cyclical process ('the feedback loop', FL)		(1) 'not at all': the design feature is not implemented; (2) 'a small extent': the design feature is implemented in the minority of the activities/weeks; (3) 'a moderate extent': the design feature is implemented in approximately half of the activities/weeks; (4) 'a great extent': the design feature is implemented in the majority of the activities/weeks; (5) 'a very great extent': the feature is implemented throughout the module.
FL1	The module is designed with a cyclical process shifting between out-of-class, online preparatory content and/or activities followed up by in-class and/or online activities	
FL2	Out-of-class, online activities are designed so they provide data to the educator and/or tutors about the students' learning.	
FL3	The educator and/or tutors provide online and/or in-class feedback on the out-of-class, online activities based on the generated data.	
FL4	The data is used to adjust in-class and/or online (synchronous) activities related to the curriculum of the present loop/week.	
FL5	The experiences with the in-class and/or online (synchronous) activities are used to adjust the out-of-class, online content and/or activities of the following loop/week.	
The out-of-class loop (OL)		
OL1	The out-of-class activities are designed as an online, cyclical process with several steps shifting between content and activities that activate the content.	
OL2	The out-of-class loop includes online activities where students are asked to reflect on their learning/understanding of the curriculum.	
OL3	Content and activity support is provided online in asynchronous forums or similar.	(1): no support forums or similar available; (3): support forum(s) or similar available, but only capitalised for one of the purposes; (5): both content support and activity support are available and capitalised.
OL4	The out-of-class activities are designed to be thought-provoking and/or require the student to explore, synthesise, and/or formulate answers for actualising higher levels on the SOLO or Bloom's taxonomies.	The extent of the out-of-class activities that qualify as being on level four or above on the Bloom's or SOLO taxonomies (e.g., analyse, relate, evaluate, create, and relate)

turning these into a STREAM assessment rubric with nine design items for observing the module pages in the virtual learning environment (VLE), Blackboard Learn (Table 6.1). The assessment rubric operates with a 5-point Likert scale ranging from (1) 'not at all' to (5) 'very great extent'. To ensure inter-rater reliability, each score was discussed by the three researchers and the scales were adjusted until they were

unequivocal and the scores were identical. The scores for each design are provided in Table 6.2.

From a networked learning perspective, the STREAM items FL2, FL3, and OL3 are of particular interest, as they indicate networked connections between the students, the educator, the context, and/or the content (Dirckinck-Holmfeld et al., 2011; NLEC, 2021; Ryberg et al., 2016).

In addition to the observations and screenings, semi-structured interviews with the module-responsible educators were carried out following an interview guide with Likert scale questions (ranging from 1: strongly disagree to 5: strongly agree) on their perspective on technology-enhanced learning and technology acceptance according to the Technology Acceptance Model, TAM (Scherer et al., 2019), details on the learning design and delivery in general and according to STREAM, and the relative scale of the associated efforts and impacts associated with the intervention. That is, to what extent the educators perceived the efforts and impacts associated with the design and delivery of the module on a scale ranging from much lower (−3) to much higher (+3) than previously. To validate the perceived efforts and impacts of the learning design and delivery, data on students' online activity in terms of the average number of hours spent on the VLE's module page, pass rates, their perceived learning outcome (on a scale of 1–5 with 5 as the highest), and their preference for and against online materials and activities as in the relevant module were used to data triangulate the answers in the educator interviews as well as provide insights into students' learning and preferences.

To interpret the balance of efforts and impacts of the interventions and to identify the underlying factors for efficient and sustainable learning designs, the concept of "Efficient Learning Design" (ELD) (Godsk, 2018, 2022) was utilised by mapping the eight cases (Fig. 6.3). In brief, ELD analyses the efficiency of Learning Design interventions by mapping the required, aggregated efforts to design and deliver the aggregated impacts compared to before the intervention and by calculating the directional perpendicular distance from "break-even":

$$\text{Learning Design efficiency} = \frac{\text{Learning Design impact} - \text{Learning Design effort}}{\sqrt{2}}$$

This yields a quantifiable magnitude of the Learning Design efficiency (Table 6.3) as well as four potential outcome scenarios referred to as "progressive", "underperforming", "regressive", and "outperforming" (Fig. 6.3). For instance, an increased impact at a lower effort yields an outperforming intervention, whereas a decreased impact at a lower effort yields a regressive intervention. In progressive and regressive scenarios, the balance between efforts and impacts becomes important. An outcome where the effort is just barely counterbalanced by the impact is considered "break-even", whereas outcomes where the impact outmatches the effort are considered "efficient". In practice, this means, that outperforming interventions are always sustainable in the sense they have been worth the efforts even though they are discontinued. Other interventions have the potential to be efficient and

Table 6.2 Overview of the eight cases

Module (alias)	Mathematics 1 (M1)	Mathematics 2 (M2)	Computer Science (CS)	Molecular Biology (MO)	Bioscience 1 (B1)	Bioscience 2 (B2)	Geoscience 1 (G1)	Geoscience 2 (G2)
ECTS credits	10	10	10	10	5	10	10	5
Students (n)	323	395	210	137	96	123	12	15
Scale (ECTS x n)	3230	3950	2100	1370	480	1230	120	75
Educator	Full prof.	Full prof.	Full prof.	Assoc. prof.	Assoc. prof.	Full prof.	Assoc. prof.	Assoc. prof.
The STREAM learning design compliance								
The major cyclical process (‘the feedback loop’, FL)								
FL1	1	1	1	5	1	5	5	1
FL2	4	4	3	4	2	5	5	2
FL3	4	4	2	3	2	4	4	2
FL4	1	1	1	1	1	2	2	1
FL5	1	1	1	1	1	1	4	1
The out-of-class loop (OL)								
OL1	5	5	4	4	1	4	5	1
OL2	2	2	4	5	2	4	4	1
OL3	5	5	5	1	1	1	1	1
OL4	1	1	1	4	2	4	3	1
Total	24	24	22	28	13	30	33	10

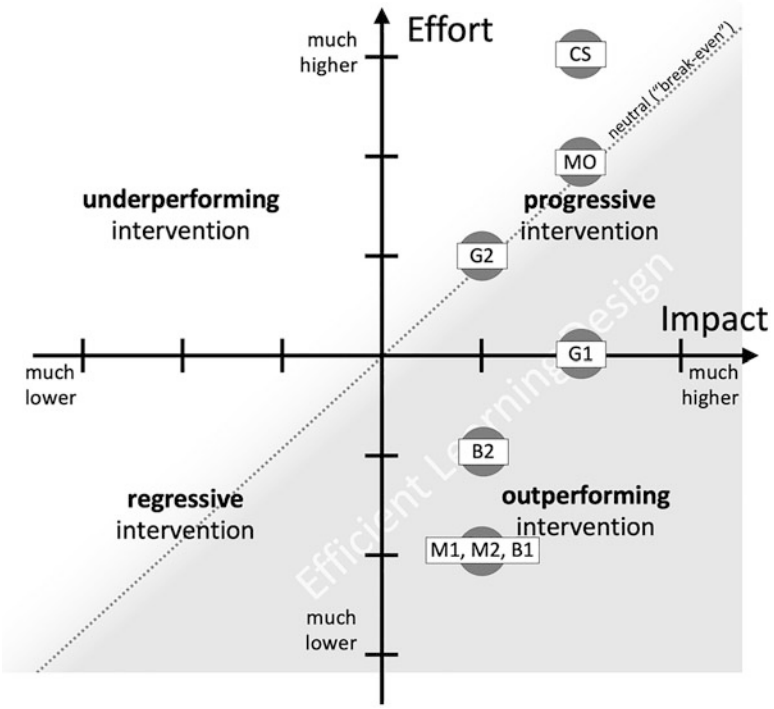

Fig. 6.3 The learning design efficiency of the eight module interventions

sustainable should they be located or over time move below the break-even line (Godsk, 2022).

Identification of the underlying factors for efficient learning designs across the eight cases was achieved using a Pearson bivariate correlation analysis supplemented with a qualitative analysis. By correlating the efficiencies with the STREAM design characteristics, educator perspective on TEL according to the TAM scales—i.e., perceived ease of use (PEOU), perceived usefulness (PU), attitudes toward technology (ATT), behavioural intention to use technology (BI), and actual use (AU)—their efforts, impacts, data on students' online activity and their perceived learning outcome obtained from the module evaluations, it was possible to identify statistically significant design and delivery factors for efficient learning designs (Table 6.4). These correlations were used as signs of potential factors and thus further qualitatively investigated and triangulated with the educator interviews and the comments from students. In the context of this study, correlations were considered significant at the 0.05 level (95% CI); however, as the sample size was small ($n = 8$), also correlations with high magnitudes and lower confidence intervals (85% or 90%) that relate to factors already identified by more significant correlations were included in the discussion to avoid false negatives.

Table 6.3 Perspectives, efforts, impacts, and efficiencies

Module alias (code)	Mathematics 1 (M1)	Mathematics 2 (M2)	Computer Science (CS)	Molecular Biology (MO)	Bioscience 1 (B1)	Bioscience 2 (B2)	Geoscience 1 (G1)	Geoscience 2 (G2)
Educator perspective								
TAM PU	4	4	5	5	2	4	4	3
TAM ATT	5	5	5	5	3	5	4	4
TAM PEOU	2	2	3	2	5	4	4	3
TAM BI	1	1	5	5	1	4	5	2
TAM AU	5	5	5	5	4	4	5	4
Student efforts and impacts								
VLE activity	54.78	57.31	78.03	52.12	22.41	65.02	17.91	12.57
Outcome	3.37	3.74	3.90	3.56	3.82	3.83	4.70	4.83
Preference (for/against)	53%/13%	58%/17%	47%/10%	–	–	59%/5%	60%/10%	–
Pass rate	84%	89%	81%	88%	83%	97%	92%	100%
Learning Design intervention								
Effort	−2	−2	+3	+2	−2	−1	0	+1
Impact	+1	+1	+2	+2	+1	+1	+2	+1
Scenario	Outperf.	Outperf.	Progres.	Progres.	Outperf.	Outperf.	Outperf.	Progres.
Efficiency	2.121	2.121	−0.707	0	2.121	1.414	1.414	0

Table 6.4 Bivariate analysis based on Pearson r correlations (n = 8)

	TAM PU	TAM ATT	TAM PEOU	TAM BI	TAM AU	VLE activity	Students' perceived outcome	Learning Design impact	Learning Design effort	Learning Design efficiency
TAM items										
PU	1	.858**	−.624	.673	.731*	.703	−.287	.866**	.579	.012
ATT	.858**	1	−.755*	.294	.548	.820*	−.468	.535	.241	.304
PEOU	−.624	−.755*	1	.066	−.643	−.428	.374	−.404	−.186	−.255
BI	.673	.294	.066	1	.286	.244	.208	.839**	.757*	−.382
AU	.731*	.548	−.643	.286	1	.401	−.305	.683	.229	.244
STREAM items										
FL1	.383	.183	.153	.716*	.067	.000	.096	.488	.194	.111
FL2	.561	.557	−.174	.437	.436	.349	−.177	.468	−.146	.649
FL3	.309	.477	−.272	.000	.383	.221	−.244	.153	−.506	.917**
FL4	.078	.000	.480	.480	−.149	−.091	.351	.218	−.118	.348
FL5	.051	−.267	.314	.419	.293	−.453	.565	.429	.026	.228
OL1	.738*	.729*	−.499	.308	.799*	.562	−.364	.570	−.059	.621
OL2	.714*	.401	.000	.891**	.390	.441	−.202	.714*	.516	−.195
OL3	.383	.548	−.582	−.286	.600	.629	−.473	.098	−.088	.289
OL4	.226	.070	.269	.601	−.127	.020	−.068	.261	.114	−.008
Total	.668	.545	−.159	.594	.553	.401	−.213	.607	.027	.473

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed)

The Eight Cases

A total of eight undergraduate modules of 5–10 European Credit Transfer System credits (ECTS) were included in the study: two in mathematics (M1, M2), one in computer science (CS), one in molecular biology (MO), two in biology (B1, B2), and two in geoscience (G1, G2) (Table 6.2). All modules were taught by experienced educators and a total of 1311 students passed the modules in the autumn 2019, ranging from 15 to 395 students per module. The distribution of subject areas, the educator profiles, the diversity of scale and ECTS, and diversity in teaching activities, involving lectures, exercise classes with group work, lab work (only MO, B1, B2), and homework clubs, made the sample representative for the structure of the undergraduate modules at the faculty.

Despite being engaged in the same Learning Design process, the observation and screening revealed a large difference in the actualised online structure, the activities, and the feedback processes (see STREAM compliance in Table 6.2). In three of the modules (MO, B2, B1), the online activities were designed with a consistent cyclic structure shifting between out-of-class online activities and in-class follow-up (STREAM FL1), whereas no cyclic structure was observed in the other five modules. Considering solely the out-of-class activities, six modules (i.e., not B1 and G2) were to a great or very great extent designed with an online cyclic alteration between content and activity (STREAM OL1). The out-of-class loop in four modules (CS, MO, B2, G1) included activities that to a great or very great extent asked the students to reflect on their learning (STREAM OL2). Online content and/or activity support in an online, asynchronous Q&A forum or similar was provided in three modules (M1, M2, CS) to support networked connections between the students (STREAM OL3). In three of the modules (MO, B2, G1), a large extent of the online out-of-class activities were on a higher learning taxonomic level (STREAM OL4). Except for G2, all modules were designed in a manner so that some or most of the activities provided data on students' learning (highest for B2 and G1, lowest for B1) (STREAM FL2). These data were used for supporting networked learning by providing feedback to students (highest extent for M1, M2, B2, G1) (STREAM FL3); however, only two modules (G1, B2) used the data to adjust the in-class activities related to the curriculum of the present week (STREAM FL4). Furthermore, only one module (G1) adjusted the online content or activities of the following week based on experiences from the in-class teaching (STREAM FL5).

The interviews revealed a similarly large difference in the educators' perspective on TEL in terms of behavioural intention to use technology (TAM BI), perceived usefulness (TAM PU), perceived ease of use (TAM PEOU), and efforts for designing and delivering their module compared to previously (Table 6.3). From a student perspective, the students' perceived outcome was generally high, whereas the average online module activity in the VLE and pass rates vary. As for the online activity, it is important to notice that four of the modules supplemented the VLE with additional platforms for online activities: Sci2u in M1 and M2 (https://sci2u.dk/), a test server in CS, and CurricuLearn in MO.

All educators reported a positive impact on their modules and the mapping of the educators' efforts and impacts associated with the Learning Design intervention compared to previously revealed that five of the modules qualified as *outperforming*, whereas the other three modules were *progressive* (Fig. 6.3). Only one of the eight modules (CS) indicated that the efforts were higher than the impacts, which suggests that the intervention may not yet have been favourable.

Factors for Sustainable Learning Designs

The bivariate analysis identified a total of 15 significant correlations (marked with asterisks, Table 6.4), which were grouped into the following five factors: three related to the educator perspective, one related to the student perspective, and one related to the design and networked learning characteristics. In addition, the scale and reuse perspective came up as a factor for sustainable learning design in the data analysis and educator interviews.

Educators' Consideration for the Institutional Perspective

Figure 6.3 illustrates that five of the interventions qualified as outperforming, whereas the others were progressive. In practice, this means that the progressive modules (CS, MO, G2) were investing more effort into designing and delivering the module compared to previously. The bivariate analysis suggests that high efforts were linked to the educator's behavioural intention to use technology (TAM BI), $r(6) = .757$, $p < .05$ and potentially also her/his perceived usefulness of the technology (TAM PU) $r(6) = .579$, $p < .15$. In the most progressive cases (CS, MO) and the three most outperforming cases (B1, M1, M2), the educator expressed a high level of motivation. For instance, the educators in MO and CS responded in the interview that technology was deeply interwoven in all aspects of teaching and expressed a personal interest in it. Furthermore, the educator in MO developed an online learning platform tailored to the specific module, and the educator in CS had used an advanced home-grown learning platform and other technologies 'long before' formal institutional ambitions for educational technology were advanced:

> There is practically no part of the module which is not completely interwoven with [technology] and if we had to do without the test server, it would be a great setback and require more [educator] time (CS).

> I do not see IT as a thing in itself—it is just the way you work. Everything is somewhat digital. Well, they do have a book, but that is the only thing that is not IT (MO).

In both cases, the educational development was driven by a desire to support students' learning with technology-enhanced feedback. Although the effort was much higher than previously, the impact measured up to the effort and the educators

did not express concerns related to the increased effort for themselves, their students, or the institution.

In the three most outperforming cases (M1, M2, B1), the educators expressed a motivation, which was mostly related to institutional impact. In M1 and M2, the educator was concerned about supporting the interaction between educator and students as well as an institutional perspective of reducing costs without lowering the quality of teaching:

> It is a way of establishing communication in a lecture hall ... with 250 students ... initially, the purpose was that we could rationalise without compromising the quality (M1, M2).

In the interview, the educator did not distinguish between his personal interests and institutional demands. This indicates that the institutional perspective of having a sustainable balance between effort and impact was more important than the personal perspective.

In B1, the educator expressed that the purpose of using technology was solely operational: to ease the handling of assignments and communication for both the educator and the students. No personal or pedagogical aims related to students' learning were expressed. However, as the effort to implement the intervention was low, the effort-impact balance was favourable.

In the cases with moderate efficiency and low impact (B2, G2), the educators were highly conscious about meeting peers' or students' TEL expectations:

> We are actually using Blackboard a lot [for study technique exercises] ... It is really such things that are best to get [new students] off to a good start ... But ... it is [my colleague] who is the expert on how to use Blackboard for all these things (B2).

> I have two Kahoots ... I tried to make it a bit more fun, let's say more like funny, entertaining (G2).

In total, the cases illustrate an important connection between awareness of the institutional perspective and the adoption of TEL. Educators with a high level of awareness of the institutional needs as well as a critical, balanced approach to the value of TEL focusing on specific aims are more likely to find an efficient balance between efforts and impacts of the intervention as well as sustain or improve this balance, whereas the educators of the progressive modules have a strong intrinsic motivation for using technology but are less concerned about efforts for her/himself, the institution, or the students.

Educators' Perceived Usefulness of TEL

Another significant aspect of the educator perspective is their perceived usefulness and attitude towards technology in education. High perceived usefulness (TAM PU) and attitude (TAM ATT) were strongly correlated with STREAM OL1, respectively $r(6) = .738$, $p < .05$ and $r(6) = .729$, $p < .05$, and the usefulness (TAM PU) was correlated with STREAM OL2, $r(6) = .714$, $p < .05$ and a high impact, $r(6) = .866$,

$p < 0.01$. In other words, educators with a more positive attitude towards and perceived usefulness of TEL were more likely to include online activities and reflection exercises as well as obtain a high impact or vice versa.

Asked about the perceived relevance of educational technology, some educators expressed a sceptical or reluctant attitude. This was most clearly manifested by educators in B1 and G2 and reflected in low perceived usefulness (TAM PU) scores.

> Handing in reports and correcting them is handled in Blackboard. This works well ... [Quizzes and video] has no potential for learning (B1).

> I also use [technology] sometimes, but I also prefer to ... stick to more traditional tools ... [With a] computer but it's really not the same (G2).

These two cases required less effort compared to previous deliveries and compared to, e.g., MO and B2, where the educators expressed a more positive attitude towards educational technology.

Educators with high perceived usefulness scores (TAM PU) mentioned the technology as effective for distribution and communication as well as for supporting student engagement and networked connections:

> It establishes this contact between educator and students which can otherwise be difficult to obtain (B2).

> The effect of IT has definitely been that [the students] spend more time [on studying], but this was deliberate, so you may consider it as "effective time" (MO).

Educators' Buy-in of TEL Pedagogy

In general, none of the educators saw the technology as a barrier in itself and the data show a negative correlation between perceived ease of use and positive attitude towards using technology, $r(6) = -.755$, $p < .05$. That is, strong technological skills do not ensure a positive attitude towards educational technology. In the case of B1, the lack of buy-in of TEL pedagogy is explicitly mentioned by the educator:

> I believe that the [IT] eases our work in the module, but I do not believe that students' learning is enhanced (B1)

Nevertheless, the correlation between educators' perceived usefulness of the technology (TAM PU) and STREAM FL2, OL1, OL2, and STREAM total suggests a connection between a large educator buy-in of TEL pedagogy as represented by the various STREAM items and impact. The higher perceived usefulness of the technology, the larger STREAM compliance, $r(6) = .668$, $r < .01$ and impact $r(6) = .866$, $r < .01$. Despite this correlation, some educators with a positive attitude towards TEL and STREAM expressed that it is not (always) possible to integrate these features due to time constraints:

> We do not really have time for [continuously adjusting the teaching—i.e., FL4 and FL5]. When the ball is rolling, we just have to go along and put out fires (MO).

> It is correct that I can see whether some topics were difficult for some [students—i.e., FL2]. I can try to use it actively in the planning of the teaching ... But this will be for the following year (B2).

That is to say, educators with a positive attitude towards TEL and who are less constrained by limited time are more likely to use more technology in their teaching and maintain a strong pedagogical focus (STREAM compliance) in their adoption of TEL.

Students' Buy-in of TEL

None of the design or student activity characteristics correlated significantly with the students' perceived outcome except for a potential correlation between STREAM FB5, $r(6) = .565$, $p < .15$ and the students' time on the VLE $r(6) = -.689$, $p < .10$. This was in contrast to the general impact, which indicated that the higher STREAM compliance, the higher impact $r(6) = .607$, $p < .15$, and that, in particular, the online reflection activities (STREAM OL2) were effective, $r(6) = .714$, $p < 0.05$. The discrepancy between the perceived outcome and the actual use and impact suggests that the students may not buy in or be fully aware of the purpose and benefit of online activities and/or networked learning despite a generally positive attitude towards technology. However, for the modules with extensive use of technology combined with the highest STREAM compliance (M1, M2, MO, B2, G1), both the educators and the students expressed a high level of satisfaction and expectations to TEL:

> It is my experience that the students like [TEL] as long as it is not too much (G1).

> [the students] have not had any problems handling [TEL]. They are used to navigate on different websites and it has never been criticised (MO).

> Even if they may have to spend extra time on it, it is my impression that [the students] find it well worth the effort if they can test themselves in a well-organised way (B2).

> Sci2u is like playing a game where you just have to win. It is a good way to get a lot of exercises done (M1 student).

This highlights the importance of how the technology is used in the module, including the extent and purpose of VLE activities, as well as how the networked and other online activities are furthered to the students.

Online Structure with Activities, Reflection, and Feedback

The structure of online activities and in particular online reflection exercises and in-class follow-up feedback appear to have a large impact. Designs that included online reflection exercises where the students were asked to reflect on their learning and understanding of the curriculum (STREAM OL2) had a strong correlation with a

high impact, $r(6) = .714$, $p < .05$. This was organised differently across modules, but a closer look at the modules which included out-of-class reflection exercises and at the same time had a high impact revealed a design that made it manageable for the students to participate and a systematic follow-up by the educators:

> We ask students to evaluate the difficulty of the assignment on a scale from 1 to 5. This means that we [the educators] immediately know how difficult the assignments are and we use this actively... [If an assignment] is rated 3 or 3.5 we [the educators] address this in order not to exhaust [the students] (MO).

> In addition to the questions to the text, there is always a question about additional comments or on what was difficult. This is not just a test to see if they study, but also to see whether there is something I need to go over next time (G1).

The data also suggests that out-of-class activities designed as an online process shifting between content and activities that activate the content (STREAM OL1) had a positive influence on impact, $r(6) = .570$, $p < .15$. This design characteristic was distinct in M1 and M2, where all teaching weeks included an online sequence of video lectures and self-assessment multiple-choice quizzes.

In addition, there was a strong correlation between Learning Design efficiency and the networked learning characteristic of supporting the feedback connection where 'the educator and/or tutors provide online and/or in-class feedback on the out-of-class, online activities based on the generated data' (STREAM FL3), $r(6) = .917$, $p < .01$, as described in G1(above) or as in CS:

> Typically, the teaching assistants correct [the assignments] and if they see the same type of mistake many times, they will do a follow-up in the exercise classes (CS).

The module evaluations revealed that feedback may also be automated:

> I think Sci2u is a good supplementary tool. The immediate feedback and the [...] assignments provide a good idea of whether I understand the type of assignment or not (M2 student).

> The weekly multiple-choice test in [B2] works well and gives me an idea of my progression (B2 student).

In these concrete modules, the majority of the students were in favour of the use of online materials and activities (58–59% for, 5–17% against) and 70% of the students responded that there has been a good connection between the online materials and activities and the other teaching activities. This indicates that it is possible to design TEL to support online activities, reflection, and feedback that is both effective and efficient. Nevertheless, the percentages and the following quote remind us that not all students prefer online connections:

> I have learnt by far the most by sitting and studying together with my peers. Neither lectures nor [exercise classes] have benefitted me (M1 student).

Scale and Reuse

The scale of the module (total ECTS), the extent of online activities (measured as STREAM compliance), and the number of deliveries influence the efficiency and thus also sustainability. The intervention in M1 and M2 initially required a high effort from the educator and other staff, but the educator emphasised in the interview that the module delivery was more efficient and flexible for both educators, students, and the institution compared to before the intervention:

> They [M1 and M2] are at least as good as the ones offered back then and it is with less staff involved.

As M1 and M2 were large-scale modules (323–395 students) with several reuses, the potential impact in terms of the number of students benefitting from the intervention compared to the required effort was extensive. This may also explain the reluctance in G2, and comparing the two small-scale modules G1 and G2 there was no significant difference in students' perceived outcome and pass rates despite large differences in STREAM compliance. In the progressive modules CS and MO, the educators were aware of the benefit of developing a reusable design but had not yet actualised this potential. This suggests that it was not a core priority:

> I think there is a reward if you manage to [design the module] in such a way that you can easily offer it the next year (MO).

> The effort in building all this is higher but when it is done, the effort [next time] will be significantly lower ... I do not expect to change the module in any way in the next 4 to 5 years (CS).

Thus, the actualised sustainability may be a consequence of institutional requirements, such as the number of possible deliveries of the same design, the educators' motivation for delivering the same module repeatedly, and her/his level of influence. Educators with limited influence on a module and its later deliveries are potentially less encouraged to invest in revising the module.

Conclusion

To introduce and maintain high-quality technology-enhanced learning in higher education without disproportionately increasing costs, there is a pressing need for identifying design and delivery factors for efficient and sustainable teaching and learning practices as well as an effective practice to support the integration.

This chapter has identified six design and delivery factors for efficient—and potentially also sustainable—Learning Design interventions involving educational technology in the context of science higher education. The factors are (1) educators' consideration for the institutional perspective; (2) educators' perceived usefulness of TEL; (3) educators' buy-in of TEL pedagogy; (4) students' buy-in of TEL; (5) online structure with activities, reflection, and a networked feedback connection between

the educator and the students; and (6) scale and reuse. The factors may be used by educational developers to identify barriers to delivering an efficient learning design or on an institutional level to organise a sustainable (networked) Learning Design practice.

Implications for Sustainable Networked Learning

Generally seen, the identified factors highlight three important aspects of designing for sustainable networked learning. The first aspect relates to the educators' perspective on TEL and networked learning. Factor 1 identifies how some educators emphasise an extrinsic motivation primarily related to an institutional impact while being highly concerned about not compromising on the quality of their teaching in terms of the level of interaction between the educator and the students and student satisfaction at the same time. That is, being concerned about the institutional impact is not contradictory to being concerned about quality in teaching nor supporting networked learning, but TEL is not seen as a goal in itself. Factor 2 highlights that educators with a positive attitude towards and high perceived usefulness of TEL are more likely to provide a clear structure to online learning, include online activities and reflection exercises and obtain a high impact. This aspect is further unfolded in Factor 3, where the educators' positive beliefs and buy-in of TEL pedagogy are identified as determinant factors for a high impact. However, strong technological skills do not ensure a positive attitude and buy-in of TEL pedagogy—rather the reverse—and thus may even be counterproductive in ensuring networked learning with online structure and support in IT-related subject areas.

Combining these three factors suggests that outperforming and other efficient interventions are most likely to occur when the educator has a constructive view on both the technology as well as TEL pedagogy; benefits from active, structured, and supported networked learning (including STREAM) and maintains its pedagogical qualities; does not want to compromise quality in her/his teaching; is extrinsically motivated by realising an institutional impact; and embraces the idea of efficient and reusable TEL, where efforts are counterbalanced by the impacts over time. Therefore, future research should investigate why some educators have this eye and commitment for the institutional perspective while others do not as well as how to address this in the Learning Design process.

The second aspect relates to the students' networked learning with technology. Factor 4 reveals that despite a generally positive attitude towards technology among the students, they are not positive towards TEL per se, which may relate to either limited technical support, a missing justification of and deficient introduction to the teaching format, or an ineffective design with limited online structure, activities, and/or reflection exercises (Factor 5). This resonates with Goodyear's (2001) conclusion that 'the majority [of students] enjoy and approve of the experience. A significant minority take a more negative view' (p. 19) and that a shared goal to sustain activity in networked learning is needed. However, this also suggests that the

students' expectations are more a *driver* than a *barrier* to the adoption of TEL if the purpose and benefit are clearly communicated. Thus, institutions should promote and justify the use of networked learning to educators, and educators should promote, explain, and support the teaching format to their students.

The third aspect relates to the module organisation and institutional perspective of having a favourable balance between the efforts for designing and delivering TEL and its impacts. Seen in isolation, educational development efforts may not be worth the trouble in small-scale and one-off module deliveries. Thus, institutions should maximise the continuity in teaching staff and syllabus to avoid unnecessary redesigns. However, positive impacts may also include professional development of the involved educators, positive ripple effects on other modules, and know-how on effective designs for networked learning. In addition to this, the study revealed an important connection between educators. In most of the modules, several educators were involved in the planning, teaching, and feedback activities of the module. The complexity of coordinating this and the potential benefit of a networked connection is emphasised by B1:

> it is nice to have a shared platform. We cannot do without it... I can follow the progress ... and what kind of feedback is given by the teaching assistants [to the students] (B1).

These three aspects may be further unfolded with additional research. Though TAM provides a quantitative measurement of the educators' beliefs about TEL and the module evaluations insights into their students' perspectives, both the educator interviews, the student comments, and a local survey (Godsk, 2019) suggest that understanding their perspectives is far more complex and that more qualitative data is needed. For instance, the educators' critical reflections in the interviews on whether students are learning from basic multiple-choice quizzes or not indicate a critical and potentially constructive view for finding a better and more advanced alternative. As for the students' perspective, it would also be relevant to investigate other aspects of their networked learning, including the assessment and skills training activities.

The Learning Design practice described in this study is based on a workshop format that presents the STREAM model and utilises pedagogical feature cards of which some relate to networked learning. Despite some comments from the educators on timing issues and a feeling of being instructed to participate, the educators were generally positive towards the workshop and its content. It is difficult to judge whether the networked characteristics of the designs are due to the workshop or other things but compared to science modules in general (e.g., Handelsman et al., 2004), the included modules support more active networked learning suggesting a potential positive impact of the described Learning Design practice. All in all, the study suggests that a sustainable Learning Design practice for networked learning should include a process that provides support and information to sceptical educators, clarify and justify the purpose of TEL, support the educators' design decisions—including how to develop online activities that connect students' activity with educator feedback—and provide ways to support the educators networking during module deliveries as well as reuse their designs.

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Chapter 7
The Future of Presence in Online Education, a Speculative Design Approach

Henrietta Carbonel

Abstract This paper adds to the movement towards rethinking the university of the future following the upheaval of emergency remote teaching during the COVID-19 pandemic. It investigates new and emerging alternatives for creating innovative teaching and learning spaces and experiences. The paper focuses on the question of creating presence at a distance within a networked learning framework. The purpose of the research is three-fold: imagine, with teachers and educational designers, what presence could look like in the online university of the future; critically engage with these futures; and evaluate the speculative approach as a means to initiate a conversation and engage teachers in thinking differently about presence in online education.

In six speculative design workshops, teachers and staff developed prototypes of what presence and affective closeness could look like in online education. Based on three groups of prototypes (measuring cognitive presence in high-tech laboratories, VR classrooms, and creating asynchronous social contact through connected objects), the paper elaborates on how presence can be enacted, each prototype offering opportunities and challenges. Bourdieu's concepts of habitus and hysteresis are then used to explain the difficult move from face-to-face experience to a new form of presence and why some participants may close off alternative imaginaries.

Keywords Networked learning · Online education · Presence · Speculative methods · Habitus · Future university

Introduction

This research is part of the movement towards re-thinking the university of the future following the upheaval of emergency remote teaching during the COVID-19 pandemic (PaTHES, 2021; The Post-Pandemic University, 2020) and focuses on the

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question of creating presence at a distance within a double networked learning framework. Presence is part of connecting and engaging and being able to connect at a distance, possibly asynchronously, can support new means of networked learning. Moreover, the method itself takes a networked learning approach through interactive online speculative design workshops. I use the word distance to indicate that teachers and students are not required to be in the same physical space at the same time, aware that there are many other distances at play such as temporal, affective, or political (Bayne et al., 2020).

Pre-pandemic, OnlineUni (anonymised) required students to attend six on-campus meetings each semester, making it difficult for some potential students to pursue their studies. The move to emergency remote teaching worked well, many students asked to keep the flexibility, and offering a fully online programme would help the university better meet its mission to offer the possibility to study to non-traditional students. However, many teachers want to return to some form of on-campus teaching, holding onto the common belief that "only face-to-face teaching and learning can be authentic, with the power of eye contact frequently cited as emblematic of the quality mark of face-to-face interaction" (Bayne et al., 2020, p. 133). Starting from the idea that learning is emergent (Carvalho & Goodyear, 2018), and involves "complex entanglements of students, teachers, ideas, tasks, activities, tools, artefacts, places and spaces" (Networked Learning Editorial Collective, 2021, p. 313), is it possible to create teacher and student presence at a distance?

The purpose of this research is three-fold. My first purpose is to imagine, with teachers and educational designers, what presence could look like in the online university of the future. The second objective is to critically engage with these possible futures to understand the beliefs they are based on, the types of educational spaces they would create, and "the dilemmas and trade-offs between imperfect alternatives" (Dunne & Raby, 2013, p. 189). I use 'educational space' as all spaces, whether physical or virtual, in which education takes place to include both teaching and learning (Lamb et al., 2022).

To do so, non-traditional, speculative methods were chosen as they offer the possibility to broaden the range of possibles. As Dunne and Raby write "we need to experiment with ways of developing new and distinctive worldviews that include different beliefs, values, ideals, hopes and fears from today. If our belief systems and ideas don't change, then reality won't change either" (2013, p. 189). The third purpose of this research is epistemological, can a speculative approach help initiate a conversation and engage teachers in thinking differently about presence?

The output of the workshops shows that speculative approaches generate creative enactments of presence at a distance, opening the field of possibilities. However, when describing their prototypes, many teachers highlighted the fact that they had tried to replicate at least a part of their experience of traditional on-campus classrooms. Bourdieu's (1980, 1984) influential work on habitus and hysteresis can help

better understand this apparent contradiction. *Habitus* offers a well-researched concept that explains both the *hysteresis* of teaching methods and the agency to change (if at the margin) while recognising the importance of the embodiment of practice.

Bourdieu's habitus consists of

> systems of durable, transposable dispositions, structured structures predisposed to function as structuring structures, that is, as principles of the generation and structuring of practices and representations which can be objectively 'regulated' and 'regular' without in any way being the product of obedience to rules, objectively adapted to their goals without presupposing a conscious aiming at ends or an express mastery of the operations necessary to attain them and, being all this, collectively orchestrated without being the product of the orchestrating action of a conductor. (1977, p. 72)

The concept is not used here in its most common acceptance, to understand how teachers replicate social structures through teaching, but to explain how these ways of being have become ingrained through what Bourdieu calls "le sense pratique"[1] and maintain the identity of the social academic group (Bourdieu, 1980, 1984). The habitus of teachers are dispositions such as their style of expression, dress code, positioning in the physical classroom, or form of teaching, which have become internalised through schooling from an early age as an embodied history. The structuring of the teacher's habitus goes back to their own experience from kindergarten and throughout their school life, often as good students. It becomes second nature, both an individual and collective identity, creating a matrix for how to behave in the academic world. This behaviour is not based on an automatic reaction, "reductible to the mechanical functioning of pre-established assemblies, 'models' or 'rôles'" (Bourdieu, 1977, p. 73). Neither is there an objective, consciously determined and deliberate action. The habitus offers a "structuring structure". The teachers have agency and adapt; however, hysteresis means that it is only possible to change at the margin. The deeper, embodied ways of being persist, even after the initial conditions that created them have changed significantly. This can help explain why the teachers were able to adapt to online teaching but found it challenging to imagine a very different form of presence.

In the rest of the paper, I first consider the concept of presence in both the physical classroom and in online education. I then consider the methodology for researching the future in a complex world. In section "A Speculative Design Method", I describe the setup of the speculative design approach used in the research process, as well as the method of analysis, followed by a description of the findings. In the final discussion, I focus on the concepts of habitus and hysteresis to explain why change essentially happens at the margin and how a more fundamental transformation may be encouraged.

[1] The logic of practice.

Physical and Online Presence in Education

I take a networked learning approach, focusing on relationships, collaborative engagement, and how these can be supported by technology. Networked learning has been defined as "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" (Banks et al., 2003, p. 1). To promote relationships and engagement, presence plays a central role. Garrison et al. (1999)'s Community of Inquiry model defines three essential types of presence: cognitive presence, social presence and teaching presence. However, there is a long-held belief that presence must be physical, the teacher and student need to be co-located for a quality education. In his seminal book *On the Internet*, Dreyfus (2001) affirms that the body is needed to understand the world, to give us a sense of reality, students need to be able to imitate their teachers; the anonymity of online activities means that there is no real commitment or risk-taking; and finally, moods are essential to creating memorable and meaningful experiences. In the preface to the second edition, Dreyfus continues "it is now clear that distance learning has failed" (2009, p. xi). With the emergency move to remote teaching, similar statements have been repeated by teachers and at the institutional level.

The traditional image of the teacher and student in an engaged dialogue in physical presence, such as between Socrates and Plato (350 B.C.E./1966) or Emile and his tutor (Rousseau, 1762/2009), appears as a sufficient argument that authentic quality education must be in physical presence. However, learning in universities today is far from a one-to-one dialogue, and has never been limited to the physical classroom, but is formed of a network of people, places and spaces, activities, technologies, etc.

Students learn with their bodies, from their bodies (Dreyfus, 2009; Merriam et al., 2007), and with their emotions, both "experienced in the educational setting", and "instrumental for academic achievement" (Pekrun & Scherer, 2014, p. 1). However, this does not imply the need for the physical presence of the teacher and student in the same place. Even at a distance, students and teachers 'meet, think, work, and learn in, for and with the world' (Nørgård & Hilli, 2022, pp. 25–26). The student's body is just as present and feeling in the physical classroom as at a distance, there is no "virtual learning", as Gourlay (2021) puts it. Zembylas et al. (2008) show how emotions, both positive (excitement about flexibility or interactions, satisfaction about fulfilling the course requirements, for example) and negative (anxiety, loneliness, isolation or stress regarding multiple obligations) affect the online learning experience.

For each statement about the need for physical presence, we could give a counterexample of what online education has to offer. For example, online education does not only focus on controlled and efficient teaching and learning as suggested by Friesen (2011) in his analysis of a dissection app but can also be messy and involve risk-taking (Collier & Ross, 2017). Rather than just two or three students asking or

answering questions in class, the chat allows all students to ask questions, making it often easier for the shyer or non-native speakers, and online quizzes allow all students to answer.

Presence is a multifaceted concept. The first definition in the Oxford English Dictionary (2021) is "the fact or condition of being present; the state of being with or in the same place as a person or thing; attendance, company, society, or association." The first part of the sentence is probably the most important for higher education, as it refers to focusing on or being closely engaged with what one is doing (cognitive presence), and does not imply other people or a shared space. The reference to being in the same place, in the second part of the definition, has, for centuries, meant sharing a physical space, but with today's technologies, space can also be virtual (e.g., cyberspace). You can be present on Zoom or in Minecraft, as you can in a meeting room or on a basketball court. Moreover, presence does not always imply being visible. Often used with a possessive form, it can also mean "a person's self or embodied personality" (Oxford English Dictionary, 2021). A teacher's energetic presence may be felt on the forum. It can also refer to a person that exists, but is not seen, as in "a feeling of presence" (Oxford English Dictionary, 2021). Or finally, when referring to a sound recording, "a quality in reproduced sound that gives a listener the impression that the recorded activity is occurring in the listener's presence" (Oxford English Dictionary, 2021). Being present does not require simultaneous co-location, but what Lombard and Ditton (1997, p. 15) call the "perceptual illusion of non-mediation". All communication is mediated, through light, language, text, or digital technologies, for example. As Downes (2002) notes, it is natural for the mind to engage with reality through different media. Films, fiction, and the Internet can all offer an authentic educational experience, just as valuable, if different, as Dreyfus' in-physical-presence experience. Presence can take many forms in education, as noted in The Manifesto for Teaching Online "a video call is contact, and so is teacher presence on a Twitter feed; a phone call is contact and so is a shared gaming session; an asynchronous text chat is contact, and so is a co-authoring session on a shared document. (. . .) Contact works in multiple ways" (Bayne et al., 2020, p. 144).

Attempting to compare online and on-campus education, showing that what can be done in one space can or cannot be done in the other, would be an unfruitful exercise. Friesen himself started *The Place of the Classroom and the Space of the Screen* (2011) noting that the outcome of learning, whether online or on-campus, was the same. There is a large body of literature about the no-significant difference phenomenon between the different modes of education (Russell, 1999). There has always been more to a learning experience than the face-to-face encounter or even the teacher-student interaction. Architecture, economy, institutions, society, technology, etc., all participate in the creation of knowledge and learning. We live in a postdigital world. Digital and face-to-face education are not opposites but are inextricably intertwined in our lives (Fawns, 2019). Learning arises from the socio-material interactions, retroactions, entanglements, each time emergent and unique (Carvalho & Goodyear, 2018). And digital technologies offer new networks and spaces for learners in which understanding and practice can unfold in new and

different ways (Calder & Otrel-Cass, 2021) such as Bayne's (2015) teacherbot with which students interacted during the course. The issue is not which is superior, nor how to make up for the limitations of digital education or reproduce as closely as possible the in-person experience, but how presence can be enacted in new and different ways in online education.

The first two purposes of this research are then to create and think critically about new ways of generating presence in an online educational space. What could presence in online education look like in the future? What are the assumptions that lie behind these propositions? What type of educational experience might they create? The third question concerns the question of research method.

Researching the Future

In this section, I briefly discuss the limits of traditional, evidence-based methods to research the future and explain the affordances of speculative design methods for the purpose of this project.

Traditional, evidence-based approaches offer limited insights when researching the future. Biesta, in *Why 'what works' still won't work: From evidence-based education to value-based education* (2010), highlights three deficits to the traditional scientific approaches: a knowledge deficit (linked to the epistemological dimension), an effectiveness or efficacy deficit (epistemological dimension), and an application deficit (practical dimension). The first two are particularly relevant to our purpose of researching the future. According to Biesta, the **knowledge deficit** is linked to the fact that what we know from the past through evidence-based research does not guarantee that it will continue in the future. When we carry out an experiment, we are not an external observer, but an actor in the world, intervening, changing the world, and gaining knowledge from this intervention. 'What works' is then about relationships between our actions and their consequences in an ever-changing world. Accordingly, evidence-based research cannot prescribe a course of action for the future, although it can enlighten choices to be made. The second deficit is that of **efficacy**. Education is an "open recursive semiotic system" (Biesta, 2010, p. 500) actions do not have linear, deterministic consequences (required for evidence-based research), but their effects are probabilistic and complex. Education systems interact with the world, and an external intervention will most likely lead to more changes as the actors adapt. Finally, the system is based on the meaning and understanding given by the teachers and students. What worked in the past, may not work in the future, and will most certainly transform the world into something different from what it was.

There is no unique, predetermined world out there waiting to unfold in the future. Theories and facts are not free of value or historical context (Kuhn, 1990). The research itself changes the world and the participants' perception of it and researchers bring their own subjectivity. Therefore, an interpretivist epistemology in which social actors are seen as constructing their understanding of the world,

negotiating its meaning in their social practices, in which meaning-making cannot be dissociated from the actors (including the researcher), and is embedded in the cultural, linguistic and historical context (Cohen et al., 2018) appears more appropriate to researching possible futures than a more traditional positivist approach.

Speculative design methods suggest a way to "explore and *create* possible futures under conditions of complexity and uncertainty" (Ross, 2018, p. 197 emphasis in original) and thus offer a solution to the epistemological issues discussed above, adapted to the question at hand (Lury & Wakeford, 2012). These are not necessarily futures to strive for, a best version that would be used to colonise the future, but a diversity of possibles to think about how things could be (Facer, 2016) and "create spaces for discussion and debate about alternative ways of being"(Dunne & Raby, 2013, p. 2). Here, design is seen as critique, it does not offer one given, necessary solution, but a field of possibles and asks questions, "challenges the way technologies enter our lives and limitations they place on people through their narrow definition of what it means to be human" (p. 34). These can help unpick hopes, dreams, fears, or concerns about new technologies, questioning underlying assumptions. Moreover, they do not leave the problem untouched, but "engage with and affect the problem it addresses" (Ross, 2017, p. 219).

A speculative approach, therefore, offers a valid framework for research into imagining and critically engaging with possible futures of presence in online education. It is not the only valid choice, traditional scientific methods help understand specific points and other approaches such as extrapolation, consensus, creative imagination or collective wisdom can and should also be used to ensure that a diversity of points of view, disciplines, and cultures are included and to offer a rich and deep palette of possibles (Gough, 2010). As the third objective of this research, we analyse whether this speculative approach enables teachers to create and engage with radically new forms of presence. The speculative design method is presented in the following section.

A Speculative Design Method

The context of this research is a Swiss, federally accredited online university, with the mission to offer equal chances for adults to receive quality higher education, compatible with caring, job or other responsibilities. Pre-pandemic, OnlineUni had a blended model including six in-physical presence meetings per semester. With the pandemic, the university moved fully online. Student surveys and focus groups showed that students appreciate the greater flexibility, without any significant change in marks or dropout rates (Baillifard & Martarelli, 2022). A fully online programme would therefore better help achieve OnlineUni's mission. However, a summer 2020 survey showed that nearly 50% of teachers wanted a return to some form of in-physical-presence teaching. By choosing a speculative approach, I hoped teachers and staff would be able to imagine different socio-material assemblages to create presence at a distance. Moreover, the method itself is an example of

networked learning, a process of "collaborative, co-operative and collective inquiry, knowledge creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies" (Networked Learning Editorial Collective, 2021). All workshops were carried out online using Zoom (Yuan, 2021) and the online collaborative whiteboard, Miro (Miro, 2021).

The speculative design method follows the four steps outlined by Ross (2018):

1. **A speculative question**: What could presence in online education look like in the future? Using a speculative design method we generate alternative futures and explore them critically.
2. **An object to think with**: to open the range of possibilities, I used a design thinking process, as defined by Stanford's d.school (D.School Starter Kit, 2021). In each workshop, the participants (2–4 people) started by discussing what they missed when teaching fully online, they then tried to gain a deeper understanding of the issue through empathy (through questions, stories, or an empathy map: what does the teacher feel, think, see, hear, say and do). This was followed by writing a common definition of the problem before ideating. Each participant then chose one solution and developed a prototype (drawing, collage, set of instructions, scene using figures, etc.). Finally, these objects were shared and discussed ('tested') in the group.
3. **An audience to engage with**: 13 professors and assistants, one faculty manager, five instructional designers, and two educational technologists took part in the six online workshops on a voluntary basis. Participants came from across Switzerland (and one was based in France), representing eight different fields (AI, business, economics, engineering, IT, law, and psychology) and three languages (English, French, and German). The researcher facilitated the design thinking process for each group (explained each step and asked clarification questions when needed) but did not take part in the activity.
4. **Capture and analyse the design decisions and responses to the object**: the workshops were recorded and transcribed. I then carried out a thematic analysis on the ideation stickies, images of the prototypes and transcriptions of the discussions. The analysis was based on Braun and Clarke's (2012) six phases: becoming familiar with the data, generating initial codes, combining the codes in overarching themes, the coherence and accuracy of the themes relative to the data, a definition of each theme and the final report. Although occurrence was used to understand which themes were central to the participants, particular attention was also given to surprising, outlying, or 'idiotic' ideas (as defined by Michael (2016)).

The research process followed BERA's ethical guidelines.

Although the approach was cautious compared to the speculative research of practitioners with more experience such as Dunne & Raby, the workshops produced a wide range of possible representation of presence at a distance and the critical discussions around what this would mean for education were lively, as we show in the findings.

Findings: Possible Futures

The speculative method reached its objective of broadening the possibilities of creating presence in an online university, as well as critically analysing their implications. The ideation process led to over 100 different ideas, nineteen were then turned into prototypes, mostly drawings, digital collages, or text. The output of the workshops can be accessed here: https://miro.com/app/board/o9J_lDE34RA=/ The Miro board includes the output from the ideation process, the prototypes, and relevant sections of the anonymised transcripts of the discussions. The prototypes respond to two main issues that the teachers considered central to their experience of online teaching: fostering social interactions and receiving feedback on their teaching, from the students. A third group of prototypes offered a more holistic approach, re-creating the on-campus experience through Virtual Reality (VR). I discuss each set of prototypes in turn.

The first group of prototypes offers ways to foster **social interactions** and build trust. Some ideas are known from on-campus teaching and already used in online education, such as icebreakers, peer feedback, group work, break-out rooms during videoconferences, or a social app to help find study buddies. Two prototypes did not attempt to re-create the face-to-face experience but suggested new ways of creating interactions and experiencing presence at a distance, asynchronously. One prototype attempted to re-create the feeling of presence and belonging through a coffee cup that lights up when other students or teachers share messages, an implicit reference to the informal coffee breaks many faculty members said they missed. The cup offered a form of immediacy in the connection and a discreet reminder that students were not alone. The second prototype offering an asynchronous solution is the Live Course Map which focused on making students' presence in the learning process visible. The pedagogical scenario, which is already shared with the students for each module was transformed into an electronic app to show where students are in the course, what activities and assessments they have completed, what they are working on and their progression. The scenario looks like a live map (see Fig. 7.1), populated with the students symbolised by different coloured dots with their initials, like Harry Potter's Marauder's Map (Rowling, 1999).

The different scenarios of the modules can be seen as a visual and dynamic representation of Gee's affinity spaces (2004, pp. 70–82). Students are visually represented as coming together to reach a common purpose, through shared activities and discussions. The dots or avatars represent the coming and going of students with different levels of engagement. The course looks alive with people active in different areas. Students could gain a more objective view of where they stand compared to others, and what is left to do. Moreover, it was hoped that this would reduce their feeling of isolation, often an issue in online education (Zembylas et al., 2008); and increase their self-efficacy and motivation, knowing that others, like them, can do it (Ryan & Deci, 2000). In the discussion, the issues of data and privacy were brought up. It was agreed that participation should be voluntary. However, the feeling of presence and affinity space may be lessened if the dots were anonymous.

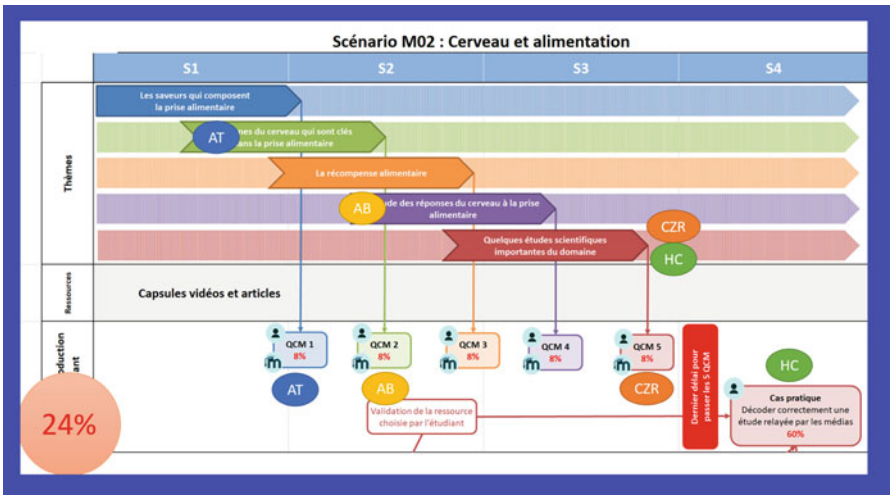

Fig. 7.1 The live course map

What data should be considered remained open, should a student dot appear when they open a document, finish the reading, complete an activity? Should the positioning be automatic or done by the students? As with other forms of learning analytics, it is important to be transparent, avoid back boxing, and understand the meaning of the data and its limitations (Knox, 2017). As in Knox's (2017) Learning Analytics Report Card, students could be asked to choose the type of information they would like to share and receive.

One drawback of the pedagogical scenario is that it makes learning look like a race, as in a horse racing board game with the different tracks and the final exam as the goal. Workshop participants worried about the feeling of competition this could introduce, positive for some students, but not all. It also seems to imply that learning is linear, with a starting point and an endpoint, far from the messiness of the learning process, the multiple iterations it implies and its open-endedness. A rhizomatic representation or knowledge map may be more appropriate to illustrate the students' presence (Cousin, 2004).

The second set of prototypes offers different ways of **eliciting student feedback**. In all workshops, teachers mentioned missing the visual cues they received from students in physical presence. They considered these essential to adapt their teaching to the students' needs. One group of solutions focused on feedback during synchronous meetings. These included a connected dice students could turn on their desk to send automatic feedback to the teacher (e.g., on their level of understanding or wish to go faster or slower), an economics' game theory approach for a group of students to decide on whether to turn on their cameras or not, or the more traditional emojis (e.g., thumbs up).

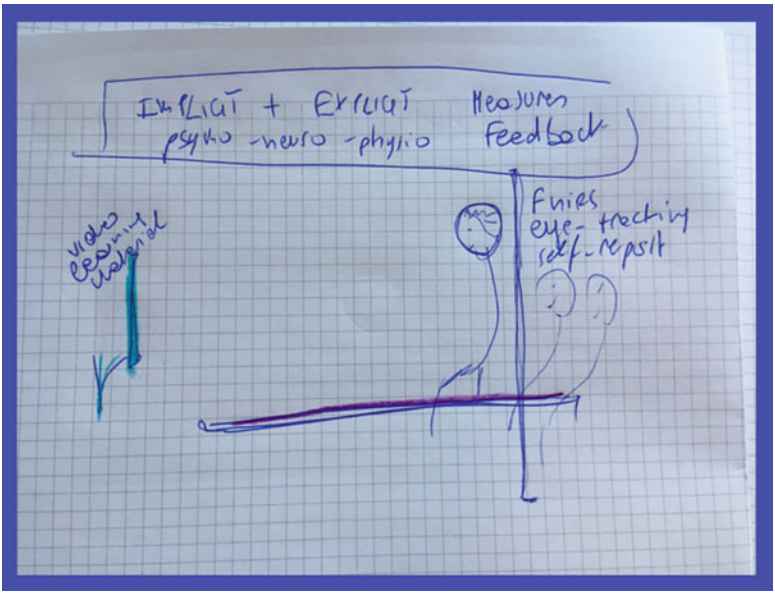

Fig. 7.2 Measuring students cognitive presence

Another set of prototypes focused on asynchronous feedback. Working independently, three teachers suggested similar science-based and data-driven approaches (see Fig. 7.2). To receive feedback on the quality of the content videos they were recording, the teachers suggested testing them in a laboratory on a group of volunteers. The students' cognitive presence would be recorded and analysed to then adapt the content and create "high-quality videos". A scientific process of data collection and analysis would be set up by a specialist in neurosciences and would include both explicit and implicit measures. Students would self-report on their emotions while watching the video, as well as on the content (understanding or optimal speed, for example). Simultaneously, psychological, neurological, and physiological measures would also be taken, including the analysis of facial expressions, body position, measures of blood pressure, eye-tracking, functional near-infrared spectroscopy (fNIRS) and saliva analysis. Finally, the data would be analysed using AI to indicate where the videos need to be improved. For a more detailed discussion regarding such a data-driven and evidence-based approach see Carbonel (2021, pp. 36–41). This teaching approach led to the question of the role of the teacher in such a space. The last set of prototypes put the teacher back in the centre, as seen in Fig. 7.3.

The **VR University** offers a very different solution to the issue of presence in online education. Participants' avatars would be beamed synchronously into a common space where they could interact freely with a feeling of non-mediation.

Fig. 7.3 VR University 2025

Body language and facial expressions would be visible (all current technological limitations had been lifted in the speculative approach). The teaching space has two blackboards, one for the teacher and one for the students to ask questions and vote questions up or down. Finally, a social media blocking app would be made available. Teachers could once again use eye contact and movement in the room to catch students' attention and check that they were fully present. This would create what one teacher called a "special moment of learning" that they missed in online teaching. The VR classroom would be a closed space over which the teacher would have control, as in the traditional on-campus classroom, at least in its idealised version. Teachers did note that, even on-campus, they were not always able to stop students from online shopping or checking social media.

The illustration in Fig. 7.3 puts the teacher back at the centre, with their body visible and the possibility of using gestures, moving around the room and writing on the blackboard, all elements that were mentioned as missing in an online class. They also felt that the institutional environment would "convey a sense of authority" and seriousness of university education, that some felt was threatened when teaching on Zoom from the kitchen table. The unstructured digital space created uncertainty around the usual social rules and hierarchies.

The speculative approach led to a variety of possibilities to create cognitive, social, and teaching presence at a distance, in both synchronous and asynchronous environments. The discussions highlighted the assumptions these were based on and the potential issues that may arise if they were implemented. In the next section, we discuss the extent to which these prototypes were able to create a radically new teaching and learning experience.

Discussion

The speculative method fostered the broadening of possibilities of enacting presence in online education, as well as engaging the participants in a critical discussion of these possible futures. The prototypes included measuring students' cognitive presence in high-tech laboratories, enabling the cyber-presence of both teachers and students in a VR environment, or creating asynchronous social contact through connected objects. These avoided the oversimplistic "one-would-just-need-to" solution while highlighting the complex socio-material entanglement of both human and non-human actors (Stengers, 2005, pp. 998–999). The effect of affordances (the laboratory equipment, for example) on our choices was highlighted in the data-driven and science-based prototype. The agencies of both the human and non-human are clear: the teachers and students transform the teaching and learning experience, but it is also affected by the technological and material environment such as the teaching space (a lecture hall, the blackboard, a videoconference from the kitchen table), the presence of the body, or the apparent non-mediation of the VR technology.

However, many prototypes attempted to re-create the conditions of a traditional classroom online (e.g., eye contact, image of the physical classroom, teacher-centered), rather than create a new way of showing presence at a distance, in particular asynchronously (which was encouraged during the workshops although rarely taken up). As discussed in the second section, the value of speculative design also lies in how it leaves no one and nothing untouched. What may have been some obstacles to engaging in more radically new approaches with the question of presence at a distance?

Imagination has long been recognised as grounded in the context in which it takes place, as Sartre wrote, a "melange of past impressions and recent knowledge" (Sartre, 1948/2001, p. 90). This is not a drawback but makes speculative methods valuable in understanding our world today (Law, 2004; Ross, 2017). However, to encourage participants to think differently, widen the field of possibles, and not be left unaffected by the process, we need to understand why some participants closed off alternative imaginaries. Markham (2021) offers some insights in her analysis of an experiment that shares a similar approach to the one described here, although on a much larger scale. In the Museum of Random Memory (MoRM) project, Markham and her team encouraged participants to imagine alternative futures in relation to the question of memory, also using speculative methods. They too found that it was difficult for participants to imagine alternative futures. Markham's analysis of the participants' interactions shed light on a strong feeling of inevitability about the future. She explains this using the concept of discursive closure, focusing on "how certain patterns of thought, talk, actions, or interactions tend to function like negative feedback loops in social ecologies, discouraging evolution and change." Through the repetition of everyday discourses and narratives, the projected future becomes normalised and appears inevitable, the cause of these practices was forgotten, leaving just the habit. In our research, it was the image of what teaching looked

like and the embodiment of what it felt like that was difficult to move away from, rather than a feeling of technological determinism. In the MoRM experiment, many participants announced that they did not understand certain technologies and therefore could not engage with them. In contrast, OnlineUni teachers, even when they did not feel they fully understood a technology and were not quite sure what it might be able to do (such as AI or VR), still suggested it as a means to create a different teaching space.

Discourse closure helps explain the narrative around the idea that face-to-face education is the superior mode and the wish to put an end to "emergency remote teaching" to return to "normal on-campus teaching". However, there are two limits to the discourse closure approach. It does not allow for change or agency and focuses exclusively on discourse, leaving aside the embodied aspects of teaching that were a recurring theme in the workshops. Bourdieu's work on *habitus* and *hysteresis* can help explain both, the agency to change and adapt to the new conditions, while maintaining or attempting to return to certain aspects of the embodied practice. The habitus means teachers can react to change, within a range of possibles, without having to think through a response to each classroom event. In the brick-and-mortar classroom, the teacher's behaviour felt 'natural' and it adapted easily to changing situations. When workshop participants remembered their teaching in the classroom, they felt they knew what to do and how to do it, for example when disproving prejudices, giving emotional support, or stopping side discussions in the class. The *hexis* of the body (the tendency to hold and use one's body in a certain way) was also mentioned, how the body was seen or not, being able to walk around the class, create eye contact, move one's arms, or look down on the room. There is a teacher's way of moving their body, a "technique of the body", deeply ingrained, learned through education, and specific to teaching (Mauss, 1934/2021, p. 54). In the traditional classroom, the expectations are clear regarding ways of being, codes, and socialisation. When walking into a classroom, no teacher needs to be told where to stand. However, when moving to a videoconferencing platform, the teacher does not know where they are on the students' screen, or whether they are even visible and audible. They do not have a visible position of authority but are on the same level as all other participants.

The habitus offers a "structuring structure". The overall structure remains over time, but the teachers still have agency and adapt at the margin, transposing the historically successful face-to-face format to an online synchronous class. The on-campus class is moved to a videoconferencing platform, the presentation is shared on the screen and the teacher engages in a dialogue with the students. There is a learning curve for using the technologies and setting new expectations. Still, most teachers were able to move their classes online, replicating the on-campus class in a virtual environment. However, many felt frustrated. Online presence in a videoconference was considered second best to in-physical presence classes. When moving physical classrooms to online platforms, physical presence is no longer an implicit part of the experience, and teachers became conscious of its role in their habitus. Hysteresis meant that many teachers transposed the historically successful face-to-face format into online teaching, moving lectures online, for example.

However, this habitus was no longer adapted to the new context. What made it successful, the physical presence and immediacy that created and maintained engagement, interactions and motivation, were gone. Furthermore, an online lecture highlights the limits of the format: a pre-recorded video that can be watched when students have time, at their speed, as many times as they need, rapidly appears more appealing (Khan, 2013; Nordmann et al., 2019). Although teachers focused on the lack of physical presence, it is the whole assemblage that no longer works as it used to.

A habitus is, by definition, enduring, subconscious, and deeply embodied, and its transformation puts into question the whole identity of the teacher at the individual and collective levels. This creates a greater barrier to change than what is often put forward such as the time and effort required to learn new technologies (Selwyn, 2017), the greater value put on an existing practice compared to an alternative that doesn't yet exist (Eidelman et al., 2009), or the difficulty in understanding new (threshold) concepts such as networked learning (Sinclair & Macleod, 2015). Increasing the duration of training or including modelling to change the teacher's habitus, as suggested by Belland (2009), is not sufficient to overcome the power of early experiences in forming a habitus. In a study of the German teachers' habitus and the pandemic pedagogy, Blume concludes that "any attempts to address the nature of teaching and schooling in a postdigital society will require the examination of long-held and deeply situated personal and systemic beliefs" (2020, p. 896).

The COVID-19 pandemic and the forced move to emergency remote learning created a misalignment between the practice and its objectives. The hysteresis of the habitus means that the teachers adapted to the change using their historical and embodied understanding of what teaching looks like and feels like. However, the new space is too far away from the traditional classroom and changes at the margin were insufficient, leaving a gap between the opportunities that have become available and the ability to take advantage of them (Bourdieu, 1980, pp. 100–104).

The current research created a space in which teachers could talk about their experiences and frustrations, hear about how others transformed their teaching and encouraged them to imagine new possibilities offered by networked learning. Therefore, the speculative approach did help initiate a new and critical conversation. However, it did not change beliefs or practices, getting teachers to think differently about presence. Further research is needed. One path is Markham's suggestion to carry out multiple iterations of the same experiment, shifting "from modes of engagement that sponsor general curiosity to more short-term actionable goals, using techniques akin to persuasion and activism" (2021, p. 400). A switch of perspective from the needs of the teacher to those of the student may bring teachers to differentiate between their needs (or habitus) and those of the student to experience a "worthwhile educational experience" (Garrison et al., 1999). Further research should include students and other stakeholders such as staff and management. With a raised awareness, research can then move towards practice and from speculation to actionable goals.

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Chapter 8
Strategies of Revision Between Design-Based Interventions: The Case of a Hybrid Learning Configuration

Anne Kristine Petersen, Peter Gundersen, Bjarke Lindsø Andersen, and Marianne Riis

Abstract The chapter investigates the revision process of a Design-Based Research (DBR) project, in which a hybrid and networked continuing professional development (CPD) course for educators from three higher education institutions was developed, tested and redesigned. The course ran over two cycles and was based on seven design principles. The key design principle of the course aims at fostering inter-institutional collaboration among participants in relation to developing, testing and evaluating new learning designs in the participants' respective teaching practices.

On the basis of semi-structured interviews with the course participants, it is discussed which aspects of the course should be revised and which revision strategy to apply during the revision process. Moreover, the implications for the following intervention are discussed and the redesigned course is presented.

The empirical contribution lies in the detailed unboxing of the steps taken by the research and design team in the revision process between the two cycles of the course. As such, the chapter exemplifies data-informed revision processes in which the key design principle of a course is maintained, but the adaptation of it is fundamentally revised though the strategy of branching out, i.e. central aspects of the design are revised to create a new solution.

Keywords Hybrid learning · Design-Based Research · Design principles · Continuing professional development

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Introduction

Fundamentally, research on *networked learning* is interested in finding new and productive ways of connecting people and their practices across boundaries in different contexts, as stated in the 2020 description put forward by the Networked Learning Collective:

> *Networked learning involves processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies. Networked learning promotes connections: between people, between sites of learning and action, between ideas, resources and solutions, across time, space and media.* (NLEC, 2020, p. 9).

In this chapter, we present selected findings from a research and development project, which was concerned with designing and testing inter-institutional learning and collaboration between participants from three higher education institutions through two interventions. As such, the project taps into and shares ideas on networked learning regarding both collaborative and collective inquiry and connection of people across sites through the use of technologies and other means.

We seek to demonstrate how a course design, intended to support networked learning, is subject to change through data-based revision of how and which technologies participants are encouraged to use and how inter-institutional connections are supported. Design-based intervention studies have been criticised for rarely describing the reasons as to why given aspects of an educational design solution are revised in the succeeding intervention (Zheng, 2015; Gundersen, 2021). This leaves the revision processes of Design-Based Research (DBR) (Barab & Squire, 2004; Design-Based Research Collective, 2003) in a closed box that has yet to be opened to shed light on the methodological considerations and implications related to the revision of solutions in educational design research.

In this chapter, we look into the revision process of a DBR project, in which a hybrid continuing professional development (CPD) course for educators was developed, tested and redesigned. The term hybrid refers to the combination and integration of the disciplines, which the course participants represent, as well as the sectors they come from to foster inter-institutional collaboration and learning. In relation to networked learning, collaborative inquiry and practice, which comprise both human relationships and technology, have drawn continuous interest within the field. Our intention is to unbox the kinds of challenges and choices that educational design researchers face when engaged in revising an educational solution, such as a hybrid CPD course, between interventions. In the chapter, we identify three aspects of an intended intervention that can be considered for revision, namely (1) the initial pedagogical theory guiding the intervention, (2) the transformation of the theory into guiding principles and (3) the adaptation of the principles in the proposed design solution. Moreover, we point to established design activities related to either opening up the solution space (branching out) or refining existing solutions (narrowing down) as strategies that can be applied during the revision process.

The core of the article is the above-mentioned CPD course, which we describe in terms of the intended design developed by the research and development team (the authors of the present chapter) and the course participants' reactions to it after the first intervention was carried out. We then seek to transparentise the revision work carried out by the research and development team by describing their considerations during the redesign phase. Lastly, we present the intended design proposal for the next intervention in order to explicate the changes that the revision process led to. The research questions we seek to answer are:

When redesigning the next intervention period in a hybrid continuing professional development course for educators in higher education

- which aspects of the proposed solution must be considered for revision by the educational design researchers?
- which revision strategy should the educational design researchers apply based on the empirical findings?
- what are the implications of the chosen revision strategy for the subsequent intervention?

The chapter is structured as follows: We first present the method used for collecting and analysing data from interviews with the course participants. Next, a hybrid CPDContinuing professional development (CPD) course for educators, titled the Double Leaning Community, is presented along with its guiding design principlesDesign principles, which entail the theoretical foundation of the CPDContinuing professional development (CPD). The findings from interviews with the course participants are subsequently presented. We move on to discuss the concept of revision in DBRDesign based research (DBR), focusing particularly on the revision of theory, guiding principles and the adaptation of design principlesDesign principles. Next, we address the different strategies that can inform the revision process and discuss the difference between the strategy of narrowing down and branching. Finally, we present the redesigned course by highlighting the differences between the first and second interventions and discuss the aspect that was revised as well as the applied revision strategy.

Method

The methodological framework of the project is based on a design-based research approach. DBR started as a reaction to psychological lab experiments and aimed at creating more impactful, relevant and useful knowledge for practitioners that was also empirically grounded in real life settings (Collins et al., 2004; van den Akker, 1999). Mainly concerned with the development of learning theory and the implementation of technology in classroom settings, DBR evolved into dealing with large-scale interventions with a variety of foci and scopes. The interventionist nature, collaboration with practitioners and the iterative manner in which experiments are

developed and tested constitute three main characteristics regarding the design process of the experiments carried out (Collins, 1992).

This approach of progressive improvement in design involves putting a first version of a design into the world to see how it works. The real life experimentation of initial theories answers the call for more empirically grounded theories developed by educational research, which as mentioned above was a key ambition of the budding DBR community. Ideally, interventions are constantly revised based on experience, until all the bugs have been fixed (Collins et al., 2004). The revision process can be seen as both prospective and reflective. The implementations of design experiments are from a prospective side carried out with a hypothesised learning process in mind. The levels of analysis from a reflective side lead to the strengthening or refutation of initial conjectures (Sandoval, 2014). Together, the prospective and reflective aspects of design experiments result in an iterative design process; as conjectures are generated and perhaps refuted, new conjectures are developed and subjected to test (Cobb et al., 2003).

Reviews specifically on DBR (Zheng, 2015; Anderson & Shattuck, 2012) reveal that DBR studies iterate between two and seven times in cycles ranging from a few months to years and that the details on the revision process moving from one intervention to the next are not always reported on. A careful conclusion on the back of this might suggest that the initial strive for more empirically based improvements of practice are pursued, but that the design efforts set in motion to achieve this goal to some degree remain unaccounted for.

In order to shed light on these design-based practices carried out by researchers, this chapter focuses on the iterative development between two intervention periods targeting the professional development of in-service educators.

The course ran over two intervention periods from August 2021 to June 2022 and was redesigned prior the second intervention. For both interventions, the participants represented different academic disciplines, and they were employed at three different higher education institutions (henceforth HEIs) in Denmark, including a university, a university college and a business academy. The chapter discusses findings related to the implementation of the first intervention as well as the preparation of the second intervention, i.e. the tentative redesign of the course.

The empirical data stem from a series of semi-structured interviews with nine course participants from the first iteration of the course who are employed at three different HEIs in Denmark. The names of institutions and course participants are anonymised. The purpose of the interview guide used was twofold. Firstly, we included questions aiming at evaluating the value of the first iteration of the course through self-reported learning outcomes. Secondly, we formulated questions aimed at revealing the participants' interpretation and experience of the key design principle as enacted in practice and asked for their feedback on our early-stage ideas for redesign. The interviews, which were conducted as individual, online interviews in October–November 2021 after the first intervention of the course, were recorded, transcribed and subsequently coded using the coding software Dedoose following an inductive approach (Thomas, 2006). A total four codes that relate to the key design principle 'Fostering a double learning community' (further described below) were

identified: (1) participants' interpretation of the key design principle, (2) attitudes towards inter-institutional collaboration, (3) challenges related to the enactment of the key design principle and (4) the participants' learning outcome.

The Double Learning Community

The Double Learning Community (DLC) is a continuing professional development (CPD) course that targets in-service educators from three higher education institutions (HEIs) in Denmark. The course was developed in reply to a call for action from the Danish Ministry of Education and Research, which encouraged inter-institutional projects that seek to strengthen educators' use of digital technologies in their lessons. During the course, the participants are engaged in (re)designing a selected number of learning designs through the integration of digital technologies. The participants are expected to take part in a double learning community (hence the name), which constitutes an online inter-institutional learning community, comprising course participants from the three HEIs, and a local learning community, comprising course participants employed at the same institution.

Even though the course has no formal curriculum, the contents of the DLC address a set of specific learning outcomes as the participants are expected to develop knowledge and skills within three subject areas related to digital technologies: visualisation, collaboration and flexible access to education. The DLC is enabled by a digital learning platform in the form of Moodle where participants can access learning materials and participate in different types of learning activities, including forum discussions with participants from other institutions and the course facilitators. Within the field of research and practice of networked learning, the Networked Learning Editorial Collective, NLEC, identifies a continuous interest in the intertwinement of three phenomena: human relationships, technology (especially digital) and collaborative inquiry and practice (NLEC, 2020). As such, we argue that the DLC first and foremost can be seen as a networked learning community that also draws on other elements that supports the notion of being networked, e.g. the hybrid element on which we elaborate in the following.

A Hybrid Learning Configuration

The DLC constitutes a hybrid learning configuration, which Wals et al. (2012) define as a social practice focused on authentic, ill-defined tasks or challenges whose resolution relies on transboundary learning, e.g. by transcending forms of learning, disciplines and traditional structures and sectors. In Networked Learning, attention is also paid to similar binary and ternary relations (NLEC, 2020). What constitutes the DLC as being hybrid, is the combination and integration of elements that are traditionally considered separate to form a new hybrid in its own right. For instance,

a mule or a grapefruit represent classic examples of hybrids because they are composed from the fusion of existing parts, while simultaneously being a new composite in its own right (Nørgård, 2021).

The DLC constitutes a hybrid learning configuration as it seeks to transcend the disciplines which the course participants represent as well as the sectors they come from to foster inter-institutional collaboration and learning in relation to the use of digital technologies in education. Although there is a growing body of conceptual and empirical literature emphasising the importance of hybrid learning, in particular due to its learning potential in transcending traditional barriers or boundaries between domains, practices and contexts (e.g. Cremers et al., 2016; Ryberg et al., 2020; Hilli et al., 2019), there are few studies on the development and implementation of such configurations designed for educational staff at HEIs.

Design Principles as Theoretical Backdrop and Guidelines for Practice

One of the characteristics that sets DBR apart from other research traditions is the generation and application of design principles, i.e. generalised, domain-specific knowledge that informs educational designers of how to achieve a specific outcome (Herrington & Reeves, 2011; van den Akker, 1999; van den Akker et al., 2006). According to Baumgartner and Bell (2002), design principles can be either explanatory, i.e. produced after an intervention has been carried out to explain why it was successful, or generative, i.e. produced before the execution of an intervention to support and guide the educational designer in generating new solutions. They suggest that both explanatory and generative design principles should be produced with three questions in mind:

- Who are the design principles for (audience)?
- When are the design principles generated (type of principle, cf. the distinction between explanatory and generative design principles)?
- What makes the design principles useful to their audience (characteristics)?

Baumgartner and Bell (2002) further argue that generative design principles should include:

- Information on how and when they should be applied (procedure)
- Information on their underlying rationale (theory)
- A description of the criteria of success (outcome)

The DLC is based on seven design principles that also serve as the theoretical backdrop of the course. The principles were developed by the research and development team prior to the first intervention. The seven principles are presented below in terms of their theoretical foundations. In the subsequent section, the key design

principle is described in further detail based on Baumgartner and Bell (2002) as a generative design principle to be applied by the course designers.

As seen above, a central aspect of the DLC is learning about the use of digital technologies in teaching and learning processes through inter-institutional collaboration. Basten and Haamann (2018) point to several obstacles, e.g. learning from others and transferring knowledge across both cognitive, social and physical boundaries in inter-institutional collaboration. As stated by Lee (2018), we all voluntarily participate in many different competing communities, making it even harder to design for formal, work-based interorganisational collaboration in – oftentimes involuntary – communities. From the get-go we anticipated challenges, and for this reason, and to counter potential obstacles and to facilitate the participants' collaboration and design processes, an overall community of practice perspective (Wenger, 1998), was taken. Further, as stated by Wenger-Trayner and Wenger-Trayner (2015), obstacles or boundaries in learning across different communities might constitute learning potentials, rather than barriers if they are treated as such. In a community of practice, participants share and develop knowledge through participation and reification. Participants need not share the same context (e.g. institutional). Rather, it is the practice which is shared (e.g. the practice of using digital technologies in teaching), and different perspectives on practice might inspire new ideas and learning. Ideally, communities of practice emerge on a voluntary basis, but in a formal setting, such as DLC, they rarely do. *Fostering a double learning community*, therefore, is the **first design principle** (henceforth referred to as the key design principle).

Particularly for adult learners, authenticity is key to motivation (Jarvis, 1987; Illeris, 2013). One way of ensuring authenticity is by having the participants work with real-life problems, preferably from their own practices. One of the partner institutions in the DLC project is renowned for its foundation in problem-oriented and project-based approaches to education. Drawing on experiences from this institution, we decided that **the second design principle** should be *encouraging problem-oriented and project-based learning*, which also aligns with the community of practice perspective.

In problem-oriented and project-based learning, *utilising the exemplary principle* is essential (Andersen & Kjeldsen, 2015; Illeris, 1974; Negt, 1971) and thus constitutes the **third design principle**. Due to the complex and messy nature of real-life problems, a curriculum can only imply possible theoretical explanations. As the participants dwell on and explore their problems, new theoretical and context specific paths may be needed which calls for an open-ended curriculum based on general and exemplary materials and activities as preliminary stepping stones in the participants' learning processes.

In a community of practice, access to both codified and tacit knowledge via peers and old-timers is indispensable (Wenger, 1998). Edmondson et al. (2003) posit that codified and tacit knowledge are not mutually exclusive, rather the knowledge types exist along a spectrum oftentimes only with a temporal difference. Over time, participation and reification in a shared practice might remedy the absence of agreed-upon language in an epistemic community, thus transforming tacit to codified

knowledge. These processes are captured in **the fourth design principle** *stimulating codified knowledge acquisition*, and in **the fifth design principle** *promoting learning through experimenting*.

For Kolb (1984) active participation through experimenting is key to learning, however, as both he and Schön (1983) pointed out, experimenting with one's practice does not automatically lead to new knowledge or learning. Dialogue and shared reflections are necessary to bring forth and qualify participants' often tacit experiences. Therefore, there is a need to support the participants' learning additionally, and thus **the sixth design principle** is *assisting reflective practitioners*.

As mentioned, we consider the DLC to be a hybrid learning configuration. According to Köppe et al. (2017), the term hybrid cuts across, circumvents, or upheaves traditional dichotomies within education. One such dichotomy entails learning in onsite vs. online settings (cf. Cremers et al.'s (2016) focus on 'forms of learning'). When designing for online communities in particular, Wenger et al. (2009) recommend focusing on how technology in the configuration supports the community's rhythms, interactions, and identities. More often than not, the rhythms, interactions and identities of the members of a community may differ significantly, which also is one of the reasons why Wenger et al. (2009) recommend the use of so-called *technology stewards*, who play an important role in securing that the technology in itself is not perceived as a barrier to learning and collaboration. **The seventh design principle**, *facilitating a hybrid community*, captures this.

Zooming in on the Key Design Principle

Due to the scope of the chapter, in the following we focus mainly on the key design principle of the DLC (the first design principle), which frames the DLC as a hybrid learning configuration with special focus on inter-institutional learning. Table 8.1 describes the key design principle, including its four characteristics and their respective criteria of success.

Adaptation of the Key Design principle in the First Intervention

In the following, we briefly outline how each characteristic of the design principle 'Fostering a double learning community' was adapted by the course designers to the specific context in the first intervention, which took place in August to November 2021.

To ensure that educators from each of the three HEIs were enrolled (characteristic no. 1), the heads of departments at the participating institutions were asked to select a number of course participants and a digital flyer describing the aim and contents of the course was distributed. A total of eleven participants from the three HEIs were enrolled, including six educators from a university, two from a university college

Table 8.1 Key Design principle of the DLC – Fostering a double learning community

Underlying rationale	Characteristics – how to apply the principle	Criteria of success
The DLC constitutes a hybrid learning configuration (Wals et al., 2012; Cremers et al., 2016). The term 'double' refers to the fact that participants take part in an inter-institutional community (with peers from other HEIs) and a local community (with colleagues from their home institution). The underlying rationale is that (1) educators can learn from each other across disciplines and educational sectors and (2) testing and sharing of new learning designs in a local context can lead to new and lasting educational practices	1. You must ensure that participants from each of the three participating HEIs are enrolled	1. A number of participants from each HEI have completed the course
	2. You must facilitate the development of a learning community which stimulates inter-institutional and local collaboration between participants	2. Participants have shared and developed their teaching practice in collaboration with their inter-institutional and local communities
	3. You must facilitate learning activities that are anchored in both the inter-institutional and local learning communities	3. All participants have actively participated in the learning activities in their inter-institutional and local communities
	4. You must establish clear links between inter-institutional and local learning activities	4. The output produced by the participants illustrates the knowledge gained in their inter-institutional and local communities

and three from a business academy. The participants from the three institutions have different experiences in using digital technologies in their lessons, and the course is focused on creating opportunities for them to share their experiences with peers from other academic fields and institutions. The two participants employed at a university college teach through various blended formats in social work education and the bachelor's degree programme in public administration. To these participants, using digital technologies is a prerequisite for carrying out their lessons. The three participants from a business academy are either employed as educators within the field of further education or a part of the institution's digital support team, which focuses on implementing the business academy's digital strategy within the organisation. Finally, the six participants employed at a university teach through various blended formats and/or are particularly interested in using digital technologies in their onsite lessons as a means for maximising opportunities for interacting with their students.

The development of a learning community that stimulates inter-institutional and local collaboration in the form of knowledge sharing about the testing of new learning designs (characteristic no. 2) was facilitated through two onsite seminars: a kick-off seminar at the beginning of the course and a final seminar at the end of the course. Also, participants were given access to an online learning platform on Moodle where they were encouraged to study selected reading materials and share and give feedback on their respective learning designs in an asynchronous discussion forum.

To ensure that the learning activities of the course are anchored in both the inter-institutional and local learning communities (characteristic no. 3), the course was

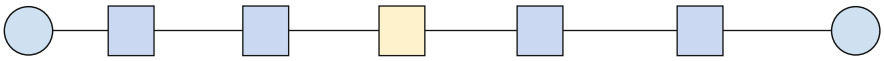

Fig. 8.1 Legend: Square = online, circle = onsite, yellow = local, blue = inter-institutional, size = number of hours allocated to each activity

divided into 5 design phases in which participants were asked to test in their local contexts the learning designs they had developed and subsequently share their reflections with the other course participants on the online platform.

Links between inter-institutional and local learning activities (characteristic no. 4) were established through three content themes (flexibility, collaboration and visualisation). All learning activities were linked to the themes, which were presented at the kick-off seminar. The reading materials and the learning designs developed by the participants were centred around one or more of the themes.

The adaptation of the key design principle in the first intervention can be illustrated as follows (Fig. 8.1).

The two circles represent the onsite kick-off seminar and the final seminar. The four blue squares represent inter-institutional collaboration, which takes place on the asynchronous online platform. The yellow square represents the participants' experimentation with learning designs in their local contexts. The size of the circles and squares indicates that an equal number of hours were allocated to the activities.

Empirical Findings – Participants' Reactions to the Adaptation

In the following, we present data in the form of clustered statements from a series of semi-structured interviews with nine course participants, including five university employees, two university college employees and two business academy employees. The interviews were conducted after the completion of the first intervention. All course participants were invited for an interview; nine participants accepted the invitation and two participants did not respond.

The Intention Underlying the 'Doubleness' Is Unclear

The interview data show that there is considerable variation in how participants understand the 'doubleness' of the Double Learning Community. As previously mentioned, the term 'double' refers to the fact that participants are expected to take part in an inter-institutional learning community (as established through the online platform and during the onsite seminars) and a local learning community (comprising the participants' colleagues at their home institutions). However, none of the informants seems to be aware of the underlying intention. Rather, they relate the

concept of 'doubleness' to either double-loop learning (two informants), blended learning (one informant), the fusion of content and pedagogical knowledge (three informants) or the fact that the participants represent different levels of expertise in using digital technologies as either experts of novices (two informants).

Considering the confusion among the participants as to the concept of doubleness, it is tempting to discard the key design principle in the next intervention. However, several of the informants mention how they appreciated interacting in a safe learning environment with peers from other institutions during the onsite seminars. For instance, one informant describes the kick-off seminar as 'exciting' (informant F) and another found that 'an open and safe atmosphere where you could discuss your teaching experiences and ideas with the others [i.e. participants from other HEIs]' was quickly established (informant D).

Moreover, the participants generally hold a positive attitude towards inter-institutional collaboration and learning. One informant explains that he:

> *[...] would like people from other traditions within education [to participate]. The more minds from different locations, the more diverse perspectives we'll get on how to handle teaching situations. Other perspectives on teaching and learning will be represented.* (Informant A)

Another informant argues that the participants can learn from each other across institutions because they, broadly speaking, are teaching the same target group:

> *We all teach students who have finished high school [...]. It's interesting to hear how students act in other contexts. It's inspiring and makes me think 'why don't my students behave like that?' Which factors cause them to act differently? What can I change in the way that I plan lessons?* (Informant I)

The attitudes expressed above are echoed in varied forms throughout the interviews. Generally speaking, the informants find that their respective teaching practices share a number of similarities, which allows for them to understand the challenges that they are each facing in relation to using digital technologies in education. At the same time, they believe that their prior teaching experiences and the contexts in which they teach are also sufficiently diverse for them to learn from each other.

Lack of Participation and Little Sharing of Knowledge

The variation in how the informants understand the 'doubleness' of the Double Learning Community seems not to be rooted in a negative attitude towards the key design principle, but rather in the fact that – for a majority of the participants – inter-institutional learning and collaboration did not take place. Commenting on the relationship between the intended idea of doubleness and his actual experiences with the course, one informant explains that:

> *On the first day [of the course] I was given another definition: that the double refers to our collaboration with other institutions. But I haven't experienced that.* (Informant C)

Several informants express similar attitudes. Their experiences are in most cases linked to the adaptation of specific characteristics of the key design principle, e.g. the adaptation of characteristic no. 2 (developing a learning community that stimulates inter-institutional and local collaboration). Although the onsite seminars were found useful for developing a learning community, the online discussion forum was not used by the participants. One informant explains that she:

> *[...] haven't used it at all [the online discussion forum]. I haven't exploited the potential that it might have. And there may well be potential to it.* (Informant G)

Similarly, another participant explains that once the onsite kick-off seminar was completed and the online periods of the course began, she experienced that:

> *[...] the feeling of being part of something across institutions, it wasn't there anymore.* (Informant C)

Furthermore, the adaptation of characteristic no. 4 (establishing links between inter-institutional and local learning activities) through the use of reading materials on the three content themes was unsuccessful. Both the amount and types of texts available on the platform were described as an obstacle by the participants. Asked if she had consulted the assigned literature, an informant says:

> *No, in fact I haven't. It didn't trigger me. I found it too peripheral and heavy, so it wasn't something I looked into. It's what I can use here and now [that interests me] because we already have... or I have... a lot to read as it is.* (Informant G)

Thus, two central elements of the online platform, the discussion forum and the reading materials, did not meet the needs of the course participants, which adversely affected their engagement in the online part of the course.

Feedback and Experimentation Considered Useful

Conversely, the interview data show that the informants experienced a high learning outcome when the learning activities and feedback from the course participants and facilitators were tied closely to their experimentation with new learning designs. One informant explains that she appreciated:

> *[...] Exemplary learning, you know, one to one, someone who gives feedback on my problems. Or when I need new [digital] tools, someone who can show me what to do [...] That's something I can use in my daily working life.* (Informant G)

Another informant gives a concrete example of how she gained hands-on knowledge from another participant during the kick-off seminar:

> *She [a participant from another HEI] showed me how to insert a link on the Moodle platform in a different way. I used this trick and it worked just fine. So it's important to me that we focus on problem solving.* (Informant H)

Along the same lines, yet another informant explains that:

> *The doubleness for me was when I received feedback from you and online feedback from Charlotte... and also from Anne [all course facilitators] because it gave me a whole new perspective on things.* (Informant C)

Conclusively, the participants have gained useful input from both their peers and the course facilitators, especially during the onsite feedback sessions that were directly related to the development of and experimentation with the participants' learning designs.

Unboxing the Revision Process

In the following we seek to unbox our revision process with reference to the interview findings presented in the previous section. The findings are with a particular focus on the revision of aspects related to the key design principle and its adaptation for the second intervention as well as the revision strategy applied by the research and development team in the revision process.

A challenge related to revision processes in DBR is the question of how to determine which aspects of a given educational design solution to revise. We argue that at least three aspects of an intended solution must be considered for revision, namely (1) the initial pedagogical theory guiding the intervention, (2) the transformation of the theory into guiding principles and (3) the adaptation of the principles in the proposed design solution.

It may be argued that the context in which the intervention takes place should also be considered for revision. However, a central characteristic of DBR is that interventions take place in messy settings and therefore researchers must take the particular context into account when designing their solution. Once a proposed design solution has been put forward it can be enacted in practice through the interactions between materials, teachers and learners (Design-Based Research XE "Design-based research (DBR)" Collective, 2003). Subsequently, the enactment produces an outcome that can inform the researcher about the promise of the intervention. In relation to this, Dede (2004) questions approaches where the enactment is deemed unimportant as long as the principles of the intended design are realised. Dede warns that such interventions can easily lead to situations in which DBR presents unfalsifiable propositions, with failures always attributable to defects in implementation rather than flaws in the theory-based design itself (ibid). Instead, Dede calls for standards for determining when to abandon suboptimal solutions, while at the same time acknowledging the complexity of generating such standards in the field of education.

Revision Strategies: Narrowing Down or Branching Out

Additionally, we suggest that researchers consider the overall purpose of their revision activities when revising the theory, the guiding principles or the adaptation of the principles of a tested solution by determining whether the analysed data call for further exploration of the solution space (branching out) or refinement of a confined set of predetermined criteria (narrowing down). Such broad categories of design purposes can be found throughout the history of design theory, e.g. divergent and convergent thinking, also at activity level in the shape of sketching and prototyping (Buxton, 2007). Sketching is a communicative activity as the designer through the materialisation of her thoughts creates an opportunity of entering a dialogical space. Goldschmidt (2003) labels such activities as the "backtalk of self-generated sketches". Sketches are characterised by being quick, readily available, dense, self-generative, plentiful, suggestive and ambiguous (Buxton, 2007; Belardi, 2014). A design-based researcher immersed in the activity of sketching is thus investigating the range of possible solutions regardless of whether she is focused on revising the underlying theory, the guiding principles or the adaptation of the principles. In contrast to the purpose of sketching, Buxton argues that the activity of prototyping is linked to convergence where designers seek to refine, test and resolve specific issues in a narrower funnel of possible solutions. It is difficult to determine whether branching out or refining is the most efficient strategy for a design team to adopt at a given time of a design project. However, from a research perspective we argue that analysis of data that stem from interventions should be a determining factor.

Data-Informed Revision

The informants' less positive experiences with certain elements of the Double Learning Community seems not to be rooted in a negative attitude towards the key design principle, but rather in the adaptation of the principles. What the data show is that the informants hold a positive attitude towards inter-institutional collaboration but, at the same time, they do not have the time for or are not interested in contributing to the online learning community.

Returning to the key design principle of the DLC, the participants appreciate the intention underlying the four characteristics, but they also find that the success criteria were not met. Particularly with regards to active participation (characteristic no. 3), the informants find that the principle was adapted in an unsuccessful manner. Additionally, as success criterion no. 3 was not fulfilled, the participants inevitably did not share knowledge with each other across institutions as intended (characteristic no. 2).

The data show an interest among the informants to explore the potential of receiving further immediate feedback when experimenting with new learning

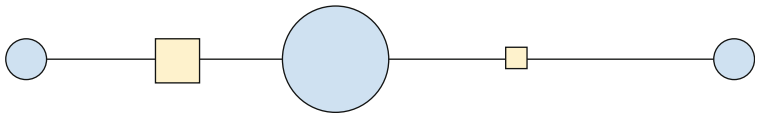

Fig. 8.2 Legend: Square = online, circle = on-site, yellow = local, blue = inter-institutional, size = number of hours allocated to each activity

designs. This pointed our attention to the supporting design principles of promoting learning through experimentation (the fifth principle) and assisting reflective practitioners (the sixth principle). Based on the data we determined that the participants had no issues with the underlying theory or the way in which we had transformed the theory into guiding principles. What the feedback from our participants did point to, however, was that the adaptation of the principles in the proposed design solution needed to be revised.

Considering the above findings in relation to the two design strategies previously discussed, i.e. narrowing down versus branching out, we had the option of either refining the adaptation of the design principle or redesigning the way it was adapted. Based on the data, we have decided to apply a strategy of branching out. The fundamental criticism brought forward by the informants, especially regarding the online aspects of the course, led us to conclude that it would be insufficient to simply refine the online activities, including the discussion forum, and find alternative reading materials. Instead, we went back to the drawing board and sketched out several new adaptations of the key design principle. The team explored various key parameters following our strategy of branching out. Aspects of technology vs. instruction, F2F vs. online, synchronous vs. asynchronous, strong thematic structure vs. no themes at all, among others were stretched, pushed and re-iterated until three vastly different but still tentative solutions were put forward and received feedback from selected experts from the participating institutions. As illustrated in Fig. 8.2 above, the design process led to a new branch of adaptation where the interaction and dialogue between the participants take place onsite, including mandatory inter-institutional observation visits, rather than online through an asynchronous discussion forum.

Adaptation of the Key Design principle in the Second Intervention

We now briefly outline how the adaptation of each characteristic of the key design principle 'Fostering a double learning community' was redesigned by the research and development team in the autumn of 2021 by using the revision strategy of branching out.

The overall recruitment strategy (characteristic no. 1) remains unchanged. However, participants are now enrolled as pairs comprising two colleagues from the same

institution to strengthen local anchoring. A total of 33 participants from the three HEIs are enrolled in the second intervention, including five educators from a university, 19 from a university college and nine from a business academy. The participants have not previously taken the course and represent different academic fields, such as social work education, pre-teacher education and teacher education (university college), the natural sciences and the social sciences (university), and finance studies and further education in management (business academy).

The second characteristic of stimulating inter-institutional and local collaboration is redesigned. The online platform is restructured to function only as a repository of shared resources. All interaction and dialogue between participants take place onsite at different campuses. Participants are required to carry out inter-institutional visits to observe and discuss experimentation with each other's learning designs.

In order to anchor the learning activities in both the inter-institutional and local learning communities (characteristic no. 3), the participants focus on designing and testing new solutions onsite in collaboration with a feedback partner from another HEI. This reduces the number of learning activities and minor cycles of the course to a few key meetings between the participants.

Lastly, the onsite visits between peers from different HEIs serve the purpose of linking inter-institutional and local learning activities (characteristic no. 4). During the onsite kick-off seminar, the participants decide which of the three content themes they would like to focus on. Subsequently, feedback partners are paired across institutions for the remainder of the course period. The intervention period ends with a final onsite seminar.

The second intervention can be visualised as follows:

The two small circles represent the onsite kick-off seminar and the final seminar of the course. The two yellow squares indicate the workload related to asynchronous self-study of the course materials in the online repository. The large blue circle represents the onsite campus visits at the three HEIs.

Conclusion

The findings from the interviews with the course participants show that they hold a positive attitude towards the key design principle 'Fostering a double learning community', but the adaptation of the principle is unsuccessful as they have not experienced the intended hybridity of the course in the form of inter-institutional collaboration. This is largely due to the fact that the participants do not have the time for or are not interested in contributing to the online learning community, which served as the primary setting for inter-institutional interaction in the first intervention. For the second intervention, the adaptation of the key design principle was redesigned through the strategy of branching out, resulting in an intended design with a greater focus on inter-institutional collaboration through onsite observation visits and cross-institutional feedback on tested learning designs.

Hence, the DDL exemplifies an intervention project in which a guiding principle remains intact, but the first and the second adaptations of the principle differ substantially. Considering the interconnectedness of networked learning contexts, exemplified here by the Double Learning Community which aims at connecting educators and their practices across academic and institutional boundaries, it should be mentioned that changes in the adaptation of one design principle most likely will lead to changes in other design principles. As highlighted by the NLEC (2020), one of the key issues in Networked Learning is about finding the proper balance between humans, technology and collaborative practice. Given that the proper balance will depend on the specific community, its purpose and members, the design process will inevitably contain black boxes whose specific content will unfold only in practice, which calls for close monitoring and consideration.

We propose that design researchers consider three aspects and two opposing strategies when revising on the back of an intervention. While our suggested list of aspects and design strategies is most likely inexhaustive, we believe that many intervention studies would benefit from unboxing their revision processes to a greater extent. Such considerations are pivotal if other interested parties are to follow the logic behind the iterative progression that characterises design-based intervention studies. Furthermore, the opposing revision strategies of branching out and narrowing down can help increase the awareness among researchers as to when to abandon suboptimal solutions and when to further increase the effectiveness of promising ones.

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Chapter 9
How to Design for the Materialisation of Networked Learning Spaces: A Cross-Case Analysis

Mette Wichmand, Magda Pischetola, and Lone Dirckinck-Holmfeld

Abstract The potential of a networked learning (NL) space comes into being when participants establish communication, build connections with one another and create a dialogic space. Moving from this premise, this chapter poses a complex question: *How to design for the materialisation of a networked learning space for professionals in education*? It bases its theoretical framework on Bakhtin's idea of centrifugal and centripetal forces, the concepts of network core and periphery as well as the idea of the strength of weak ties. Through these lenses, this chapter presents a cross-case analysis of two projects aimed at teacher/leader professional development in technology education in Denmark: Master of ICT and Learning (MIL) and Teknosofikum. The two cases are analysed qualitatively through the concepts of forces, connections and movements. Findings show that the materialisation of NL spaces occurs through the constant movement between centrifugal and centripetal forces; the core and the periphery meet in between, and new connections are created in this encounter. The newly materialised NL spaces will not survive the ending of the courses. They do, however, allow for experimenting with NL principles and for bringing new practices and ideas into the participants' own organisations.

Keywords Networked learning space · Centrifugal and centripetal forces · Core and periphery · Connections · Professionals in education

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Introduction

The long-standing concept of networked learning (NL) (Goodyear et al., 2004) has undergone a recent collective redefinition towards a more situated sensibility; it now comprises a broader conceptualisation of cognition and it acknowledges the 'messiness' that characterises learning processes (NLEC et al., 2021). The critical and emancipatory roots of NL have expanded to include socio-technical, sociomaterial, postdigital and postphenomenological perspectives (Pischetola & Dirckinck-Holmfeld, 2021). In this reconceptualisation, NL now stresses how learning is a complex, emergent and holistic process that appears inseparable from the surrounding environment; the network can be considered an assemblage of actors and organisations where agency is distributed and decentralised. On these grounds, it is crucial to understand how the connected actors taking part in a network can create a space for NL or, in other words, how their agency materialises in a specific, situated, and unique space-time (Orlikowski, 2007).

Thestrup et al. (2018) suggest that a NL space comes into being when participants become aware of the potential of NL, establish communication and build 'experimenting communities' (NLEC et al., 2021, p. 21). In this sense, a NL space is a dynamic ecosystem (Miranda & Pischetola, 2020), where participants take responsibility for their own and others' learning while navigating the networks multiple dimensions and layers (Blaschke et al., 2021). Thus, a NL space is first and foremost a relational space (Jones, 2004; Jones et al., 2008) – that is, it is made of elements and the relations between participants (Mol & Law, 1994). Yet a NL space escapes formal structures (Fawns, 2019) and cannot be conceived as stabilised through a set of well-identified nodes (Lamb & Ross, 2021), as its fluidity is essential to nurture the network itself. Bearing this in mind, this chapter poses a complex question: *How to design for the materialisation of a networked learning space for professionals in education?*

As Hodgson et al. (2012) pointed out, a community organised around a NL space must be 'designed into' learning events by teachers; it cannot assume to exist without an intention. In this chapter, design is thought of as a non-linear process in which ideas are developed, challenged and tested in order to generate new answers to complex questions – in this case, the question is how to enable the materialisation of a NL space (Dorst, 2012). Drawing on the tradition of design thinking, we see educational design as an iterative process; thus, the cases presented in this study should therefore be seen as 'proto-types', ideas to be tested, evaluated and open for redesign. The main intention of such a process is for the involved community to support one another in developing a shared process of learning (Hodgson et al., 2012).

To inform the designs presented here, we embrace Bakhtin's concept of centrifugal and centripetal forces (Bakhtin, 1986), the concepts of network core and periphery (Borgatti & Everett, 2000; Freeman, 1979; Hargadon, 2005) as well as the idea of strong and weak ties (Granovetter, 1973). Building on these theoretical grounds, we present two cases of design for the materialisation of a NL space and examine their potential for the creation of living and experimenting communities of

networked learners. The cases are bound together by a shared focus on educating teachers and leaders from the educational sector to have a critical and reflective approach to the role of technologies in education. Furthermore, both cases intend to design NL spaces and facilitate the establishment of a relational dialogue among the participants that supports the learning process during the course. But the cases also work as a structure for continuous learning after the course has ended.

Materialising a Networked Learning Space: Forces, Movements and Connections

In the NL tradition, dialogic communication has often been highlighted as the main element for the establishment of connections among the nodes (Goodyear et al., 2004; Hodgson & Watland, 2004; McConnell et al., 2012). However, despite the well-accepted idea that the construction of knowledge is a socially negotiated activity, in educational settings, dialogue can also be seen in an instrumental way, as a tool (Mishra, 2015; Pischetola & Dirckinck-Holmfeld, 2021), rather than understood as a necessary condition for any human relationship (Matusov, 2011). These issues resulted in the need to redefine NL in the first place (NLEC, 2021).

In this chapter, we adopt Bakhtin's theoretical perspective on dialogue, understanding its material power (Naumann & Pischetola, 2017) for the creation of NL spaces. In fact, a Bakhtinian perspective on dialogic communication can help us analyse the forces at work in this materialisation and discuss the value of any type of relationship, including those between people and resources (Jones et al., 2008), those that have been defined as 'weak ties' in literature (Granovetter, 1973) and those that are defined by their positions at the core or in the periphery of the network (Borgatti & Everett, 2000; Freeman, 1979; Hargadon, 2005).

Centripetal and Centrifugal Forces: Creating Meaning

According to Bakhtin (1986), dialogue is shaped both by *centripetal* and *centrifugal* forces (Mishra, 2015). Centripetal forces lead towards unification, homologation and monologism (Matusov, 2011), whereas centrifugal forces lead towards complexity, diffusion, and multivoicedness (Elden, 2007). These forces might 'open the pathway for ideological becoming' (Mishra, 2015, p. 79), as they comprise more than one unified truth about the world.

The movement between these forces also has a relationship with the creation of meaning in time. Bakhtin argues that an utterance made in the present is always related to utterances made in the past. In this sense, every utterance carries with it traces of history – of previous meanings. At the same time, an utterance is also always connected to the future, as every utterance contains the seeds for future utterances and meanings (Bakhtin, 1986).

In an educational perspective, Bakhtin's argument is relevant because it becomes possible to understand learning as a dialogical process of continuous meaning making. A process where the centrifugal forces challenge our centripetal movement towards a self-authored voice characterised by unification, homologation and monologism by introducing us to a multi-voiced space, characterised by complexity and diffusion (Bakhtin, 1986).

Taking Bakhtin into account when one wants to design for the materialisation of a NL space makes it important to design for the participants' movement between centrifugal and centripetal forces as well as between unification, homologation and monologism on one side and complexity, diffusion and multivoicedness on the other.

Movements Between Core and Periphery: Facilitating Access to New Resources

Individuals mutually constitute one another, as through dialogue, they build meaning and knowledge about themselves (Bakhtin, 1986). This view is in line with a relational understanding of networks, in which individuals acquire an identity in a context depending on the position they occupy in the network (Jones et al., 2008).

According to Dahlander and Frederiksen (2012, p. 989), a person's position in the network 'can range on a continuum from core to peripheral'. Individuals positioned at the core are often considered to hold an advantageous stable position with many connections to other nodes in the network; they therefore have an empowering access to resources (Borgatti & Everett, 2000; Freeman, 1979; Hargadon, 2005).

The intention in both cases is to design for the materialisation of a NL space by using core members' access to resources to enable more peripheral members to move closer to the core and form newer or stronger ties. In both cases presented in this study, we see the universities offering courses where both core position members and peripheral actors move closer together. And we have seen that this materialisation of a network can provide participants with access to new resources. In both cases, the intention was to create a network that would last longer than the course itself and provide the members with continuous access to the resources needed to translate the knowledge created during the course to the participants' context and everyday practice.

Connections as Constellations of Ties: Giving Value to Knowledge Creation

In a NL perspective, it becomes important that educational settings – seen as knowledge-creating contexts – bring people together in new networked constellations. However, it is not clear how these constellations are built or how they come to being.

In the attempt to find a bridge between micro-level interactions and macro-level patterns of networks, Granovetter (1973) characterised the strength of interpersonal ties through four key elements: amount of time dedicated to the interaction; emotional intensity of the exchange; intimacy; and reciprocal services. According to his analysis, 'weak ties are more likely to link members of *different* small groups than are strong ones, which tend to be concentrated within particular groups' (Granovetter, 1973, p. 1376). The major implication of these findings, the author concludes, is that individuals' experiences are tied up with larger social structures: weak ties, often dismissed as irrelevant in sociological theory, are the connections that mostly provide integration into communities and local cohesion.

Four decades after this theoretical contribution, Jones et al. (2008) applied this model to virtual networks and found the strength of weak ties to be even more relevant for the materialisation of NL spaces.

In the following sections, we will explore and discuss what materialises a NL space. We will emphasise three aspects, related to forces, movements, and connections, respectively: (1) shared meaning making through dialogues shaped both by *centripetal* and *centrifugal* forces; (2) space for innovation through movements between *core* and *periphery;* and (3) the value of knowledge exchange and knowledge creation in the dynamics that acknowledge the *strength of weak ties*.

Research Methods

Our methodological approach is structured around a cross-case model of analysis. Khan and VanWynsberghe (2008) propose that mobilisation of new knowledge occurs when studying different cases at the same time. According to Byrne (2005), a comparative method of analysis is well suited to explain the complexity of a phenomenon, and it also has the potential to reshape the investigative tools in human and social sciences. Particularly, case-based methods can offer us 'a new way of seeing how things have come to be' (Byrne, 2005, p. 101) – that is, their process of materialisation. This idea recalls the dialogic space theorised by Wegerif (2011), which understands knowledge as the result of the clash between different perspectives, seen from both the outside and the inside. In a cross-case analysis, we operate with the same principles of dialogic and relational theories: we look at the *relationship* between the cases rather than consider the studies as separate parts or compare/contrast their results.

In a review of cross-case analysis approaches, Khan and VanWynsberghe (2008) divide them in two main categories: (1) a variable-oriented approach, where similar factors are used to evaluate both cases independently before comparing them; and (2) a case-oriented approach, where similar processes are highlighted in diverse sets of studies. The latter 'can show how a story unfolded in different cases, how researchers can make sense of the original case, or suggest new typologies, classes or families of a social phenomenon' (Khan & VanWynsberghe, 2008, p. 9). A key strength of a case-oriented approach is that it is a holistic approach, meaning that it

considers each case in its complexity; it considers all different combinations of conditions that can produce a certain outcome (Rihoux & Lobe, 2009). Such an approach also forces researchers to justify their choices from a theoretical perspective, with additional observable implications than the original one-case analysis (Beach & Rohlfing, 2018). In this sense, it proves to be an interesting methodology for the purpose of our research, which explores the process of designing for the materialisation of NL spaces.

It is important to underline that the authors of this chapter have come together in a shared interest in digital technology and learning. We are all involved in the two cases presented as teachers, educational designers, researchers and managers. This constellation has a strength in that we are all internal observers of the two cases described, but we also provide an outside-in view to each other's project. In this sense, we are trying to create our own small NL space through the cross-case analysis that follows.

Cases

Both cases refer to courses held in higher education for professionals working in different educational settings. The courses are offered with a similar structure/duration and in a hybrid format, which comprises both physical and online activities.

We will report the two cases through a narrative based on participant observations during physical workshop activities (Case 1 and Case 2). We also use student-produced materials from the physical and the online activities, as well as the knowledge shared during the seminar, for Case 1. Qualitative group interviews (Cohen et al., 2002), posters, and video-recorded presentations are used for data collection in Case 2.

For Case 1, Master in ICT and Learning (MIL), we draw on rich data materials from the workshops and course activities. These materials were constructed in the participants own organisations as well as in collective activities during the course. The detailed materials were: 30 to 40 photos taken by the students from their educational setting and organisation; workshops discussing the concept and use of technology based on the photos, including plenary sessions where students produced post-it reflections on their observations and learnings; teachers' notes on the whiteboard from their observations; and plenary discussions. During the online period, the students worked side by side in groups of three to four with a supervisor. This was followed by a knowledge-sharing seminar with group presentations based on slides and discussions. Furthermore, each student had to deliver a short reflection paper (4 p.). All produced materials were kept on the virtual learning platform for shared use, and the process was documented by photos; main points of discussions were kept on whiteboards or Padlets. All the researchers participated in all physical and online activities. After the main sessions, researchers were sharing notes and

observations guided by the research questions and a hermeneutic 'reading' and mutual discussions. The educational process provided an authentic glimpse into how networked learning unfolds, and it produced a rich dataset with a high ecological validity (Andrade, 2018).

The workshops were designed to 'produce the best learning experience for the students and as such designed to amplify certain elements while reducing others' (Ørngreen & Levinsen, 2017, p. 73). However, at the same time, they served as research workshops, where the participants 'along with their expected and performed agency, become part of the research design and the data-producing apparatus' (ibid, p. 73). Ørngreen and Levinsen discuss how these dual purposes with regards to roles, expectations and interests can sometimes contradict each other; however in our case, the two purposes went hand in hand as we as teachers (as well as the students) were also engaged in understanding the materialisation of NL spaces, and we as researchers could use the produced data and materials in the research.

For Case 2, Teknosofikum, we draw on the data collected along three iterations of the course, through five qualitative online group interviews (Cohen et al., 2002) with course participants (first iteration), as well as through observation of group activities during four physical workshops (second and third iterations). The interviews were recorded and afterwards analysed through the methodology of design-based research, which involves preparation of a prototype, experimentation (the trial itself, where data are collected) and reflective analysis (Pischetola & Møller, 2023). Participant observation (Cohen et al., 2002) was carried out by two educational designers and a postdoctoral researcher during both online activities and physical workshops. Interviews and observations were complemented by other materials collected along the course. Posters produced by course participants were stored and photographed by the researchers for later additional analysis, and group presentations were video recorded with the permission of the course participants. The researchers also took field notes of the discussions in plenum during the workshops. The data were analysed inductively through the methodology of grounded theory (Glaser & Strauss, 1967).

For the purposes of this chapter, we examine what emerges in both cases about centripetal/centrifugal forces, their movement between the core and the periphery, and the emergence of a strength among weak ties in NL spaces.

Case 1: Master of ICT and Learning

Master of ICT and Learning (MIL) is a two-year, 60 ECTS, part-time continuing adult education program, which was established in 2000 as a collaboration between four universities in Denmark: Aalborg University, Aarhus University, Copenhagen Business School and Roskilde University. Over the years, MIL has produced more

than 450 degrees, and more than a thousand students have participated in its modules[1].

For Case 1 in this study, we describe a six-week, 5 ECTS, elective course, which was offered in the spring of 2022. The elective is called 'Leadership, education and technologies – Post COVID-19' and is aimed at managers and executives in the educational sector who have an interest in the interplay between technologies, organisational learning and pedagogical development. The elective is organised as a mix of physical, online and hybrid participation, individual fieldwork and group work. The assessment criterion is pass/no pass based on an uploaded portfolio documenting the students' work and learning throughout the elective subject.

Over the years, technological development has become faster, and technologies are no longer 'nice to have' in an educational setting; they are more or less a prerequisite. Due to COVID-19 and the shift to remote learning, educators and educational institutions have gained much experience with teaching with technologies. This development calls for practitioners who not only can use and design with technologies but can also feel empowered to instigate and facilitate critical discussion about the access and use of technologies in education as well as what we want future technologies to enable. These are discussions that need to take place at all levels and in all corners of the educational system – also among managers and executives.

A total of 17 (12 women and five men) students signed up for the elective representing different types of educational institutions: high schools; business school; health educations; agricultural schools and university colleges. Some were leaders and head teachers, and others were teachers. Some took the elective as part of their full MIL; others only joined for the elective.

The development and execution of the module was done by three teachers. Two of the teachers have personal experience as leaders. The elective is designed to enable a NL space – a space where not only a collective exploration of the influence and management of digital technologies in educational organisations can take place but also where a network among the participants and the resources present is formed. In what follows, we describe the design of the three phases of the course: the physical seminar, the online period and the final presentation. We show how the design around centripetal and centrifugal forces was used to enable the participants to form connections with one another as well as with the materials offered during the course. The intention was to make them move between individual and multi-voiced networked processes and allow them to formulate new questions connected to the interplay between technologies, education and leadership. Questions that can guide future technological developments in their home organisations as well as within the educational sector as a whole.

[1] For a full description of the program, see https://www.aau.dk/uddannelser/efteruddannelse/master/ikt-laering

The Physical Seminar

The course brings together 17 people from different parts of the country and different educational organisations. In order to support the formation of connections between them, the participants are invited to a short online introduction before the official start of the course takes place as a physical meeting from 10 am to 3.30 pm at Aalborg University, Copenhagen. During the online meeting, the teachers talk a bit about the course design,

but the main goal is for the participants to start building connections.

When meeting physically for the first course day, the participants encounter several centripetal and centrifugal forces. As preparation, the participants are asked to produce 30 to 40 printed photos of technologies existing in their home organisation. The assignment brings both centripetal and centrifugal forces into play: centripetal in the sense that the participants work with a shared focus and centrifugal in the sense that the created material is multifaceted depicting many different technologies and organisational contexts.

As the participants meet, share and introduce their pictures, a centrifugal process is instigated – a process in which the participants in groups of three examine the organisations and technologies represented in the pictures. During the process, the participants are introduced to a theoretical model for analysis (i.e., activity theory, see e.g., Engeström & Sannino, 2010) and are asked to continue their analysis using the model. At the beginning, the participants find themselves in a centrifugal process where they get insight into the technological practices of other organisations, but slowly they move into a centripetal movement, as they discover the similarities and the shared experiences with technologies across their organisations – as when they discover that they have a picture of the same technologies or when they share the challenges they experience with the technologies.

At the end of the physical seminar, the participants are asked to bring the analysis and reflections from the day together in a centripetal process of formulating a 'research question' that can guide their work for the coming 6 weeks of the course.

The Six-Week Online Period

After the initial physical seminar, the course continues online with a mix of online seminars for the participants as a whole and online group work supported by a supervisor.

During the first 2 weeks of the online period, the participants are asked to interview actors in their home organisations, with the aim of creating a new centrifugal process that will allow the encounter of more and various voices.

After creating data in the home organisations, the participants will enter into a period of analysing, discussing and reflecting on their collective material (i.e., pictures, theory and interview data), with the aim of bringing the many and diverse voices present in the material together – a centripetal movement leading to new

findings, understandings, questions and wonderings related to the interplay between leadership, education and technologies.

The Final Presentation

At the end of the course, a hybrid meeting is organised, where some participants are present together physically, and some participate via Zoom. The participants then present and discuss their group work.

One of the last assignments the participants are asked to produce is a post for the social network LinkedIn (actual posting is voluntary). The goal of the post is to disseminate to others outside the course what was learned as well as instigate a dialogue between the participants and a larger network of actors in the educational sector about the findings produced and issues raised by the participants during the course.

Master of ICT and Learning and the Networked Learning Space

Figure 9.1 illustrates how the design of the course is intended to enable movements between the centripetal and centrifugal forces during the course and facilitate the connections between the participants and the materials. The centripetal forces are illustrated by the lines moving into a crossing and the centrifugal forces by the lines moving to the points where the lines are the furthest apart.

The centripetal and centrifugal forces come into play in the design through the use of the photo method, theory and analysis. It is important to understand that all of the elements can enable both centrifugal and centripetal forces. The photo method, for example, allows for both the centripetal movement of strengthening the participants' focus on the course's theme and a centrifugal process where the participants get a look into each one another's organisations.

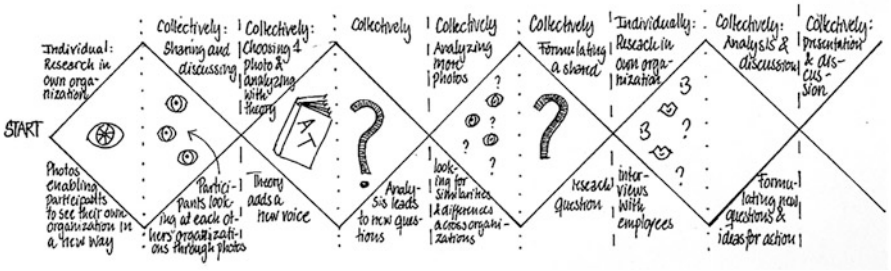

Fig. 9.1 Design for movements between centripetal and centrifugal forces during the course

During the course, the centripetal and centrifugal forces are used to generate connections between the participants and between the participants and the materials presented and created during the course. An example of this is from the beginning of the course, when the participants present their individual stack of photos. In this process, the participants discover that some of their photos are nearly identical and that they share with others some of the same challenges and questions connected to the role of technologies in their organisation. This discovery of communality is reflected in the following quotes from some of the participants.

> *I discovered that we share some of the same questions across organisations, but that we have different views on those common problems in the groups* (M, physical seminar. Translated by the authors).

> *In the dialogue that emerged around our pictures in the group, it became clear that despite the differences between our schools, we had a common interest in what is seen as good teaching in the organisations and how technology plays a role in that* (K, final portfolio. Translated by the authors).

The shared experience allows for the formation of ties not only between the participants but also between the participants and the material. These connections develop during the analysis of the photos and later the interviews. As the similarities become clear, the sharp divide between yours and my photos or interviews gets perforated, and the material becomes a shared resource.

Together, the centripetal and centrifugal forces and the connections formed during the course take the participants through a learning process, which enables the materialisation of a NL space.

This process is exemplified by the movement of the participants' perspective during the course. As they enter the course, they do so as individuals representing individual organisations, believing that they have individual challenges with leadership, education and technologies. By the end of the course, however, they feel more connected with one another and acknowledge that the challenges they face are shared by other leaders and organisations, which cannot be solved by individual leaders. Instead, the solutions are best created in a multi-voiced and networked process. This belief is exemplified in the following quote, in which a participant describes how the participants collectively start to identify points of interest across their organisations that they would like to explore further.

> *Last but not least, my knowledge and findings have been expanded by the collaboration in the group, which through discussion has found several points of interest among our organisations that could be worth exploring further* (M, MIL final portfolio. Translated by the authors).

However, a new reflection for us as designers was that we should not focus on designing for the formation of new stable or long-term NL spaces but instead design for the participants' meta-learning about the NL principles and their ability to put these principles into play in other contexts. This reflection is based on a quote like the following where the participant applies some of the design principles from the course – like e.g., multivoicedness.

> *How can I catapult this* [red. Learning from the course] *into the organisation?* [...] *I would like to be the colleague that hears the many voices present in the organisation and brings them forwards when needed and possible. I am present in other parts of the organisation than the teachers.* [...] *I can direct the focus and attention of others to something that is invisible to them but exists in the organisation.* [...] *I can bring different understandings into the light so that everyone can get a more nuanced and broader perspective* [...].
>
> (H., MIL final portfolio. Translated by the authors).

Case 2: Teknosofikum

Teknosofikum is a three-year project (2020–2023) funded by the Danish Ministry of Higher Education and Science as a follow-up to the national action plan in higher education named 'Digital Competences and Digital Learning' (UFM, 2018). The plan emphasises the need for teachers to understand digital technologies in a critical way and with ethical considerations, which will drive their teaching practices in all disciplines and subjects. The outcome of the project is a professional course in technology education for higher education teachers held in a hybrid format with a total duration of 37 hours. Four institutions are working collaboratively at this task: the IT University of Copenhagen; the Royal Danish Academy of Architecture, Design and Conservation; Design School Kolding and University of Copenhagen – Faculty of Law[2].

At the moment of writing, Teknosofikum has undergone five iterations – twice a year starting in May 2021 – with a sixth and last iteration scheduled for October 2023. For the cross-case analysis presented here, the first three editions of the course are taken into consideration, with a total number of 64 course participants, of which 22 have participated online and 44 in the hybrid format. The participants belong to the four partner institutions and since the third iteration from an additional higher education institution: University College Copenhagen.

The duration of the hybrid Teknosofikum course is 6 weeks in total; the learning path starts with a full-day physical workshop and ends in the same way. In between the two workshops, the participants are required to attend 20 hours of online self-paced study on a virtual learning platform and a midway online meeting, which is facilitated by educational designers. Inter-institutional groups are formed at the first workshop and they are maintained until the last physical workshop. In the second edition of the course, we have tried to make the groups also collaborate also during the online work, but this initiative did not work as planned, given that not all of the meetings were facilitated.

In what follows, we present the designing process of Teknosofikum, which has taken into account forces, movements, and connections at work in materialising a NL space.

[2]For a full description of the project, see https://www.teknosofikum.dk

The Physical Workshop

The first workshop is organised around two activities in groups, which aim at disclosing the theoretical framework (i.e., science and technologies studies [STS]) proposed along the Teknosofikum learning path.

In the first activity (morning), the course participants are asked to fill out a survey that will frame their pedagogical beliefs, intentions and actions as teachers belonging to a certain learning theory tradition. The survey was not used to collect research data, only as a conversational tool. Based on the survey results, the participants discuss in groups their teaching styles, their proposals to students and the challenges they face in teaching (with and without technologies). Most often, there is a convergence of forces (and understanding) around shared experiences, and the participants find themselves amused by the similarities they have with colleagues who teach different subjects at a different organisation.

In the second activity (afternoon), the course participants focus on digital technology and discuss it through a list of questions that explore different dimensions: economic, material, pedagogical, political, symbolic etc. They bring their professional expertise from different disciplinary fields – for example, design, humanities, IT, law and social sciences – to discuss the same object or artifact (e.g., digital tools, material objects, platforms and software) and its relationship to their daily pedagogical practice.

The purpose of both exercises is to find a correlation between theories and practices, which are not separated but entangled and co-created in an STS perspective. In a Bakhtinian sense, we see in both activities multiple forces at work in the creation of new meanings. A disciplinary field that would be at the core of a specific knowledge domain (e.g., computer science and discussing an object such as a wi-fi router) proves peripheral when discussing a political or a legal dimension of the same object. Thus, the course participants are constantly displaced between the core and the periphery of their own abilities of interpretation and sense making.

The Six-Week Online Period

In the virtual learning platform, the course participants work individually and in a self-paced mode. They are initially asked to pick at least 10 small topics to study (e.g., machine learning, computational trends and AI in higher education), which usually consist of a short video lecture or a podcast with a final debate in an online forum. In a few cases, the participants are also challenged to try new digital tools in their own teaching and then tell the others how the experiment worked out. Despite the debate in the online forum not being innovative in its format, the participants' engagement is high.

The Final Workshop

At the final workshop, the participants share the new knowledge that they have acquired. They may not have had enough time to go in depth with many topics, but some of the forum debates have made an impression on them, and their critical views on digital technology in education have sharpened. They meet in groups one more time, and they give each other feedback on a small assignment that they develop throughout the day: the creation of a teaching plan for a subject that they are teaching/will teach. The concreteness of the task makes the connections work, as their mutual superficial knowledge – the weak ties – proves now to be enough to give one another advice. The task also involves enacting one or more digital tools that they have used in the virtual learning platform, thus giving voice to their own creativity.

The Networked Learning Space at Teknosofikum

Figure 9.2 below shows the designing process of Teknosofikum along the first three iterations of the course. The forces at work are illustrated by a continuous line that expands towards centrifugal forces and a movement to the periphery in the first two iterations and towards the core in the third iteration. This process was due to a gradual transformation of the learning path from linear and predetermined to a more non-linear experience of attendance. In fact, the initial project description provided a list of eight modules that should be developed in the course, which were divided roughly into four disciplinary fields (i.e., computer science, design, law and pedagogy). In the project development, the educational designers decided to divide those modules in smaller 'topics', to facilitate a self-paced mode of learning based on concentrated content and in a cross-disciplinary perspective. However, after the third iteration, with more than 30 topics to choose from, it became evident that the course

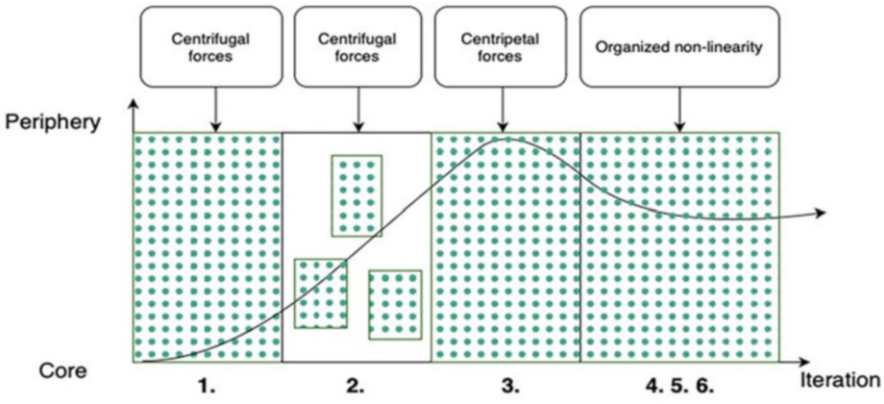

Fig. 9.2 Movements between centripetal/centrifugal and core/periphery

participants needed some sort of direction, and the topics were clustered into categories. The final design of Teknosofikum shows a learning path driven by the principle of 'organised non-linearity' (Pischetola & Møller, 2023).

One more element defines the development of the course in terms of what connections are facilitated. In Fig. 9.2, the connections are represented by the dots in the background. At the second iteration of the course, the course participants were divided in groups for the whole duration of the project, and this has proved to limit the interaction with other participants. Thus, this restriction was removed, and the groups were maintained only for the physical workshops, enhancing a more spontaneous dialogue among the participants.

In the following excerpts, we report some of the feedback received by the participants during the examined three first editions of the course:

> *I liked this exchange in the forum where I can also see different views from different professions. For me, it's very valuable to see the different view angles on some things because when we had the first meeting in person, there was this one exercise, this implosion thing, which we did, and I actually liked that. But I don't see how I could apply this in my field with the specific things I'm teaching'* (S., midway interview, trial 2).

> *What I like about our group is the age distribution. (...) You see the older people coming with experience and the younger ones with 'let's just try something' because they can. And you see that this exchange would also work the other way around* (H., midway interview, trial 2).

> *I did not expect to hear that colleagues that work with such different subjects had experiences so similar to mine with students, with the institutional challenges. I learned a lot today* (M., workshop 1, trial 3).

> *It is so much easier now to call any of you because we have been in the same room. We have shared this experience before going online, so you are not total strangers. This aspect is very important, as networking is always relevant for us academics* (H., workshop 2, trial 3).

In these briefs opinions about the Teknosofikum experience, we can delineate some results that highlight important aspects for the initial materialisation of a NL space.

First, interactions and communication among the participants – both online and in physical meetings – are mentioned as drivers for reflection, inspiration and potential change for teachers' practices. In these results, we find evidence of the importance of weak ties. Teknosofikum course participants mostly did not know each other before the course. Not only do they belong to different institutions, but they also work in different fields: law, design, IT and social sciences. Nevertheless, they appreciate the opportunity to connect with peers and to exchange ideas about teaching; in conversation with their peers, they found common challenges and common goals.

Second, on some occasions, the participants defined Teknosofikum as a 'safe space', where they were challenged with new activities (which they both liked and disliked), but failure was also accepted and even encouraged. The possibility to build such a protected space, where rules are different from the established institutional norms and outside of structural assessment and evaluation, provided participants with eagerness to try. They experienced being pushed by divergent, centrifugal forces, and they experimented with teaching in their own disciplines. This happened because of the course requirements (e.g., in terms of producing a video or a mind map) but also because of differences between the participants. In many cases, in fact,

the participants mentioned how they learned from being with colleagues that were completely different from them in age, discipline and even teaching perspective. Instead of representing an obstacle, this difference triggered their curiosity and made them try (or plan) something new.

The short duration of the Teknosofikum course trials did not allow for the (re)-combination of roles and positions in the NL space. However, it is relevant to mention that the participants at the final workshop requested that the online course remain available to them for future incursions and that the educational designers plan Teknosofikum not only as a 37-hour course but as lifelong and continuous learning experience.

Based on these findings, and since the second edition of the course, the team of educational designers has discussed the need to create a closer dialogue among participants of the same institution (e.g., by forming pairs of colleagues that will support one another along the course so that weak connections can become stronger). After the third iteration of the course, the facilitation process of the online meetings has also been strengthened. The online meetings are no longer considered as an optional 'drop-in' method of supervision, as they were initially designed, but as a required step that will support the self-paced individual learning during the 6 weeks online.

Discussion

The cross-case micro-analysis of interactions presented in this study is insightful in showing the fundamental materialisation of NL spaces, which can inform the future design of activities within the two projects.

In the case of MIL, the materialisation of a NL space is generated in the movement away from an individualised perspective towards a space, where listening to and connecting with multiple voices (Elden, 2007), represented by human and non-human actors (Pischetola & Dirckinck-Holmfeld, 2021), become meaningful for the participants. The analysis shows that the materialisation took place when the participants were enabled to move from their initial self-referential perspective, represented by their 40 images, through various centrifugal and centripetal processes (Bakhtin, 1986), which allowed them to hear both their own voice and that of others, see their own organisation from a new perspective and challenge their existing perspectives as well as develop new ones based on the presented resources. In these movements, the participants formed connections (Goodyear et al., 2004), as they discovered that the challenges they face are shared by their peers and other organisations.

In the case of Teknosofikum, the networking aspect of the project was underlined by many participants who pointed at the importance of having a space, both physical and online, both metaphorical and concrete, where they could exchange ideas and experiences about their own practices. In this perspective, the connections proved themselves powerful and useful for a cross-institutional exchange of voices and points of view. The forces at work (Mishra, 2015) showed how dialogue can be built

across disciplines and even disciplinary fields (i.e., law, design, IT, social sciences and humanities), on a different level than the usual institutional teacher professional development courses. This aspect was stressed, for example, by junior course participants who were pleased to exchange ideas with more experienced teachers. They mentioned that they had not had this chance before, even within the compulsory teacher development program (in Danish: adjunktpædagogikum) at their own institution. Perhaps, these connections are initially more volatile and unstable, but they are nevertheless meaningful for the course participants. These are the reasons to redesign the final format of Teknosofikum with a stronger focus on continuous dialogue and feedback among the participants, group activities along the course, and collaborative outcomes to present in plenary at the end of the process (Pischetola et al., 2022).

The cross-case analysis shows that in both cases, the strength of the design for the materialisation of a NL space lies in the movements between the centripetal and centrifugal forces as well as in the dialogic communication established in new connections among the nodes (McConnell et al., 2012).

The movements in the two cases are, however, different. In the case of Teknosofikum, the design followed an increasing centrifugal process, until a centripetal force was needed towards the end of the project and the final format of the course. In the case of MIL, the design followed a continuous alternation between the centrifugal and centripetal forces. On the other hand, the designed communication processes are quite similar in the two courses. In both cases, the focus was on the materials and activities that exposed the participants to a cross-institutional and cross-disciplinary dialogue in a way that made every group of participants unique (Pischetola & Møller, 2023). As we mentioned before, the ultimate intention of this design was enabling the participants to form connections that were strong enough to last beyond the duration of the course.

The analysis has illustrated that a NL space materialised during both courses, with an increasing value being put by the participants on multi-voiced dialogue and both familiar and unfamiliar perspectives on teaching and technologies. However, an open question remains, about the possibility for these NL spaces to survive after the end of the courses: Will the participants eventually integrate some of the new meanings emerged in the course into their own present and future teaching? That is, will the 'enactment of educational design' (Yeoman & Carvalho, 2019, p. 66) happen later on? We have no clear answer to that, only some indications worth reflecting on.

In the case of MIL, the course ended with the call for the participants to meet again online after 4 weeks. A meeting was organised, but only two participants attended. In the case of Teknosofikum, the participants asked for a prolongation of the collaboration among groups, but there is no evidence yet that they succeeded in creating such a practice. This indicates that the designs for NL spaces presented enabled the formation of weak ties that could last for a while – during the course and the formalised project activities – but they failed to move the participants into a more stable position with stronger ties.

This reminds us of the importance of the role of some peripheral members of a network, which Dahlander and Frederiksen (2012) call 'cosmopolitans'. This is a

role characterised by the member only visiting the network for a while and moving on to other networks. During the visit, the cosmopolitan explores the practices and ideas of the core members in the network, which enables them to 'transfer, translate, and transform experiences from one community to another' (ibid, p. 990). This concept calls for future studies not on how to design for the materialisations of NL spaces but on how to design for the long-term materialisation of NL spaces – facilitated by the empowerment of cosmopolitans.

Another aspect that appears crucial in the process of NL space materialisation is communication. Getting to know each other, even on a superficial level, allows the participants to connect and to possibly collaborate on future projects. Their shared experiences around activities aimed at discussing teaching practices and technologies mean the participants are no longer strangers. The new weak ties have potential strength for them (Granovetter, 1973).

Conclusion

This chapter took its point of departure in the research question *How to design for the materialisation of a networked learning space for professionals in education*? It presented two cases of teacher/leader professional development in Denmark, which have the common purpose of creating a NL community. A cross-case analysis (Khan & VanWynsberghe, 2008) has made it possible to highlight similar processes emerging from the two cases, despite their differences in theoretical foundations, target group, and pedagogies.

First, MIL and Teknosofikum have pointed, in two different ways, to the same conclusion that if one wishes to design NL spaces it is important to allow for the movement between centripetal and centrifugal forces and between core and periphery. In fact, it is this movement that facilitates the formation of new connections and triggers unexpected outcomes, such as the participants' surprise of sharing teaching practices, institutional challenges and pedagogical proposals in different organisations and across disciplines. The first outcome of our analysis is thus the unexpected meeting with the familiar, which was experienced by most participants.

Second, the analysis indicates that the networks created during the courses are based on weak ties that do not seem to endure after the courses have ended. As the intention of both MIL and Teknosofikum is to make the NL space last beyond the duration of the course, this outcome is obviously disappointing. However, we understand that this result is in line with the most recent reformulation of the NL concept, which emphasises the potential to build 'experimenting communities' (NLEC et al., 2021, p. 21). It is important to acknowledge that a newly materialised NL space displays core and periphery upside down and allows for movements and connections that constitute an opportunity to talk, share, work, discuss, learn, and think in a new way. In this sense, the unexpected meeting with the unfamiliar becomes a chance for professional development.

Third, the analysis has raised the question of when designing for the materialisation of NL spaces, whether one should be more focused on moving the participants towards the core or on supporting them to take the role of cosmopolitans. In our understanding, exploring and experimenting within the newly created NL space and empowering participants to bring their experiences into life in new contexts that could benefit from being pollinated with some of the characteristics of a NL space is worth pursuing.

In conclusion, we acknowledge that working with the theoretical concepts introduced in the chapter could make it easy to place them in a dualistic relationship with one another – with the centripetal, the core and the strong ties on the one hand and the centrifugal, the periphery and the weak ones on the other. This presents a dichotomy that would call for a choice between what is better, more useful and/or more effective in relation to NL spaces. However, based on our analysis, we believe that in a networked perspective, it is not a matter of choosing but a matter of finding a way to *move between* the two kinds of forces and 'beings' in the network. In fact, in line with the reconceptualisation of NL (NLEC et al., 2021), we argue that it is in the movement *between* the modes of being that a NL space materialises.

It is not the centripetal or centrifugal forces that matter in the design process but rather the composition of both. It is not specifically the institutional core (which in our cross-case analysis includes many institutions) that makes the NL space materialise, but rather the possibility for the periphery to experiment being at the core and for the core to move and align with more external input. Even the long-term survival of the NL is not important, when we look at the strength of the new weak ties. The new materialised NL spaces may be ephemeral, but they are part of the professional development process that allows the participants to implement new ideas, tools, methods, and techniques into their teaching practices after the courses.

In conclusion, we note that further research on this topic should also include an effort to broaden the scope of teacher professional development programmes, with the aim to establish NL spaces beyond formal programmes and across disciplinary and/or institutional boundaries (Pischetola, 2021).

Following the Bakhtinian concept of dialogue as 'the interanimation of real voices where there is no necessary "overcoming" or "synthesis"' (Wegerif, 2011, p. 3), we suggest avoiding the choice between accepting dualistic positions or synthetising them into one. Instead, we advocate accepting the messiness of NL processes and designing to support the creation of these spaces.

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Part III
Sociological Perspectives on Networked Learning

Chapter 10
Transformative Networked Learning: An Expanded Design Framework for Individual, Group, and Social Perspective Transformations

Kyungmee Lee and Brett Bligh

Abstract There has been the growing effort within a research community of networked learning (NL) to re-define the notion of NL. Contributing to such a collective effort, the authors argue that there is a significant distance between the community's political aspirations and everyday practices—subsequently, the community has exclusively focused on the "network" part of NL while neglecting the "learning" part. The chapter demonstrates how the NL theory and associated design principles have failed to translate the criticality of macro-level critiques into micro-level design practices. To address this issue, the authors propose an *expanded* design framework for transformative NL, consisting of three levels of interconnected NL communities: (i) *internal* NL communities in online courses that aim to transform individual students' perspectives, (ii) *external* NL communities in students' real-life contexts that aim to transform group practice, and (iii) social NL communities in broader contexts that aim to transform social perspectives. Thus, the emphasis of transformative NL design should not be restricted to facilitating learner interactions and knowledge acquisition inside an online course but expanded to helping learners' holistic development and leading to meaningful changes in their lives outside the course. The authors conclude the chapter by drafting new transformative NL design principles.

Keywords Transformative networked learning · Expanded design framework · Transformative networked learning design principles · Three levels of networked learning communities · Online doctoral education

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Introduction

In 1998, alongside a fast-growing excitement in society about the new opportunities and possibilities created by emerging information and communication technology, the first definition of Networked Learning (NL) emerged:

> [L]earning 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. Some of the richest examples of networked learning involve interaction with on-line materials and with other people. But use of on-line materials is not a sufficient characteristic to define networked learning. (Goodyear et al., 1998, p. 2)

The above definition, which emphasises human "connections", has strongly influenced research agendas and pedagogical practices within the NL community for the past two decades. Whether mediated by technology or not, human connections are inherently complex, shaped by the amalgam of ideological, political, and materialistic conditions of each "connected" human being; consequently, they are value-driven, power-embedded, and unequal in multi-directional ways (Jandrić & Boras, 2015). Thus, the emphasis on human connections in the NL community has profound implications for the ways in which the community develops, interacts, and communicates (McConnell et al., 2012).

In recent years, there has emerged a collective effort from the NL community to reflect on the original definition that emerged in the (pre-)digital era and examine its applicability in the fast-emerging post-digital era (Jandrić & Ford, 2020) or post-human era (Gourlay, 2020) when the dichotomy between digital and analogue (and human and machine) blurred. Fundamentally, it is a moment to search for a shared community identity by re-defining the notion of NL and re-configuring the landscape of NL practice (de Laat & Ryberg, 2018). In 2020, the Networked Learning Editorial Collective (2021) proposed a new definition of NL as follows:

> Networked learning involves processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies. Networked learning promotes connections: between people, between sites of learning and action, between ideas, resources and solutions, across time, space and media. (p. 320)

The new definition successfully expanded the scope of the NL process and highlighted a sense of the NL purpose as the terms "knowledgeable action", "shared challenge", and "learning and action" suggest. Nevertheless, the community's response to the new definition (or "what is NL in the new era?") clearly indicates a continuing sense of critical orientation within the community and a strong desire to integrate more critical perspectives in the new definition (Networked Learning Editorial Collective et al., 2021). Laura Czerniewicz, the first reviewer of the collective definition article, reflects:

> [the community response] sets out to reclaim and surface critical principles: that humanity is at the centre of educational technologies, that tools can be 'convivial' (Illich, 1973), that knowledge forms should be inclusive. Community and connectedness are emphasised.

> These qualities, call them criteria for being considered NL, however, need to be a means to an end rather than ends in themselves... in order to strengthen the collective definition, it is necessary to articulate which goals these convivial tools, communities, and connections will serve. The public good. An alternative platform economy. Equity. Social justice. With these explicit goals and a bolder vision, the community definition will be a hopeful statement of what is, and can be, right, in digitally mediated Higher Education and the post-pandemic university. (ibid, p. 358)

The article concluded with the following recommendation by the second reviewer, Jeremy Knox:

> Bayne's 'trap' of endlessly defining NL might be avoided by putting NL 'to work', rather than trying purify it; doing something with it, rather than struggling to draw its boundary. Here the NL community might look to other areas of theory that have attempted to move beyond the impasse of ideology. To borrow a phrase from Deleuze and Guattari (1987), how might we 'plug in' NL to other concepts, such as postcolonialism? To reuse a term from Haraway (1997), how might we 'diffract' NL through social justice theory? In other words, to allow the concept of NL itself to become 'networked': to make connections, to interrelate, to transform, mutate, and hybridise in response to the pressing issues of our time. (ibid, p. 359)

As members of the NL community, we (the two authors of the present chapter) value and support the critical perspective in the community; thus, the present article is also written to contribute to the community (re-)definition effort by re-directing its focus onto the emancipatory origin of the NL community and its critical orientation for research and practice. We strongly agree with Czerniewicz's point about the necessity and urgency of articulating "explicit goals and a bolder vision"; that is, the ultimate purpose for nurturing such human connections. Further inspired by Knox's call for "putting NL to work" and "doing something with it", we propose an expanded design framework for transformative NL. Given the strong influence of Transformative Learning Theory (Mezirow, 1997) on the development of the NL theory, the term "transformative" in transformative NL can be seen as superfluous; however, our intention is to make it more "explicit" again. That is, the framework presents three dimensions of perspective transformations at an individual, group, and social level as explicit goals of networked learning. More importantly, we argue that the direction of such transformations needs to be purposefully designed and facilitated by critical pedagogues: educators whose practice is informed by Critical Pedagogy (Freire, 1970).

The following section will re-visit the origin of the NL community and theory to better situate the ideas of transformative NL and expanded design in the historical development of the community's approach to NL design. We will further illustrate the framework in a specific educational context: an online doctoral programme.

The Origin of the NL Community and Theory

The founding members of the NL community shared an emancipatory mandate that stemmed "from the traditions of open learning and other radical pedagogies and humanistic educational ideas from the likes of Dewey, Freire, Giroux and Rogers"

(McConnell et al., 2012, p. 4). Subsequently, the NL community established a more immediate research agenda "to optimise and research the growing potential and possibilities of rapid developments in ICT to offer greater degrees of educational openness" (McConnell et al., 2012, p. 6). Educational openness, as one of the core NL principles, became a focal point of how the NL community distinguishes itself from other neighbouring academic communities that are also interested in technology-mediated human connections and relationships, such as e-learning and Computer-Supported Collaborative Learning (CSCL) (Bligh & Lee, 2022; de Laat & Ryberg, 2018; Steeples et al., 2002). NL puts learners (not technologies nor teachers) at the heart of learning "networks" and networked "learning", enabling them to define their own needs for learning and professional development (McConnell et al., 2012, p. 8).

In this view, the emergence of the NL theory is often referred to as a "critical response to dominant discourses" in the broader field of Educational Technology (Networked Learning Editorial Collective et al., 2021, p. 327). The two criticisms brought by early NL scholars focused on: (i) the restricted and uni-directional understanding of relationships between humans and technologies, such as technological determinism and technological instrumentalism, and (ii) the neglected focus on unequal power relationships embedded in day-to-day educational situations. Thus, the community has always been at the vanguard of critically observing new educational phenomena in the broader historical and social backdrop of emerging technologies and subsequent changes in human connections (Jandrić & Boras, 2015). Those criticisms towards the dominant ideology of Educational Technology permeate community members' writings: for example, Czerniewicz (2018) explores diverse forms of inequality growing in online higher education, categorising them as vital inequality, resources inequality, and existential inequality; Jones (2016) criticises neoliberal ideas and technological determinism underlying the rise of Massive Open Online Courses (MOOCs).

The Development of NL Theory and Design Practice

The NL theory continued to develop as members of the NL community engaged with a range of NL practices and subsequently pursued more practical "design" conversations: "what constitutes a useful design for NL" and "what issues need to be addressed in designing such courses." McConnell (2006) first suggested a pedagogic framework for NL, including six principles as follows: (i) *Openness in the educational process* where teaching and learning occur are seen by participants in the learning communities; (ii) *Self-determined learning* process where learners take primary responsibility for identifying and pursuing their own learning needs; (iii) *A real purpose in the cooperative process* where a group of learners engage with learning relevant and meaningful to themselves interdependently; (iv) *A supportive learning environment* where learners encourage and facilitate each other's learning efforts; (v) *Collaborative assessment of learning* that involves self-peer-tutor

assessment processes followed by reflections on such experiences as well; and (vi) *Assessment and evaluation of the ongoing learning process* where tutors and learners continuously and collaboratively discuss and improve the design of the course.

Whether the design is directly translated into learners' NL activities or indirectly infiltrates into learners' surrounding learning environments, "design" is a mediating activity between the NL principles and the NL experiences. Thus, despite the heterogeneity of NL community members' professional roles and pedagogical responsibilities, "design" is at the heart of their practices (McConnell, 2006). Subsequently, the above six principles have been used to develop and improve a number of NL-informed educational programmes and courses, including the one that will be introduced in the following section (cf. Hodgson & McConnell, 2019; McConnell et al., 2012).

As discussed above, the NL community has also been interested in observing a range of emerging technology-mediated social learning phenomena that are not necessarily deliberately designed and planned. Even for NL researchers whose everyday practices are not immediately related to a particular NL design, the above principles have also been useful, guiding their investigation into NL experiences in informal educational contexts such as MOOCs (Koutropoulos & Koseoglu, 2018) and social networking sites (Cloudworks in Alevizou et al., 2012). These works explore the formation of informal NL communities in specific educational and social settings, the nature of participant interactions in those communities, and the roles of ICTs in mediating and shaping such interactions. Those informal NL communities possess some characteristics commonly pursued by NL researchers, even where they develop serendipitously rather than as a result of deliberate design.

Despite their dominance in the NL community, it is difficult not to notice a somewhat neutral, less critical tone in the descriptions of the six principles. Unlike the claim made about the critical origin of the NL theory, which was influenced by "radical pedagogies and humanistic educational ideas from the likes of Dewey, Freire, Giroux and Rogers" (McConnell et al., 2012, p. 4), the devised design principles do not necessarily reflect such criticality. Furthermore, macro-level conceptual criticisms towards the dominant discourses of Educational Technology, which are frequently observed in the community members' eloquent writings (e.g., Czerniewicz, 2018; Jones, 2016), do not seem to be smoothly translated into the design principles of the community.

Such discrepancies fundamentally undermine the NL community's efforts to distinguish itself from other neighbouring academic communities, such as e-learning and CSCL (cf. Bligh & Lee, 2022). As several contributions to the collective definition article have pointed out (Networked Learning Editorial Collective et al., 2021), the new definition of NL appears rather idealistic, yet misses an (explicit) criticality. That is, it can be argued that the NL theory (more specifically, the NL "design" theory) fails to differentiate itself from these learning design (or instructional design) theories that unconditionally and uncritically emphasise learner-to-learner interactions and connections as a means for knowledge construction, normally known as constructivist learning theories (Dohn et al., 2018). The first

author (Lee, 2018a) of the present paper has previously warned about losing the critical identity of the NL community by making the same mistakes as others. She criticised that learning designers in online higher education contexts tend to have blind faith in social learning activities, subsequently exclusively valuing learner-to-learner interactions and treating them as evidence for (or equivalent to) effective online learning outcomes. Their design practices, misinformed and misguided by such faith and associated dominant discourses, tend to replace the "end" with the "means"; that is, learner-to-learner interactions become "ends" rather than a "means" to an end—learning (borrowing the phrases from Laura Czerniewicz's review in the collective definition article, 358).

The Problem and Moving Backward to Move Forward

As indicated in the previous section, the problem that the present chapter aims to address, at least partially, is the gap between a conceptual criticality prevailing in the NL community' macro-level critiques and a practical criticality absent in the NL community's micro-level design practices. More specifically, NL design practices have often limitedly focused on increasing learner-to-learner interactions in technology-mediated learning contexts, including online courses and programmes. As a result, the NL community has developed knowledge repositories with useful design principles and strategies for learner interactions and "networking". However, such networking has been misunderstood as learning outcomes themselves; NL researchers have overlooked the collection of empirical evidence to develop a deeper understanding of the outcomes of such interactions—or prove whether or not "being networked" increased or improved learning outcomes. What we do not intend here is to urge NL researchers to collect more data (e.g., assessment outcomes and learner perspectives). Indeed, a large number of studies conducted both in NL and CSCL communities have provided ample data; learners' perceived benefits of social interactions and increased exam scores followed after social learning have been well-reported.

What we want to argue here is that despite the excessive emphasis on "networking", the purpose of the NL design of such networks is not explicitly critical in NL literature. It is unclear how those learner connections and interactions in learning networks aim to change learners' lives in a more fundamental sense. We are not the first to observe this issue. Others have already reported that the NL community has much more focused on the educational phenomenon of being "networked" (and the technological affordances for connecting multiple actors and artefacts) than "learning" (and the pedagogical outcome of such networking) (see Hodgson & McConnell, 2018; Öztok, 2021). Such an unbalanced research approach that focuses on the "network" part of NL while assuming and neglecting the "learning" part has resulted in weakening the political and critical essence of the original NL theory.

Some may accept this as a natural progression of NL becoming a more established "field" in which the NL community grew, and the NL theory became

widely adopted by a broader group of educational practitioners and researchers without being carefully distinguished from other constructivist learning theories. Vice versa: constructivist learning theories have already been picked up by many NL researchers and used almost interchangeably with the NL theory (de Laat & Ryberg, 2018). In this context, defining NL and drawing the boundaries of NL is not necessarily a useful practice (cf. Siân Bayne's response in Networked Learning Editorial Collective et al., 2021). However, although we do not want to fall into the "trap of endlessly defining NL", we believe it may be necessary—to try "purify it" (ibid, p. 359) to challenge the taken-for-granted assumption that learning happens if learners are networked and networking and stop the NL design efforts going into "network" (the means) rather than "learning" (the end).

In response to the problem, alongside the valuable attempts to re-define NL, therefore, the NL community needs to engage more in design conversations (Goodyear & Carvalho, 2014). We suggest that the NL community needs to move backwards to move forward; how far? Perhaps to those NL design principles. This wake-up call can be particularly challenging since it also requires us (referring to the NL community, in this context) to rethink the established NL design principles that we have used for the past two decades—to some of us, they are the solid rock of the NL theory. It is, however, a necessary step to embrace the more fundamental identity of the NL community as critical theorists and critical pedagogues. Accordingly, it may also require us to rethink the core ideas in (and behind) the six principles, including the self-determination of learners and the roles of learners and teachers in NL processes. If we want to be critical pedagogues, the roles of teachers are to develop a deeper meaning of learning in their pedagogical context and guide their learners throughout learning processes to personalise and realise some teacher-determined meaning. The emphasis of the NL design should not be restricted to facilitating learner interactions and specific knowledge acquisition inside a course but expanded to helping learners' holistic development, which leads to meaningful changes in their lives outside the course. We propose a "expanded" design framework for "transformative" NL as one way (of many possible ways) to foreground the end part of NL design practices in the NL theory and community: the framework should be able to help us re-direct our focus on the ultimate "purpose" of NL design practices—transformative learning (neither human connections nor learner interactions themselves).

Context: An Online Doctoral Programme

Before presenting our expanded NL design framework, it is necessary to situate this conversation in our specific pedagogical context where the framework has been developed: a PhD in E-Research and Technology Enhanced Learning offered by the Department of Educational Research at Lancaster University in the UK. The programme is one of the first UK online doctoral programmes with taught elements—known as one of the first online programmes originally designed and

developed using the six NL design principles discussed above (McConnell et al., 2012).

During the first 2 years of the programme (Part I), students as a cohort of around 30 start the programme at the same time and take six online modules together as a cohort in the same order. A lead tutor convening each of the six modules supervises the cohort's Part I learning progress. The online doctoral students are all experienced educators in diverse educational and cultural settings. Approximately half of the cohort join the programme from outside the UK. Part I also offers two annual residential meetings during which members of the cohort visit the university campus in Lancaster, meet each other, and participate in intensive face-to-face research training sessions for a week (the description reflects the situation before the COVID-19 pandemic). Part II begins with each student submitting a research proposal (i.e., confirmation document) and seeking institutional approval of their research ideas and plans. Each student is allocated one of the tutors as a thesis supervisor based on the chosen research topic and methodological approach. Once the proposal is approved, students conduct an independent thesis project with academic support from their thesis supervisor. Most students complete Part II and obtain a PhD in 2–4 years. Except for the two residentials organised during the first 2 years, students study fully online at a distance from the university and each other.

Since the launch of the programme in 2007, most of the original tutor team have left, new tutors have joined the programme (including the two authors of the present article), and different aspects of the programme have been changed and re-designed over time. Nevertheless, the initial NL principle-informed design of the programme has remained strong until now. For example, the cohort-based structure provides a supportive learning environment where students are encouraged to work with each other and help each other. There are multiple communication channels between students and the programme tutor team to discuss how to improve the programme design and student learning experiences. Each module also involves a collaborative (self-peer-tutor) assessment process and individual reflections on the process. However, it is worth mentioning the same problem identified in the previous section—that is, an absence of "explicit goals and a bolder vision" of NL design—was observed in the programme, which often lacked a clear sense of political and critical purpose in teaching and learning.

Since the present authors joined the programme (each in 2013 and 2015), we have taught different modules in Part I and each supervised more than a dozen students in Part II to completion. Since 2016, the first author, Lee, has taught the first module of the programme aiming to help students' effective transition into the doctoral programme and guide their initial growth into a (qualitative) educational researcher. Lee, as a lead tutor of the module, has continued to change the module design and evaluate the effectiveness of those changes through researching how those changes had impacted and improved student NL experiences and outcomes. The module is the core space (or test bed) where the framework was developed, implemented, evaluated, and refined. The fundamental ideas of the framework (i.e., transformative NL and expanded NL design) were born out of Lee's pedagogical experiences (often, struggles) and research endeavours to reflect on those experiences. Both

successful and unsuccessful aspects of different versions of the module design have been recorded in the first author's previous publications (Lee, 2019, 2020a, b, 2021, 2022). Although the details of the changes and evaluation outcomes are all recorded in those publications, some of the critical points will be discussed in the later part of the chapter after introducing the framework.

The second author, Bligh, has been a close colleague and critical friend, supporting Lee's pedagogical experiments and theoretical developments. The two authors have had ongoing conversations on the design of different modules and the programme as a whole and further made a range of improvements across Part I. Thus, the ideas of this chapter can be said the outcome of our collective teaching and research efforts in the online PhD expanded design framework for transformative NL.

What Is Transformative NL?

The NL theory (and its design principles) strongly emphasises the self-determined learning process where learners (not teachers) take primary responsibility for identifying and pursuing their own learning needs (McConnell, 2006; McConnell et al., 2012). Lee (2018b) also observes the limitations of teacher-centred authoritarian design approaches to determining and imposing "good" (or "best") learning behaviours and outcomes without fully considering and understanding individual learners' circumstances and learning needs. Thus, we fully appreciate the challenging (if not impossible) nature of pre-determining specific learning processes and outcomes before learners join online programmes. The challenge is even greater in adult learning contexts like our online PhD programme, in which learners are part-time students whose personal and professional lives are situated in different cultural and social settings from each other's and tutors'. Students' immediate goals for participating in the PhD programme also vary, and subsequently, the knowledge and skills they wish to acquire are diverse (Lee, 2020a).

It is, therefore, difficult to answer epistemological questions about learning, such as "what knowledge should we teach in this course?" or "is there something students must know at the end of the course?" However, it is still necessary (and possible) to pre-determine the learning purpose in an ontological and axiological sense by asking, "what is worth feeling, thinking, and experiencing during the course period?" or "what kinds of person do we want our students to be and become at the end of the course?" (Lee, 2020b). Table 10.1 illustrates the core difference between the epistemological and ontological approaches to learning. Obviously, it is the second approach we aim to foreground in the expanded NL design, although the epistemological approach remains as background.

As discussed, the origin of the NL theory was strongly influenced by two theoretical approaches to adult learning: transformative learning theory and critical pedagogy (Networked Learning Editorial Collective, 2021). Both learning theories suggest that the ultimate purpose of adult learning is to make meaningful changes in

Table 10.1 A comparison of two approaches to learning: constructivist vs transformative learning (Lee, 2020b)

	Epistemological approach	Ontological approach
Philosophical Foundations	Knowledge-focused: Constructivist learning paradigm	Existence-focused: Transformative learning paradigm
Learning Purpose	Constructing meaningful knowledge	Becoming a more authentic person
Learning Process	Problem-solving, collaborative knowledge production, reflection	Critical reflection, rational dialogue, multiple becomings
Learning Outcome	New knowledge and skills	New perspectives and critical awareness
Learning Model	Situated learning	Transformative learning
Tutors' Roles	Instructional designers: Designing authentic learning activities and facilitating knowledge production	Emotional supporters: Triggering disorienting dilemmas and providing emotional supports
Pedagogical Limitations	A lack of political direction and emotional emphasis	A lack of pedagogical direction and practical design principles

learners' perspectives and practices (or praxis). In such transformative learning scenarios, in particular, the role of adult educators is to provide learners with opportunities to be exposed to new perspectives, re-examine and challenge their own, and plan different actions in their real-life working situations (Mezirow, 1997, 2000). It is essential that adult learners interact with other learners and teachers who have different perspectives as well as feel safe and encouraged to share their perspectives with others.

Therefore, the focus of learner interactions is not limited to exchanging useful knowledge and similar opinions (consequently reinforcing each others' perspectives) but expanded to creating meaningful conflicts and having open dialogues to resolve the conflicts (consequently transforming each other's perspectives and co-developing a new perspective). Furthermore, these open dialogues should lead to planning and making real-life changes (consequently transforming group practice in real-life contexts). For critical pedagogues, the aim of learner interactions is even more political—raising learners' critical awareness of those unequal and oppressive social structures producing a range of struggles in their own lives (and consequently, enabling learners to undertake collective actions to make positive social changes) (Freire, 1970; McLaren & Jandrić, 2015).

Drawn from the adult learning theories, we argue that transformative NL begins with a strong sense of learning "purpose"—facilitating individual perspective transformations, group practice transformations, and social changes. In this view, the core outcome of being networked in an online course must be learners' ontological and axiological development (i.e., becoming a critical educator and a critical scholar) through exposure to and interaction with diverse perspectives. Learner interactions, therefore, should support and guide these processes of personal transformation and subsequent group and social changes (rather than knowledge construction and skill development). Whereas individual learners take primary responsibility for their

engagements with the course activities and specific changes made in their personal lives, teachers should determine the direction of students' learning processes and outcomes. We call it transformative NL.

The focused ontological outcome of transformative NL in the first author's module in the online PhD programme is, therefore, "becoming" (i) critical scholars who are fully aware of social and educational inequalities in one's pedagogical settings, (ii) ethical researchers who are deeply concerned about the political nature of scientific knowledge and its production, and (iii) critical pedagogues who are actively engaged with social changes and movements. Such a tutor-determined purpose is at the heart of our NL design practice—the NL process is still learner-centred but, we argue, teacher-driven.

Expanded Design for Transformative NL Cycle Through Three Levels of NL Communities

The question is then what to design to ensure the tutor-determined purpose of NL is achieved in the doctoral programme. There are two critical aspects of our expanded design framework for transformative NL. Firstly, the framework redefines the "scope" of the NL design. Previous works (Lee, 2018b, 2021) argue that there is no clear separation between learning and living in online doctoral education contexts. Students log into our online courses from where they have been and where they continue to be; thus, learning does not occur in a vacuum. Online learning happens in their pre-existing messy reality. Therefore, it is necessary to expand the conceptual boundaries of an online learning environment beyond teachers' (or learning designers') immediately accessible teaching space (i.e., a Moodle platform) to include each learner's everyday learning and living spaces. Of course, recognising this reality is not to presumptuously insist that we need to access students' personal spaces and control their everyday practices, but instead to acknowledge that their learning experiences and outcomes are bound and shaped by their personal and professional circumstances and relationships (see also, Dohn et al., 2018 for the socio-materiality of NL).

Here, the concept of "community" can be helpful to better frame the scope of NL design. In the framing work, relative positions of communities (internal versus external) will be adopted from teachers' vantage points. For example, in our online PhD programme, doctoral students as historical beings already have multiple memberships of different communities when they join the programme. They have lived, worked, and learned by participating and socialising in those communities. Their established memberships in those external communities outside the programme remain valid during their doctoral studies. They simultaneously exist in multiple communities; they may be more present in some communities and less in others (see also, Littlejohn et al., 2019 for core characteristics of networked professional learning).

A cohort community newly built in the programme will be another one (not the only one) they join and co-develop; similarly, some students will be more present in this community and others less so. Although we often feel the urgency to build a new cohort into a supportive community during the module period of 3–6 months, it takes time and effort to establish a genuine sense of community among a cohort (Lee, 2021). Thus, the expanded conceptualisation of the online learning environment that includes and utilises the existing communities outside the course space can provide an effective (even more efficient) approach to the NL design.

The second aspect of the expanded design framework is the "purpose" of the NL design, which was primarily discussed in the previous section: enabling personal, group, and social transformations. It is crucial to realise that an internal NL community, a cohort community within a specific online course, does not necessarily provide learners with opportunities to make changes in real-life contexts (Lee & Brett, 2015). When the NL design aims to transform learner perspectives that ultimately lead to positive social changes, design efforts restricted to learner-to-learner interactions within the online course are insufficient. Although students may experience meaningful perspective transformations in the cohort community within the course and may develop action plans to transform their professional practices in their external communities outside the course, it may be too ambitious to expect each student to successfully manage those changes alone after the course period (Moffitt & Bligh, 2022).

Especially when the planned changes are rather radical, as critical pedagogues would envision, students are likely to experience resistance from other members of their external communities relevant to the changes. When some students (maybe a small number of students who actually enact new perspectives in their work environment) face such difficulties, they would genuinely need a supportive community. Given that most learning communities developed within formal online courses do not sustain after the course period when carefully designed and facilitated collaborative learning activities are no longer available (see Lee, 2018b for the ephemerality of internal learning communities), it is necessary to think about the role of the courses in developing and strengthening the external communities that exist and more likely sustain in learners' life (Fig. 10.1).

The scope of the expanded design framework for transformative NL embraces expanded boundaries. The mid-size dark grey circle in the middle refers to an "internal" community emerging within an online course: a cohort community in our doctoral programme, for example. Circle "Teacher" represents an academic tutor who designs and teaches the course. There are students (circles A to G) joining the course. Their engagement with the internal community varies. Some students (circles E and F) may more actively participate in the cohort community, playing central roles as core members even from the beginning of the course. Others (circles D and G) are less likely to move towards the centre of the cohort community, remaining as outsiders even at the end of the course.

From each student's perspective, the internal course community is new. Regardless of their engagement level, they are all newcomers in the cohort community for

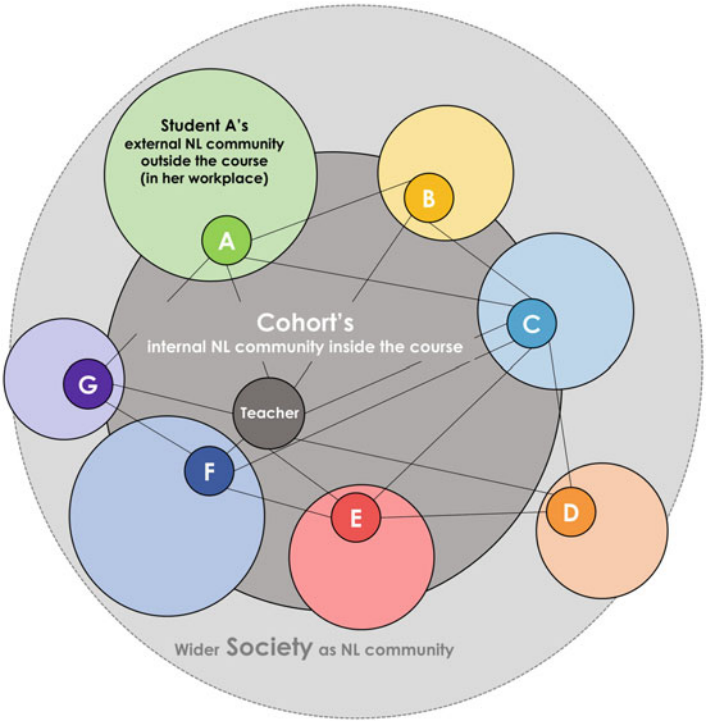

Fig. 10.1 Expanded boundaries of online learning environments: A Scope of the transformative NL Design

the time being—borrowing a notion of legitimate peripheral participation from a theory of community of practice (Wenger, 1998). On the other hand, they all have their own "external" communities outside the online course in which their everyday practice is centrally situated. The lighter-coloured outer circles of each student indicate their existence in those external communities as core members. Many online doctoral students, as experienced educators themselves, tend to have a member identity of old-timers in their external communities, often exerting strong leadership. The large light grey circle with the dotted border indicates a bigger society potentially influenced by doctoral students' transformative NL outcomes through multiple changes made in their external communities: an envisioned scope for the expanded design of transformative NL.

The original NL definition suggests the use of ICT to promote multiple connections "between one learner and other learners, between learners and tutors; between a learning community and its learning resources." (Goodyear et al., 1998, p. 2). However, as argued above, those connections are insufficient to achieve the purpose of transformative NL. When it comes to what to design, therefore, transformative NL designers not only focus on building an NL community inside their courses but also

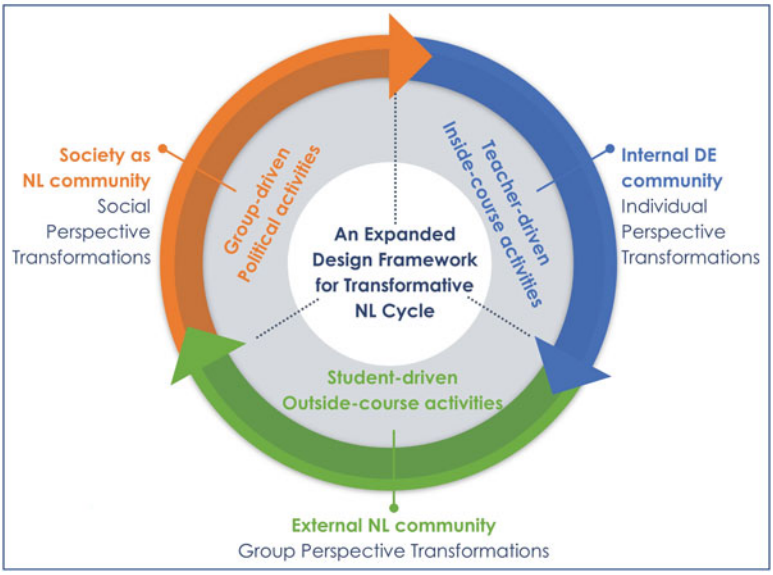

Fig. 10.2 A visualisation of the expanded design framework for Transformative NL cycle

connect the internal cohort community to learners' real-life contexts and the wider society. Despite the inseparability between doctoral students' online learning and living, developing the authentic and organic connection between an internal NL community and learners' real-life context (and the bigger society) is not necessarily a simple task (Lee, 2018b). Thus, the expanded design framework enables us to reduce the focused scope of learners' real-life context into one of the external communities to which their practice and planned changes are the most relevant.

Figure 10.2, then, demonstrates three levels of NL communities whose developments and connections need to be carefully considered when purposefully designing transformative NL:

1. Internal NL community: a cohort community developed within an online course that aims to transform individual students' perspectives through tutor-driven inside-course activities.
2. External NL community: a professional community developed outside an online course (in students' workplaces) that aims to transform group perspectives through student-driven outside-course activities.
3. Society as NL community: a social community developed in the wider society that aims to transform social perspectives through group-driven political activities.

An Illustrative Example: Transformative NL in Online Doctoral Education

The idea of promoting such "connections" between the single "internal" NL community and multiple "external" NL communities, in which each of the cohort members has individually participated, is somewhat general and abstract. To make the idea more concrete, therefore, we will present an illustrative example of expanded design based on our own experiences in the online PhD programme.

The scenario presented here is a careful and neat (re-)construction of our ongoing module design experiences, which are historically rooted in the limitations of the original NL design principles and primarily constrained by the design of the entire programme and the regulations of the university. Thus, we admit that our module design process is, in reality, rather messy, clumsy, and unsystematic. The conceptualisation of transformative NL and expanded NL design has been done retrospectively; in other words, the framework has emerged alongside and within our practices. Nevertheless, to help readers better grasp the complex notion of the transformative NL design, we have decided to trim such messy details (e.g., any residual crumbs of the original design) and develop a neat narrative with a definite sense of temporality, pretending that we have fully and systematically designed our modules from start to finish, using the pre-existing framework. It should be noted that the below text is a hybrid of texts of both actual and conceptual (or imaginary and hypothetical); it should not be read as an empirical research report.

Our design effort goes into Part I of the programme, where we offer six online modules to the cohort. The internal NL community has research projects as shared practices—each module requires students to design and conduct a research project relevant to their professional practices and write a 4000–6000 research report. Many students experience a range of academic and emotional struggles, especially during the first part of the programme when they try to familiarise themselves with this new learning environment and research practices. The cohort community, including the module tutors, thus, provides both academic and social support. However, more importantly, as the modules aim to develop critical scholars, a series of learner interactions are strategically planned to challenge some widespread assumptions about Educational Technology (Networked Learning Editorial Collective et al., 2021), provoke students' emotional responses to various educational problems (diverse forms of social injustice), and increase critical thinking and research skills to address particular educational problems of their interest. The cohort community engages with the transformative learning process together as critical friends whose role is, in a nutshell, to provide not only resources and encouragement but different perspectives and constructive feedback.

While students in the internal NL community develop the research foundation and engage with different perspectives, they select an external community where they would like to conduct their research projects (see Fig. 10.3). Tutor-driven NL activities in the internal community guide students in identifying critical, and often "social justice-oriented", research problems worthwhile to explore both for the

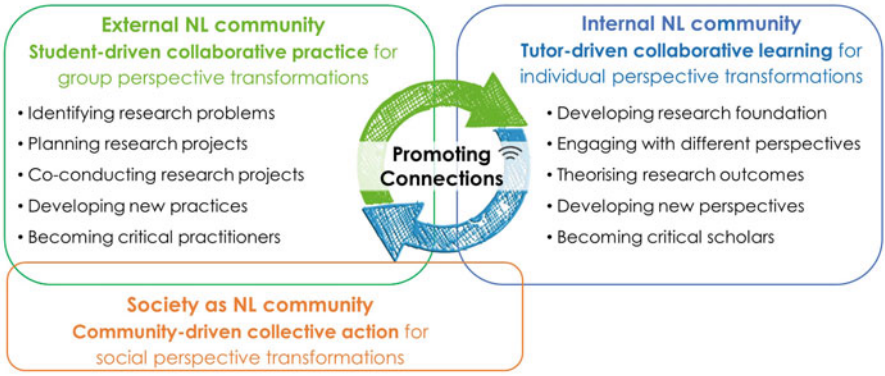

Fig. 10.3 Transformative NL in online doctor programme. (A model adopted from Lee & Brett, 2015)

students and their external communities. Students bring the research foundations and different perspectives built through their engagement with the internal NL community into their chosen external communities and plan specific research projects. Students are also encouraged to reflect on the ideas of research collaboration and relational research ethics and further co-conduct their research project with other members of their external community—through which the community also develops into an NL community with a shared practice. The research outcomes drawn from the external NL communities are brought back to the internal NL community, where students theorise them and develop new perspectives, which are brought back to the external NL community. Based on such "bringing back and forth" connection between the two communities, doctoral students achieve the purpose of doctoral education: becoming critical scholars and practitioners.

All aspects of this expanded module design (including learners' interactions at different moments of the module) explicitly focus on promoting "connections" between internal and external NL communities (see Fig. 10.3). Even though the ultimate purpose of transformative NL is to make social changes, the scope of expanded NL design is inevitably limited to the expanded boundaries of the online learning environments that, at most, include students' external NL communities. Arguably, making social changes by social perspective transformations requires group-driven collective actions beyond the design capacity of individual teachers in formal educational programmes. However, in a manner analogous to how previous NL researchers have observed the natural emergence of informal NL communities in different educational and social settings (e.g., Alevizou et al., 2012; Koutropoulos & Koseoglu, 2018), we can envision the potentially transformative impact of the external NL communities on the broader society in which students with raised critical awareness and social justice-oriented perspectives are situated.

Conclusion

What we have described above is work-in-progress—the narrative represents a hybridity of our realities and aspirations. The expanded design framework must be further used, tested, and refined; its feasibility and effectiveness must be repeatedly evaluated and improved in different NL settings; more specific pedagogical strategies and methods must be developed and added to the framework. We present this framework not to boast the completeness and spotlessness of our teaching and research practice but to invite other members of the NL community to try it out (if they find our arguments persuasive and the envisioned scenarios attractive). As mentioned in the Introduction, we intend to contribute to the ongoing community effort to redefine NL in the current postdigital context and re-establish the community identity by proposing the ideas of transformative NL and expanded NL design.

We want to conclude this inconclusive chapter by drafting transformative NL design principles that can replace the original ones (McConnell, 2006) with the hope of initiating more practical "design" conversations on what constitutes a useful design for "transformative" NL. These principles are more applicable to formal educational settings, and "teachers" in the below descriptions can be substituted by other related terms such as educators, designers, trainers, tutors, and critical pedagogues. The new seven "expanded" design principles are as follows: (i) *A real purpose in the learning process* where all pedagogical activities and interactions consistently aim at meaningful individual, group, and social perspective transformations, (ii) *An expanded scope of learning design* that embraces and connects three levels of learning communities of internal, external, and social communities, (iii) *Openness in the educational process* where teachers explicitly communicate the political aim of their teaching and associated design choices to their learners; (iv) *Teacher-directedness in the learning process* where teachers carefully guide their learners to achieve the teacher-determined aim, such as raising critical awareness and transforming perspectives and practices; (*v) Learner-centeredness in the learning process* where all transformations and changes are directly meaningful for learners themselves and their own communities, meeting their needs; (vi) *A supportive learning environment* where learners encourage and facilitate each other's transformative learning efforts, and (vii) *Collaborative assessment and ongoing evaluation on learning process* where teachers and learners continuously and collaboratively assess and improve their learning processes and the design of the course.

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Chapter 11
The Mode 3 Network University and Design: A New Materialist Perspective

Adam Matthews

Abstract Universities have grown to be complex institutions, networked both inwardly and outwardly within society. This has produced a complex network of humans, technologies, discourses, policy, and diverse and contested path dependent ideas on what a university is and does. Digital technologies have changed many social practices but promises of innovation and revolution in higher education have not in the mainstream materialised. New materialisms provide theoretical perspectives for research and practice within the contemporary Mode 3 Network University. The network from a new materialist perspective brings together human relationships, technologies and collaborative enquiry and action. These perspectives question exclusive human agency to shape and use technologies in simple and instrumental ways to achieve desired ends. Many actors, both human and non-human come together and are entangled, in constant flux to enact the becoming of the network university. This raises the question of how technologies are adopted and designed in the network where agency does not reside exclusively with the individual human, such as policy maker, designer or technologist. New materialisms provide the perspective that the human designer affects and is affected by the network assemblage and rather than being a fixer or solutionist, designs *with* the human and non-human networked university.

Keywords Mode 3 University · Network University · New materialism · Entanglement · Network assemblage · Design assemblage

Introduction

The introduction of new technologies into learning environments hasn't been a smooth development and the hopes of many coming out of the 2020 Covid-19 pandemic following the reliance on networked communication technologies have

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arguably (at least not yet) failed to be realised. Prior to the pandemic of 2020, many had tempered enthusiasms for networked learning technologies to revolutionise and innovate the traditional and mainstream. Friesen for example describes such developments as a 'longue durée' with slow incremental change, entangled with societal developments in religion, politics and culture (Friesen, 2017). This seeming lack of revolution (in the mainstream) endures despite a huge amount of hype and predictions which create headlines such as the end of teachers and lecturers with technologies and robots stepping in to take their place (Selwyn, 2019; Matthews, 2022a). Reich (2020) agrees with Friesen's longue durée, arguing that technology hasn't and won't have a big bang disruption to education as institutions of learning are complex ecologies. As universities have grown in size, influence and number, becoming ever more complex, they have become more networked in many ways, technologically, socially and politically.

If the technological revolution has not yet been realised despite seismic change in many areas of everyday life afforded by technological developments and the undoubted possibility that technologies have for education, then where next for networked learning, pedagogical practice and education systems? In this chapter, I set the contemporary university in a wider social, political, and historical context using new materialisms to position the university institution as networked and part of society and to incorporate wider assemblages of policy, historical path dependency and social change to put forward suggestions for incorporating technology into complex and networked learning environments, from design to becoming.

The field of networked learning has long been interested in how communication technologies such as radio, television, personal computers, mobile devices and the internet can enable collaborative learning environments (Steeples & Jones, 2002). Following 20 years of development, scholars in the field invited redefinition (Networked learning Editorial Collective (NLEC), 2020) for future research and practice into the entanglements between technology, society and education. This chapter aims to further take up this challenge.

New materialisms incorporate the human and non-human to break down ontological divides between actors such as such as designer, teacher, policy, technology, and learner to see the social and the technological as an entangled assemblage. The non-human includes technologies but also ideas, discourses and hype, all of which affect, even though they may not be an accurate depiction of the past, present or prediction of the future (Milne, 2020). New materialisms provide an opportunity to trace complex assemblages, seeing universities as physical and digital sites of networked learning with networks of human and non-human actors. I argue that a network of affects is a methodological opportunity to aid the design and analysis of networked learning environments beyond a humanistic instrumentalism of cause and effect.

I propose theoretical opportunities for future research in the field as well as ways of working and designing in complex networks of individuals, social groups, ideas, and technologies. New materialisms reject a top-down structure and agency dualism and rather sees network entities as relational within assemblages of human and non-human relations with social production rather than social construction.

> This flux of assemblages and affects is the means whereby the social world is produced and reproduced, and from which the flow of history derives (Fox & Alldred, 2017 p. 56)

Fawns (2022) has acknowledged such entanglements to encourage us not to slip into dichotomous technological or pedagogical determinism, but develops a framework which embraces the mutual shaping of technology, teaching methods, values and context. Further entanglements in networked learning include artefacts and activities (Goodyear et al., 2016), experience and networks (Jones, 2018), the individual context of the learner in networked learning (Jones, 2015) and the values associated with networked learning (McLaren & Jandrić, 2015). In this spirit I build draw upon a rich body of networked learning literature to explore new materialist perspectives which look to acknowledge complex entanglements of technologies and the social in a Mode 3 Networked University emerging from the Mode 1 Ivory Tower and Mode 2 Factory. To do this I take a historical and path dependent framework from modes 1 and 2 with which to look at the development of three modes of the university as presented by Nørgård et al. (2019) and expanded by Matthews (2021b, 2022b). The Mode 3 University is part of society and is networked socially and technologically where boundary walls are much more porous than the classic vision of the Mode 1 Ivory Tower university walled off from society and the efficient Mode 2 Factory producing research and teaching for national interests with mass access.

First, I outline the concept of the Mode 3 Network University, emphasising that strands of history, bound up with ideas and discourses leave affective residual traces on the becoming of the university and its entanglements with network technologies and how this has influences the becoming of the Mode 3 Network University socially, politically and technologically. This highlights the complexity of higher education systems and the myriad stakeholders and influences upon universities. This is followed by a proposition for a new materialist approach to researching and designing in the networked university which embraces complexity, entanglements and becomings which enact the idea of a university in complex assemblages of actors both inside and outside of the university. An example of a design assemblage which networks the human and non-human in the Mode 3 University provides an illustration of the new materialist perspective before a brief conclusion.

The Mode 3 Network University

The Mode 3 Networked University has not appeared independently but is emerging with path dependence from modes 1 and 2. The Mode 1 academic as lone craft worker, designer and artisan became (and in some instances is still becoming) an output driven factory-like worker in the Mode 2 Factory University with increased technologies and governance structures (see Matthews, 2022c for a detailed description of these three modes). These structures are physical in terms of technologies, including the printing press, mass media, including TV and Radio but also less tangible such as policy and other discourses on the purpose of higher and tertiary

education. International, national and institutional policy structures (i.e. Bologna process, quality standards, legal frameworks, competition etc) have and continue to be developed. Design of higher education learning environments grew from the lone artisan in mode 1 to the factory workforce in mode 2. This developed alongside industrialisation and nation state building policy agendas and global competition. As universities develop and change, the lone academic designer academic gives way to a greater division of labour in the productive factory. The US and UK in particular have moved to neoliberal political structures from the 1980s to the present. Neoliberal approaches to education are well documented (Moore, 2004; Ball, 2008) and have fuelled market driven and quantifiable outcomes – products in the mode 2 factory. A key aspect of neoliberal practice is measurable output of performance rather than professional experience and knowledge (Olssen & Peters, 2005), known widely in education as 'managerialism'. Factories in industrial societies mass produce products for wider accessibility in terms of cost and supply – universities in factory mode became and are far more accessible than they were in Mode 1.[1]

Using new materialism, I hold that technologies are entangled with social and political change and the modern university has developed as knowledge has become more of a commodity, outgrowing the roots of the contemporary university in Mode 1 in Ivory Tower form. The Mode 2 University was described and enacted in a Californian masterplan (Marginson, 2016) in the mid twentieth century with Clark Kerr as one of the chief architects as leader and writer on the idea of a university. Marginson holds that the model described and enacted in California is now global. Kerr described development of the US university emerging from the traditions of Europe (Mode 1) as the 'Multiversity' in his ***Uses of the University*** (Kerr, 2001) in the second half of the twentieth century. Digital technologies then held the potential to increase access further and have had a profound effect on much of society. Kerr foresaw this:

> Television makes it possible for extension to reach into literally every home; the boundaries of the university are stretched to embrace all of society. The student becomes alumnus and the alumnus continues as student; the graduate enters the outside world and the public enters the classroom and the laboratory. Knowledge has the terrifying potential of becoming popular, opening a Pandora's box. (p. 86)

The development of digital technologies and the demand for knowledge has seen the Mode 2 university grow further, expanding outwardly and internationally with not just a production line of knowledge production and dissemination but collaboration and integration of knowledge, expertise and infrastructures beyond the campus and institutional boundaries. This is the Mode 3 Network. It must be emphasised however that the network is not purely determined by network technologies, for example part-time courses have declined in England due to policy changes at a time when digital technologies make distance and flexible education all the more possible (Matthews & Kotzee, 2020).

[1] Who pays for such mass access is a key debate globally with some countries laying the cost at the tax payer and others directly with students.

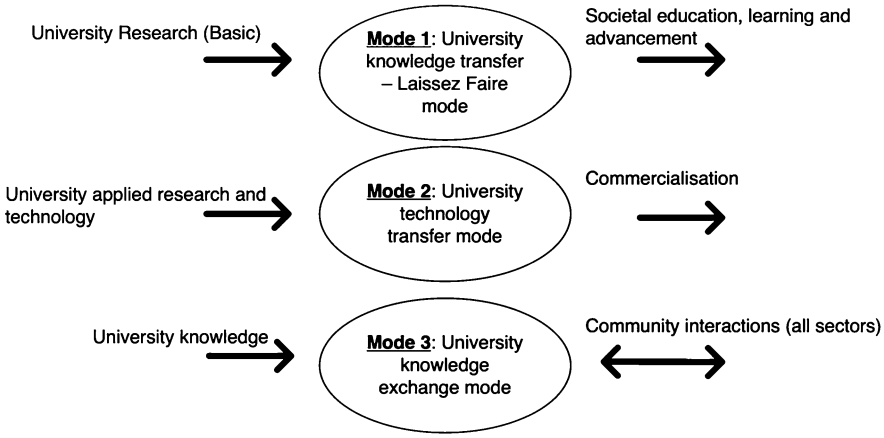

Fig. 11.1 Knowledge production modes and university knowledge transfer. Based on Miller et al. (2018)

Key to my conceptualisation of the Mode 3 Network University is Gibbons (1994) knowledge production model. As described above, mode 1 university knowledge production is set within disciplines with freedom for academic enquiry, while mode 2 is interdisciplinary and problem solving to the needs of governments and markets.

Figure 11.1 shows the development of the modes of knowledge production concept further with Mode 3 as knowledge exchange and production as multi-directional between all aspects of society. Moreover, the university in Mode 3 does not have exclusivity on knowledge production (research) and dissemination (teaching and public engagement). Mode 3 knowledge production is not the one way dissemination of knowledge (from a university) but a two way interaction of nodes including (amongst many others) industry, governments, academia and wider public (Carayannis & Campbell, 2012; Carayannis et al., 2018). Liyanage and Netswera sum this up:

> In other words, Mode 1 is not adequate to solve social problems. As a result, Mode 2 and Mode 3 have evolved combining scientific knowledge and social contexts. It is a reflexive knowledge production system with reverse communication. Namely, science speaks to society, and society speaks back to science. (Liyanage & Netswera, 2021, p. 3)

Castells (2000) outlined the emerging Network Society at the start of the twenty-first century. For Castells the development and access to new network technologies was just part of the social move toward a more networked way of living and working. The network for Castells dominates contemporary life, not just work and economics but all social life in the Information Age. These networks for Castells are open, global and connect diverse entities that would have previously been independent (universities in modes 1 and 2 for example). Examples for Castells include stock markets, governments, television systems and the natural world making up a meta-

network of capital where it is often unclear who the owners, producers and managers are. The university in modes 1 and 2 is singular and linear, in mode 3 it is networked both inwardly and outwardly.

An example of such networking is the professional social media platform LinkedIn. Komljenovic (2019) outlines how the platform 'networks'with the university in that students (and faculty and professions) record and advertise their experiences (data) on the platform which algorithmically or by independent searches links to jobs and other advertisements drawing upon the data owned by LinkedIn. Further, universities themselves use the LinkedIn platform to advertise but also track student employment destinations through dashboards and data. Such data collection provides analysis and links to jobs and learning courses (Matthews, 2016). Shaw and McNamara (2021) show how open access podcasts offer practitioners access to authentic and novel information which networks with more formal education. Other examples include teachers and students accessing materials on YouTube and information on Wikipedia. The two way nature of the network is clear when universities, academics and students use LinkedIn, produce podcasts and video and update Wikipedia. This shows the networked power of such platforms as part of the Mode 3 Network University transcending the boundaries and inner workings of the university - and thus having an influence upon knowledge, the university and its idea and being. It may be argued that these forms of knowledge are not 'academic' as proponents of the modes 1 and 2 university and knowledge production would hold. However, it is hard to argue that such information and knowledge does not affect society and learning.

The networking and boundary blurring of society and the university is evident in what has been termed the Unbundled University (McCowan, 2017; Swinnerton et al., 2018). Walji (2018) describes unbundling as:

> Unbundling is the process of disaggregating educational provision into its component parts likely for delivery by multiple stakeholders, often using digital approaches and which can result in rebundling.
>
> An example of unbundled educational provision could be a degree programme offered as individual standalone modules available for credit via an online platform, to be studied at the learners' pace, in any order, on a pay-per-module model, with academic content, tutoring and support being offered by the awarding university, other universities and a private company. (Walji, 2018)

Just as LinkedIn enters the university in a networked permeable fashion (with specific values and goals), Mode 3 as depicted in Fig. 11.1 sees a two-way, multidirectional and networked relationship between society and the university. This is an important area of study as the idea of a university develops and evolves. For some, unbundling has been happening since the beginnings of the contemporary university (Mode 1 as the sole academic researching and teaching) and higher education's growth and success has seen specialist roles (careers, accommodation, management, estates etc) being required for large-scale institutions the size of the modern university (Gehrke & Kezar, 2015). Learning and instructional designers, policy makers, management, technologists and media specialists are part of this

increasing 'third space' (Whitchurch, 2015) professional working in universities and other learning environments (Brigance, 2011; Tracey et al., 2014; Brown, 2016; Ashby & Exter, 2019). The roles now being employed and projects which incorporate media and technology into networked learning environments can be seen as part of the wider concept of unbundling. Moreover, the very identity of a university as a teaching and researching institution is potentially being unbundled (Matthews & Kotzee, 2022). In the Mode 3 Network University collaborations are made within and beyond the university (White et al., 2020) in contrast to the lone artisan in Mode 1.

The recent attention and growing literature on the unbundled university shows that the university in Mode 3 is enacted in many ways through many nodes including new technologies, private commercial interests and the residual path dependency (genealogy) idea of the university of the past (i.e research and teaching, free enquiry, academic freedom etc).

> Universities will need to guard against this disaggregation of education, and its unintended consequences, whilst remaining relevant and active in this space, which will continue to attract interest from a wide range of private providers, including employers and new training providers. (Morris et al., 2020, p. 15)

The Mode 3 network university boundary is becoming more porous to outside interest. The need for specialist skills also comes with commercial interest from private companies and political interest from governments. Perrotta (2018) details the phenomena of Online Programme Management (OPM) companies which go further than designing online resources as a service for universities but engage in long term commercial partnerships and take up aspects of the university operation. This includes many aspects of the university such as admissions, marketing and digital to directly teaching students which result in curriculum, pedagogy, technology and assessment decisions. Such partnerships draw upon the 'brand' position of the university in question playing a part in the propensity for up front financial investment for long term gain. Such brand and reputation is often steeped in images of the Mode 1 institution as traditional, elite and high quality.

The Mode 3 Network University is an important concept in considering the influences and co-existence of influences of actors in the unbundled university embedded within a network society. McCowan (2017) warns that the university in unbundled form could no longer exist as a university as borders become so permeable that they disappear. Writers such as Barnett (2018) see this development of the university as an open ecosystem with many influences and actors. Barnett's ecological university is defined as an ecosystem of ecosystems including: knowledge; social institutions (schools, universities, government etc); people; the economy; learning; culture and the natural environment. Ellis and Goodyear (2019) highlight some of the challenges and complexities of the ecological university and its governance strategies with so many actors bearing influence upon the ecosystem/network.

The Mode 3 network university cannot be theorised or researched from purely a technological or social perspective alone. Analysis of such complex relationships requires methodologies and perspectives which make connections between the

growing number of (human and non-human) influences in the Mode 3 University. What follows is an introductory overview of new materialisms which I propose as a way of understanding and researching such complexity of actors which come together to enact the idea and becoming of the contemporary university.

The Mode 3 Network, New Materialism and Design

The Mode 3 network university then, makes it much harder to impose sole agency and power to direct and enact the idea of a university. We may lay the effect of unbundling of university functions to specialist roles or private companies (see OPMs above) under a social structure of capitalism or a particular flavour of capitalism such as neoliberalism. However, New Materialist perspectives 'flatten' such structural ontologies and grand narratives.

> There are no structures, no systems and no mechanisms at work in the new materialist ontology; instead there are 'events'; and an endless cascade of events compromising the material effects of both nature and culture that together produce the world and human history. Exploring the relational character of these events and their physical, biological and expressive composition becomes the means for sociology to explain the continuities, fluxes and 'becomings' that produce the world around us. (Fox & Alldred, 2017, p. 7)

This perspective is particularly counter-intuitive to the meaning of design and designer. New materialisms reject binaries (such as agency and structure) in what is described as a flat or monistic ontology. Such a relational perspective fits the Mode 3 Network University with its vast array of human and non-human actors which include (to name but a few) specialist roles in the university, employer and student expectations, commercial private interest, government and institutional policy, built physical and digital environments and the residual and genealogical legacy ideas of a university (see modes 1–2 above).

New materialisms have ontological orientations towards matter in that it is concerned with what is produced rather than what it is. Such matter is post-anthropocentric in that it focuses on humans and non-humans as matter including thoughts, memories, desires as well as power and resistance to power. This ontology of new materialisms is relational (Fox & Alldred, 2017). Key to the broad umbrella term, new materialisms is the assemblage – a group or network of actors that affect and are affected. As outlined so far in this chapter, in the Mode 3 Network University there are many actors in an assemblage.

Such an assemblage of relational actors includes the different modes or ideas of a university. The increasing number of actors which are networked bring their own ideas and values which affect and are affected. The relationality of new materialisms hold promise in future research and practice with which to analyse and design (the removal of specific agency in new materialisms is tackled below) university networked learning assemblages. Moreover, the practice of design for networked learning environments can be guided by new materialist perspectives which problematise the idea and practice of rational design (with specific outcomes

identified and achieved) as seeing specific individuals and groups structuring learning in a complex network environment.

New materialisms span a range of disciplines and theorists and due to space cannot be fully reviewed here. However for an overview and point of reference see Lupton (2019) and Fox and Alldred (2019). Here I provide an introductory overview before applying as an example how such an approaches can be applied to the design of networked learning environments.

Non-human Agency

Barad's (2007) agential realism of intra-acting (rather than interacting) entanglements of agencies include discourse, causality, agency, power, identity, embodiment objectivity, space and time and include nature, culture and technology. Along similar lines Latour (2007) uses a sociology of associations as part of a wider Actor-Network theory to describe the unstable network of human and non-human actants which make up a network. Both Barad and Latour emphasise moving beyond a humanistic Anthropocene which sees humans as controlling the non-human with sole agency for our environment. This problematises the very notion of the concept of design in modernity. Moreover, this singular, powerful humanistic view can often be solely male, white, western and privileged (Davies, 1997). Further, a humanistic view of technology and the non-human is often seen as instrumentalist and mere tools to be used by with full human agency (Matthews, 2021c) or the digital is seen as radically at odds with being human (Hassan, 2018). The New Materialist approach I propose here attempts to blur these dualisms and binaries as well as those described in the introduction.

Posthumanism

Braidotti (2013) proposed a move beyond such humanism which was not a crisis but an opportunity to be reflective as to what it means to live in an ecology of nature, other species, materiality and technology. Posthumanism adopts an ecological and holistic relationship to assemblages of the environment and material, including the spatial, temporal, political, legal, economic, epistemological, technological and education (Braidotti & Bignall, 2019). This allows for a more considered criticality with potential futures of the idea of a university which is entangled with technology and not a binary techno-utopian or dystopian future. This draws upon a critique of humanism in seeing the human as centre of the universe (Hassan, 1977) and removed from and separated from the human. Posthumanism sees animals, machines and nonhuman entities not as separate and controlled and observed by the human with a single universal essence but decentred and plural. This has implications for both research (the researcher is part of the assemblage) and practice (the perceived

agency positionality of designers and technologists and their position within an assemblage). Bayne (2018) provides an overview of posthumanism specifically applied to education practice and research themed as critical, ecological and technological.

> This perspective is particularly useful when considering the implications of digital aspects of contemporary education, as a way of stepping back from the still widely-held assumption that the value of digital technology in education is largely instrumental, with digital technology seen as a 'tool' to be used to make education 'better' (more efficient, more effective, more available). (Bayne, 2018)

In similar ways to the three modes of university described above, posthumanism looks at what there is to be salvaged (Herbrechter, 2013; Jandrić & Bayne, 2017; Braidotti, 2019) from residual and legacy theory and practice but also as a way at looking at complex assemblages. For these reasons I argue that this has potential for the analysis and design practices of the Mode 3 Network University and what is to be salvaged from the past when looking critically to the future. Rejecting one grand narrative idea and purpose of the idea and ontology of a university (Herbrechter, 2018) and its design is an important reflective project and timely in the ongoing development and enactment of the Mode 3 networked and unbundled university. This allows for futures thinking to be plural and critical rather than an accepted singular idea or inevitability (Urry, 2016; Matthews, 2022b).

New Materialisms and Design

Design as a concept is often seen as a particularly humanist endeavour and is clearly an issue to be tackled in a networked learning environment whereby many actors, both human and non-human are brought together in assemblages whereby each node in the network affects and is affected. This counters the idea of a human designer exerting exclusive agency upon the network. New materialisms are not concerned with what the assemblage is but what it does in this affect economy of micropolitics. Such micropolitics might involve the political and the social (policy and neoliberalism for example) but these top-down structures aren't enough to produce the Mode 3 Network University. Such events (design and use for example) may have singular micro affects and disruptions which when repeated become aggregated affects. This might in design become habituated 'best practice', policy or automated by a technology. These flows of affect are what Deleuze and Guttari called territorialization which can be changed as the assemblage is in constant flux of becoming. Many assemblage systems stay remarkably stable but can be disrupted by many actors (or addition/removal). Such change is described as the assemblage system becoming de-territorialized with a collection of singular affects that then over time become aggregated affects and one again territorialized (Deleuze & Guattari, 1983).

> The affect economy mediates the micropolitics of the assemblage, or to put it in sociological terms, the processes of power and resistance shape social organization and subjectivities". (Fox & Alldred, 2017 p. 31).

Designs, their implementations, uses and affects are as described by Deleuze and Guttari (Deleuze & Guattari, 1987) as rhizomes which are like roots of bulb plants which spread out and emerge unpredictably, emerging and becoming (Gourlay, 2020).

The Design Assemblage

In outlining some of the central tenets to a New Materialist philosophy along with the complexity of the university in mode 3, the popular conception of a designer (learning design, teacher, academic, policy maker, manager etc) is problematised. The rational human designer is conceptually and in practice, seen as bringing order, ideas, solutions, outcomes and innovations to learning environments in a tidy and clean process. This is idea buttressed by visuals of design (and other) processes and the theory of constructive alignment which sees learning outcomes objectively identified and met through formative and summative assessment (Biggs, 1996). Here are some broad definitions of design:

> Designed things are the means by which we achieve desired ends.
> (Petroski, 2008, p. 48)

> All men (sic) are designers. All that we do, almost all of the time, is design.
> (Papanek, 1985, p. 23)

> Engineers are not the only professional designers. Everyone designs who devises courses of action aimed at changing existing situations into preferred.
> (Simon, 1988, p. 67)

> Design is the intentional solution of a problem, by the creation of plans for a new sort of thing, where the plans would not be immediately seen, by a reasonable person, as an inadequate solution.
> (Parsons, 2016, p. 11)

> The design of learning environments is the systematic analysis, planning, development, implementation, and evaluation of physical or virtual settings in which learning takes place.
> (Ifenthaler, 2012, p. 929)

These quotes, show the anthropocentric humanistic view of control and in the case of Papanek, a gendered perspective on the human designer. Here the designer is depicted as holding full agency, as a fixer or solutionist. Barthes from a literary perspective announced the death of the author (Barthes, 2001) in that texts are released into the world to be interpreted socially and individually – the agentic individual author and designer are removed or at least de-prioritized. Material digital artefacts in a networked learning environment from a new materialist perspective see texts, digital artefacts and platforms (non-humans) as active and affective out in the wild of the network. Active audience theory in media studies, similarly sees the

production of media and its reception by audiences as active and filtered through social contexts (Hall, 1993). The design and becoming of learning environments is a creative endeavour and a Deleuzian/Spinozist toolkit of assemblages, affects and lines of flight has been used in creative fields such as architecture (Ballantyne, 2007), music (DeNora, 1999), shop design (Roberts, 2012) and learning environments (Charteris et al., 2017) to see design activity as change and in many cases de-territorialization of norms, discourses and 'best practice'.

Fox and Alldred (2017) present assemblages as lists of actants to show relations and frame assemblages. Here, I present an example of a design assemblage in the Mode 3 Network University. A challenge for research and practice is framing an assemblage and deciding where it starts and ends.

Design role – academic role – knowledge – Virtual Learning Environment (VLE) – media – internet access – quality assurance – marketing – accounting – student – student data – employers – institutional policy – national government policy – discourses of 'best' practice.

Each context, assemblage and chosen framing will be different. An example of the Mode 3 networked learning environment described above shows the many different actors that may be present in different contexts. Such an exercise can be used to research design assemblages but can also be used for design practice in identifying influences, boundaries and structure as well as freeing designers from the delusion of simple cause and effect. In summary, such an assemblage results in what Bennett (2010) describes as distributed agency. In the design assemblage above then, a designer or design team are not in full humanistic control.

> We have shown how materialism de-centres creativity from any notion of a human creator, to focus on two associated aspects: the affect economy that surrounds creative production, and the affect economies of events within which creative products subsequently play a part. (Fox & Alldred, 2017, p. 90)

A New Materialist approach asks what this assemblage *does* and produces. Fox and Alldred (2017) argue that predictions cannot be made about how the interactions will affect and be affected but must be seen when assembled together and events in specific contexts observed. Whilst depictions of design and the designer might be seen as solutionist or fixing, design as a verb does fit with such an approach in that something is done which in New Materialist terms is productive. What is produced is however always in flux. Issues of best practice and solutions are tackled with De Landa's (2016) 'relations of exteriority' which rejects the notion of plugging an entity from one assemblage into another with the same productive result where entities are not purely relational but highly influenced by the particular assemblage.

New materialisms hold promise to make sense of these complex bundling and unbundling assemblages of the present and future university. For example Gourlay (2020) describes the laptop and digital learning environments not as merely tools but active and agentive agents exerting influence upon the idea of a university. Other examples of matter affecting includes PowerPoint structuring teaching and learning (Adams, 2006) and further digital machines with algorithmic decision making produce a digital habitus in educational and social media platforms (Romele &

Rodighiero, 2020). Generative artificial intelligence is one of the clearest examples to date of non-humans acting, influencing and affecting many assemblage systems. ChatGPT in 2023 is showing examples of machine generated texts which draws upon swathes of textual data available online to create texts which cannot be detected as plagiarised and not written by a human (Carvalho et al., 2022; Swiecki et al., 2022; Blinkoff & Blinkoff, 2023).

Drawing upon the Mode 3 Network university and its complexity, institutions are partnering with industry and government to include degree programmes as apprenticeships with employers and also to unbundle degree programmes into microcredentials. Such changes are not purely technological, drawing upon the affordances of information and technology but socially and politically enabled. Looking back, a new university in the UK in the 1960s, the Open University embraced technologies such as postal systems, TV, radio and the Internet to create a distance learning institution from scratch but this came with a huge amount of political will (Dorey, 2015; Jones, 2019) and not determined by communication technologies solely. A political will and policy assemblage driven by social democratic values was created by then British Prime Minister Harold Wilson and enacted by ministers, administrators, academics and students. More recent policy changes, despite the impact of information and communication technologies have threatened the existence of the Open University and part-time higher education in general (Matthews & Kotzee, 2020). Those working in design and learning technology need to understand such policy environments or need to work closely with those that do to implement new media and technological infrastructures.

In the 'upstream' of a design there are various actors and social groups affecting the assemblage such as policy makers, administrators, management, designers, content experts, technologists, funders, project managers etc. Whilst 'downstream' of a design is the events of teaching and learning, interaction with digital artefacts directly or mediating communication with another human. This adds a temporal perspective to an assemblage or event. All of this produces a flow of micropolitics of events across time and space which, include policy discourse, design processes, meetings, ideas, 'best practice' discourse, users and use. A combination of Media Sociology and Science and Technology Studies argue Wajcman and Jones (2012) can draw together further 'design' and 'use' in sociotechnical analysis of such technologies.

What role then does the designer play when the non-human is afforded agency and the human decentred? Scholars in Design Studies are engaging with these issues. For example, Forlano (2017) provides an overview of posthumanism for the field of Design Studies and advocates a *more than* human approach to design, taking into account the environment and technologies but also emphasising the need to acknowledge and accommodate multiple human subjectivities around gender, race, class, sexuality etc. and not seeing the designer and user/audience as white, male, privileged, well-off and young. This is a critical posthumanism as described by Bayne (2018). A human-centred approach of desirability (what do people want), feasibility (is it technically feasible to build), viability (is it financially viable) model need not purely focus on an individual, profit and efficiency driven discourse but

affordances towards a much more socially driven collective responsibility to inequality and the environment influenced by social movements and the Covid-19 pandemic (Velliyur, 2021) are needed. This changes the role and responsibility of the designer to critically reflect upon their role in social and environmental justice. Don Norman is calling for those with design skills to broaden the scope and responsibility and *Design for a Better World* (Norman, 2023). Wakkary (2020) reflects on design as the humanistic endeavour and uses posthuman nomadic epistemology to show multiple and situated design knowledge and practice.

> To date, conceptions of design draw on humanist understandings of a discipline as an autonomous body of knowledge that has clear boundaries with other disciplines. A characteristic of humanist disciplines is its reliance on objectivist viewpoints that are neutral and encompassing, and that the knowledge produced aspires to be unified in its concepts to be seen as foundational or universal. By contrast, nomadic practices draw on posthumanist epistemologies in which knowledge production is situated, embodied, and partial—that is, knowledge is structured without foundations or universality but rather is nomadic in that it is constantly shifting and it is pluralistic. (p. 117)

Wakkary sees this approach to research and practice as a multiplicity of intentionalities and situated knowing. Knowledge production in design for Wakkary is situated, embodied and partial. This follows with the ever in flux and uniqueness of each design assemblage described above. This in many ways is liberating for those involved in the design of networked learning environments in that not everything can be known but something has to be designed resulting in events and becomings. This doesn't ignore large bodies of knowledges and experiences but is open to 'intersections, divergences, contestations, or alliances' (p. 117). New materialisms are interested in what is produced rather than what something is and similarly, Wakkary draws upon Schön's (1983) work on practice as a form of knowledge in itself.

> This shows intentionality to be bidirectional: The designer shapes the something designed as it in turn shapes the designer. Intentionality also reveals that the subject-object is not only mutually constituted but variant. In this way, designers are formed by what they design in ways that can vary; as such, however we constitute the designer, intentionality is not only relational, but composed of differences and differently structured experiences of the world. (Wakkary, 2020, p. 123)

Pepperell (1995) summed this up with 15 general statements of a posthuman condition as 'Surf or die. You can't control a wave, but you can ride it'. Nomadism drawn from the work of Deleuze and Guttari for Wakkary is a nomadic practice of variety where design is not a recipe, a universal 'what works' or 'best practice' to be followed. Yes, knowledge drawn from academic knowledge and professional practice, experience and other sources will, in new materialist terminology, *affect,* but nomadic practices are more fluid and dynamic than disciplines and abandon ideas of universal and generalizable knowledge. I have previously looked specifically at design as a postdigital practice which sees the design as a bricoleur, pulling together what is at hand, be that knowledge or tools to make something (Matthews, 2019). As with nomadic practice the bricoleur looks beyond disciplines to conceive of a design in a networked learning environment which is unique and creative to design anew or

reconfigure in a reflective, pragmatic and situated manner where each design assemblage is unique and always in flux between human and non-human technologies.

A flat ontology and distributed agency across human and non-human is a key feature of the new materialisms. In the design assemblage of the Mode 3 Network University, I argue that agency is distributed across a growing number of actors, all designers in activity if not in title. As stated, this problematises designs as humanistic ways of ordering the world in full human control. This does not throw out design principles into an unordered chaos but asks us to question simple cause and effect in complex networks of actors. A posthuman and new materialist design for networked environments, has a humility of design which adopts the ethos of 'working with' the human and non-human as part of the design assemblage rather than attempting full control as an all-knowing fixer and solutionist. Morozov (2013) warns of technology as a fix without consideration of social and political issues. Wakkary (2021) proposes ways of 'designing with' in 'entanglements, relationality, multistability, agentic forces, and nonhuman vitalities of posthuman design' (p240) with values of humility, togetherness, cohabitation and caring over diverse concerns. Wakkary in this context asks designers (nomadic in their situated practice) in a practical sense, acknowledging the situated (rather than universal abstraction) social, political and economic infrastructures (nonhuman actors) which affect, to accept that agency is distributed across assemblages of the human and non-human. This is adopting a practice which accepts mediation of technology to be shaped as well as shaping our subjectivity (Verbeek, 2005), to affect and be affected. This requires a constant reflective practice as knowledge and praxis that doesn't fall into norms of design in networked learning environments and a technological determinism (Wyatt, 2008; Matthews, 2021a) which gives up all agency and autonomy – and Wakkary challenges us to ask what designers we want to be whilst designing with and within the assemblages we find ourselves in.

Conclusion

New materialisms offer a perspective with which to analyse, theorise and influence practice in networked learning environments. I have used the Mode 3 Network University to show how an assemblage of actors are involved, all affecting and being affected as relational entities, in constant flux as emergent and becoming. The Mode 3 Network University is a product of the growth and influence of the modern university and its complexity institutionally, nationally and internationally in both the public and private spheres with inward and outward affects. This affect network encompasses professional perspectives across and within institutions, policy, technologies and discourses on the purpose of the university as well as wider influences on the governance of public and private organisations. For example, in the becoming of a networked learning environment in higher education, ideas and identities of different modes developed historically can clash and entangle. Clashes and entanglements occur between the Mode 1 University as self-sufficient, with laissez faire

academic freedom of enquiry in the ivory tower, the Mode 2 University as linear, organised and productive in response to governments, institutional management and markets as a factory and the Mode 3 Network University driven by inward and outward communication and influence and new technologies. This goes beyond binaries such as structure and agency which might look to social structures such as neoliberal capitalism, technological determinism or individual agency and instrumentalism of using technologies as tools to achieve desired ends. Moreover, discourses of 'best practice', technology infrastructures and path dependency of what have gone before are non-human influences acting in the production and becoming of networked learning environments. This raises issues and challenges for the design, implementation, and evaluation of networked learning environments beyond simple recipes of linear best practice and inevitability of technological revolution. Acknowledging that all nodes in the network affect and are affected in constant flux with varying degrees of capacity as learning environments, designers and learners are 'constantly becoming' (Thrift, 2008). Fox and Alldred (2021) advocate for philosophies such as these to (re)think the world but also to be drawn upon to structure empirical enquiry.

Networked learning is a field that has for the past 20 years been interested in how 'students live in a complex social-material-digital world and the learning places they make affect how they learn' with roots in critical and emancipatory educational traditions with a commitment to equity and social justice (Networked learning Networked learning Editorial Collective (NLEC), 2020). Human relationships, technologies, collaborative inquiry and joint action has underpinned networked learning research and practice. New materialisms provide an opportunity to bring these together holistically, or in new materialist language – see them as an assemblage. Moreover, new materialisms provide us with opportunities to look at such networks in a particular way in that the human and non-human have capacity to affect and be affected in complex relations in networked assemblages. Such affects flow rhizomically in their becoming. The Mode 3 University network has inward and outward affect in this becoming. I have problematized the idea of design in this context of complexity and network affects. Networks being seen as a solution to be mapped out and created in cause-and-effect fashion in contemporary learning environments speaks to an anthropocentric human agency to fix or create an ideal type. Without such acknowledgement of complexity, affect and relationality of the human and non-human there is a danger of falling into a linear process dictated by hegemonic ideas or fixed and essentialist technology. The purpose of this approach has been to embrace complexity and reject a rationalist and solutionist idea of designer as fixer and provider of solutions but to (re)think networked learning environments as assemblages building on the ethos of networked learning as bringing together human relationships, technologies and collaborative enquiry and action.

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Chapter 12
Framing Networked Learning

Henrik Brandén

Abstract The main purpose of this chapter is to explore the idea of conceptualising networked learning, not as a kind of human activity, but as a way of viewing human activities. This idea is explored by outlining four metaphors of society that are named the biosphere, the distorted reality, the community, and the market. The metaphors are used as foundations for four different frames that can be used when studying or design for networked learning. Each metaphor introduces its own system of concepts, and the corresponding frame consequently directs attention in a certain way and raises certain kinds of questions. It is suggested that explicating frames in this way could help practitioners and researchers to make their approach to networked learning visible and to move beyond what has been called the impasse of ideology in the field of networked learning, since it may encourage discussions about different knowledge interests and objectives. It is also noted that by combining several frames, it may be possible to approach networked learning in a more thoughtful, nuanced, and well-balanced way. The hope with this is to promote collaborations and connections between the field of networked learning and other fields.

Keywords Networked learning · Frames · Metaphors · Ideology

Introduction

The definition of networked learning has recently been discussed in a paper by The Networked Learning Editorial Collective (NLEC, 2021) and in a community response to the collective's paper, a response that included a total of 27 short submissions (Gourlay et al., 2021). The community response also included two concluding submissions from reviewers. The second of the concluding submissions was written by Knox, who noted that:

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> However, the wealth of issues raised across these responses, rather than simply 'enriching' the NLEC definition, or indeed solving the question of 'what is NL?', combine in this article in a way that suggests something of an existential crisis for the term and its associated community. (Gourlay et al., 2021, p. 359)

A possible conclusion from the community response is thus that the field of networked learning has grown in complexity in such a way that it has become impossible to give a definition that expresses the essence of networked learning. Knox (Gourlay et al., 2021) argues that it has become a Sisyphean task, where each attempt to arrive at the top with a perfect, all-encompassing definition puts clear boundaries around the field of networked learning that can be questioned, and therefore inevitably creates the need for a new attempt. Knox also suggests that this endless trap may be avoided

> by putting NL 'to work', rather than trying [to] purify it; doing something with it, rather than struggling to draw its boundary. Here the NL community might look to other areas of theory that have attempted to move beyond the impasse of ideology. (Gourlay et al., 2021, p. 359)

The main purpose of the current chapter is to elaborate upon and explore this idea. With inspiration from the field of organisational theory, so called frames are used to conceptualise networked learning as a way of viewing human activities instead of as a certain kind of human activity. Each frame comes with its own system of concepts that directs attention in a certain way and raises certain kinds of questions about networked learning. One intention of this Copernican turn is to clarify how concepts that have become important in the field of networked learning, such as collaboration, cooperation, and collective inquiry, can be put to work in the sense that these concepts are related to other concepts that may be of interest, such as deliberating practice, emancipation, community of practice, community of inquiry, and so on. Another intention is to help making tacit knowledge interests and objectives visible and to encourage discussions about when and how different knowledge interests and objectives are complementary rather than mutually exclusive. The hope is that such discussions could be a way of moving beyond what Knox calls an impasse of ideology.

What frames are and how they are used in this chapter are explained in the next section. In the section after that, possible levels of analysis are identified, and the societal level, which is used in this chapter, is considered in some more detail. Then, four sections follow where four different frames are briefly outlined. These are examples of possible ways of viewing human activities that may be of interest when studying or designing for networked learning. The four example frames should be understood as tentative and open for revision.[1] Also, the list of frames introduced in this chapter is not intended to be exhaustive. Other frames could be added. The chapter ends with some concluding remarks.

[1] The four frames in this chapter were originally introduced in a chapter about the institutional field of higher education in a textbook about teaching and learning in higher education (Brandén, 2022).

Frames

One field where frames are being used for structuring knowledge and enabling interactions between researchers is the field of organisational theory. This section presents some possible framings of organisations that has been introduced by organisational theorists. The intention is to explain what frames are, give examples of how they can be used, highlight some possible advantages of using frames, and thereby motivating the use of frames.

Framing something is like looking at it through a picture frame. Depending on the positions of the observer and of the frame, different things appear. Several examples of frames can be found in the textbook *Reframing Organizations* by Bolman and Deal (2021). The authors use four different framings of organisations:

- If an organisation is framed as a factory, it directs attention to the division of labour and the rules, routines, systems, and hierarchies that are used to coordinate activities.
- If an organisation is framed as a family, it directs attention to relationships between people and what needs, desires, skills, and limitations they have.
- If an organisation is framed as a jungle, it directs attention to how people create coalitions around different interests to compete for limited resources.
- If an organisation is framed as a temple, it directs attention to how different cultures are maintained through rituals, ceremonies, and the retelling of myths and stories.

The factory, the family, the jungle, and the temple are metaphors that Bolman and Deal (2021) use to direct the reader's attention. This is a convenient way of organising material that has been produced by researchers from different research fields, such as communication science, pedagogy, political science, psychology, and sociology. It is also a way of relating to the material in the textbook that may provide a better understanding of organisations. Consider, for example, a reorganisation. The factory framing then raises questions about how the relationship between roles and tasks changes in the organisation, the family framing raises questions about how the relationship between roles and people's needs changes, the jungle framing raises questions about how power is redistributed, and the temple framing raises questions about how the image of the organisation's management changes. Correspondingly, other events in an organisation, such as an evaluation, writing a vision statement, a meeting, or deciding something, can be framed in several different ways. Each framing directs attention and puts forward certain types of questions. When using more than one frame, a more complex and multifaceted picture of an organisational event may emerge. This may make it easier for managers and employees to approach the organisation's complex challenges in a more thoughtful, nuanced, and well-balanced way.

Using a metaphor is one way of framing something. A metaphor contributes with a system of concepts that makes it possible to put experiences into words. At the same time, a metaphor also provides a symbolism that helps making these

experiences meaningful and comprehensible. This is true also for frames that does not build on metaphors. A frame is in this chapter defined as

- a system of concepts that makes it possible to communicate about certain experiences and
- a symbolic system that helps making such experiences comprehensible and meaningful.

Bolman and Deal (2021) argue that a frame could be understood as a mental model. Such mental models are referred to in the literature under names such as maps, mindsets, schemas, or lenses. At the same time, Bolman and Deal's four metaphors are not chosen arbitrarily, but derived from four different research traditions. This suggests that metaphors and frames may be shared among people and could consequently also be understood as socially constructed, historical patterns. This seems to be closer to the way Dewey (see Dreon, 2021) or Goffman (1974) understand frames, as noted by the authors themselves.

How many frames are there? Bolman and Deal's four frames are certainly not the only frames that have been used to study organisations. For example, Morgan (1997) uses machines, brains, organisms, cultures, psychic prisons, systems of politics, transformation, and tools of domination as different metaphors for organisations. It is also possible to introduce new frames that directs attention to gender equality, intersectionality, organisational learning, or anything else that is of interest. In other words, frames can be used both to capture past and ongoing activities within a field and to directing attention in new directions and to put forward new questions.

One may argue (see for example the definition of institutional logics by Thornton & Ocasio, 2008) that a (research) tradition is a socially constructed, historical pattern that at the same time is.

- a system of practices that results in certain types of experiences,
- a system of concepts that makes it possible to communicate about such experiences,
- a symbolic system that helps making such experiences comprehensible and meaningful, and
- a system of social norms that makes it possible to evaluate practices and experiences.

According to this understanding, a tradition is a frame, but also something else: It contributes a toolbox that can be used when doing something. It also has a normative and ideological side to it, where some practices and experiences are understood as more normal or better than others.

One lesson that may be learned from the field of organisational theory is that even though research traditions cannot usually be combined due to ideological differences, frames may be, since the process of explicating a frame may facilitate a transformation of ideological assumptions into knowledge interests and objectives. For example, when framing an organisation as a jungle, it may involve a transformation of the assumption that conflicts between coalitions is of major importance for organisational dynamics, into research questions about how coalitions form,

compete, and influence an organisation. Similarly, when framing an organisation as a temple, it may involve a transformation of the assumption that it is not what happens, but how these events are perceived and explained, that matters, into research questions about how events are perceived and explained, and how that matters. Transforming ideological assumptions into knowledge interests and objectives in this way may allow practitioners and researchers from different fields to meet in fruitful conversations even if they are schooled in different traditions. For example, instead of quarrelling about whether material conditions, such as limited resources, or cultural circumstances, such as the retelling of myths and stories, are the major influencers on the dynamics in organisations, practitioners and researchers may for example discuss how material conditions shape cultural circumstances and vice versa. In this case, practitioners and researchers from both fields may feel that they have something valuable to contribute with and joint findings may be perceived as valuable by members from both fields. This may promote collaborations between the two fields.

Levels of Analysis

The metaphors used by Bolman and Deal (2021) are metaphors for organisations. This is, however, not the only possible way of framing organisations. One could, for example, use metaphors for the individuals that belong to organisations, the teams that are put together within organisations, the departments and units within organisations, the environment that certain types of organisations have in common, and/or the entire society. Different levels of analysis help directing attention in different directions, putting forward different questions, and explicating different types of knowledge interests and objectives. For example, the frames introduced in this chapter have the society as a level of analysis, which is beneficial when trying to transform assumptions about networked learning in a societal context into knowledge interests and objectives. At the same time, there are assumptions about individuals, dyads, groups, organisations, networks, communities, and so on that are not as easily made visible when using this level of analysis. Choosing a level of analysis is in other words one way of supporting the process of making certain types of assumptions visible.

There are several common assumptions about the society and its relationship to its members. In this chapter, distinctions are made between consensus and conflict theories and between theories of individualism and collectivism. Consensus theories view shared values and silent agreements as a foundation of social order, harmony, and the possibility of slow change. Such theories are often contrasted with conflict theories. Conflict theories focus on how differences in interests create tensions and conflicts. The prevailing social order is understood as a consequence of some people dominating others by consciously or unconsciously influencing or manipulating them, something that may change abruptly if those dominated manage to take control. The different focuses in consensus and conflict theories have been the

Table 12.1 Four ways of viewing society

	Consensus theories	Conflict theories
Theories of collectivism	Combination 1	Combination 2
Theories of individualism	Combination 3	Combination 4

subject of a recurring debate throughout the history of Western thought (Bernard, 1983).

Theories of collectivism put the collective before the individual, based on the assumption that what is good for the collective is also good for the individual. They tend to argue that power should be put in the hands of the collective as a whole and that decision-making should be a collective process. Theories of collectivism are often contrasted with theories of individualism. Theories of individualism put the individual before the collective, based on the assumption that what is good for the individual is also good for the collective. They tend to focus on human independence and are in general against external interference regarding personal choices. For an in-depth discussion about individualism and collectivism, see Triandis (1995).

The distinctions between consensus and conflict theories and between theories of individualism and collectivism make four different combinations possible, see Table 12.1. In the upcoming sections, one metaphor of society is proposed for each one of these four combinations. The four metaphors and their corresponding frames are formulated using inspiration from four different traditions. All though it is argued that these traditions are of relevance for networked learning, none of them are native to the field of networked learning and they do not necessarily reflect the evolution of the field. No attempt has been made to analyse the history of the networked learning field or to identify metaphors and frames that have developed within the field over the years. Nor is there any ambition to be completely true to the traditions that are being described. Focus is not on sorting out the history, but to explore the idea of using metaphors and frames as a way of conceptualising networked learning, which is the purpose of this chapter.

The Biosphere

The first metaphor of society is the earth's biosphere, which consists of ecosystems where actors and resources are connected in networks and evolve together. The corresponding frame is intended to be an example of Combination 1 in Table 12.1, where focus is on how shared values and silent agreements may enable slow change and how the good of the collective may benefit the individual. It is also intended to direct attention to the relationship between joint knowledge-creation processes and the evolution of the networks that are involved.

The inspiration for this metaphor comes from the writings of Barnett and Bengtsen (2017). They argue that universities of today need to become ecological universities that are sensitive to "at least seven ecosystems: those of knowledge, the

economy, social institutions, learning, individual persons, culture, and the natural environment" (Barnett & Bengtsen, 2017, p. 9). Drawing upon their biological metaphor of ecosystems, the earth's biosphere, which consists of ecosystems where actors and resources are connected in networks, has been proposed as an extension that serves as a metaphor for the global society of today (Brandén, 2022). One assumption is then that the society is governed by natural selection: Actors, ideas, and activities that manage to adapt to changing circumstances and to utilise connections in different ecosystems flourish and grow stronger. Ideas and activities that are no longer fit for today's society wither and eventually go extinct. This assumption could be transformed into questions about when and how actors and ideas grow stronger and when they wither.

The biosphere metaphor could for example be used to direct attention to the type of questions that are portrayed in the definition of networked learning proposed by The Networked Learning Editorial Collective (NLEC, 2021): How does collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, trusting relationships, shared challenges, and convivial technologies (or communication technologies in general) promote connections? Also, as noted by Pischetola and Dirckinck-Holmfeld (Gourlay et al., 2021, p. 338), when participants engage meaningfully in the process of knowledge-creation in a living ecosystem, the ecosystem itself may undergo change. How the coupling of brain, body, and environment then changes, as well as contributes to the change, are therefore possible research questions that can be raised when using this frame.

The Distorted Reality

The second metaphor of society is the distorted reality, a metaphor that contributes with a critical view. The corresponding frame is intended to be an example of Combination 2 in Table 12.1, where focus is on how differences in interests create tensions and conflicts, and how joining forces may benefit individuals. It is also intended to direct attention to oppressive aspects of networked learning and how networked learning may be transformed into a deliberating practice.

The inspiration for this metaphor comes from the writings of the Frankfurt School, which includes thinkers such as Fromm, Marcuse, Adorno, Horkheimer, and Habermas, and from the critical pedagogy of Freire (2018). A central idea that can be found in early Frankfurt School theorists is that communication is never neutral. What people talk about and how they talk about it, distorts the perception of reality. According to this view, adopting a dominant way of communication can maintain a prevailing social order. To create change, what has been invisible first needs to be made visible and questioned.

Thus, one possible metaphor that depicts a critical view of society is that of a distorted reality (Brandén, 2022). One assumption is then that oppressors try to distort reality by using metaphors like the biosphere to maintain a prevailing social and political order that benefits the oppressors at the expense of the oppressed. The

metaphor therefore directs attention to communication and when and how it distorts people's perceptions. In the context of networked learning, attention is directed towards hidden and oppressive aspects of networked learning, how these aspects can be made visible, and how networked learning with shared efforts may become an emancipating force. Studying and challenging heteronormativity, sexism, racism, ableism, classism, and the like, for example by deliberating dialogues between teachers and students, could be one part of this.

More generally, research could focus on how networked learning can be designed in ways that promote equality and social justice, as discussed by Matthews (Gourlay et al., 2021, p. 340), and when and how diversity and conflicting perspectives may force participants to reflect on ongoing activities in a way that leads to change, as studied by Vermeulen, Nijland, and Vrieling-Teunter (Gourlay et al., 2021, p. 344).

The Community

The third metaphor of society is a community that acts as a shield towards outsiders and gives its members freedom to realise their inner potential. The corresponding frame is intended to be an example of Combination 3 in Table 12.1, where focus is on how individual learning processes may benefit the collective and how knowledge traditions can be maintained by resisting change. It is also intended to raise questions about for example learning communities, situated knowledge, transfer, and boundary crossings.

The inspiration for this metaphor comes from the German Bildung tradition (see for example Östling, 2016). The concept of Bildung makes it possible to talk about learning and education as a means to realise the inner potentials of individual students, teachers, or higher education institutions. Granting members of the academic community academic freedom is one important part of this. This is intended to foster well educated, self-sufficient, and critical-thinking individuals who can contribute to the community. These ideals parallel the ideals in ancient Greece, where well developed rhetorical skills distinguished a truly educated man and where the ability to persuade others was seen as crucial for a free citizen. It made it possible for a citizen to participate in public debates, exercise civil rights, and contribute to democracy.

However, given that higher education has historically excluded both women and those who do not belong to society's upper classes, academic communities have not always been very inclusive. As with the democratic state in ancient Greece, academic communities may be reserved for a selected few. To capture this way of thinking, society can be conceptualised as the community (or the communities) one belongs to (Brandén, 2022). In such a society, a community acts as a shield, protecting its members from outsiders. Also, members do not have many responsibilities for those who do not belong to one's community. This made the democratic state in ancient Greece possible. It may also be a contributing factor to higher

education's long history of reproducing a prevailing social order in society (Bourdieu, 1996).

The metaphor of society as a community directs attention to how freedom given to individuals by the support from other members of the community and how protection from outsiders may help them realise their inner potentials, possibly as a lifelong learning process, and thereby becoming an increasingly valuable asset for the society. In the context of networked learning, this place focus on creating and maintaining learning communities, and, as Gourlay puts it, "towards a more ethnographic sensibility, opening up educational settings in terms of the actual, situated, more-than-human 'mess' of specific contexts, disciplinary content and cultures" (Gourlay et al., 2021, p. 329). Research about voluntary and involuntary outsiders could also be of interest. For example, Scott notes that

> ambivalence can be a profound turning away and rejection of groupthink or consensus [. . .] They are likely to seek their own communities elsewhere, which is clearly problematic for educators working with social learning models or who endorse any situated practices that are collaborative and co-operative. (Gourlay et al., 2021, p. 344)

Lave and Wenger's (1991) Community of Practice and Vaughan et al.'s (2013) Community of Inquiry are two theories that fit nicely into this frame. The frame may also direct attention to questions about transfer and boundary crossings (Akkermann & Bakker, 2011).

The Market

The fourth and final metaphor of society in this chapter is the market (Brandén, 2022). The corresponding frame is intended to be an example of Combination 4 in Table 12.1. It is also intended to help raising questions about when and how competition between individual students, teachers, researchers, or higher education institutions may benefit everyone in the long run.

The inspiration for this metaphor comes from the so-called New Public Management, which has contributed to a market-oriented model for higher education that has been called academic capitalism and made it possible to talk about knowledge, learning, and education with the help of a language that is taken from business management models (see for example Münch, 2014). Education is then seen as something that is marketed and produced, students are viewed as customers and consumers, and knowledge is understood as a resource that can contribute to economic growth in society.

The political discourse by leaders such as Margaret Thatcher and Ronald Reagan, who in the 1980s argued that the public sector had become too costly and that public organisations therefore needed to be exposed to competition, was that the proposed New Public Management would benefit everyone in the long run. The most common critique against this claim is that New Public Management has turned out to have negative side effects, such as uninterested students, substitutable teachers, and an

instrumental view of knowledge. It has also contributed to "technological evangelism and the predatory commercial behaviours of players in the educational technology industry" (NLEC, 2021, p. 317), as well as "education's susceptibility to fads, fashions and quick fixes" (NLEC, 2021, p. 317).

The market as a metaphor for society can be used to direct attention to how market forces and competition between individuals transform individuals, higher education institutions, and the society itself. In the context of networked learning, this may raise questions about why, how, and what teachers teach, as well as why, how, and what students learn when individualism and competition are encouraged.

Does learning never benefit from individualism and competition? Is it better to completely avoid using a market framing? Or are the negative side effects of New Public Management due to the fact that the market frame has become the *only* frame that is being used when governing higher education institutions? What would happen if several frames were being used and were allowed to complement each other? These are other questions that could be explored with inspiration from this frame.

Concluding Remarks

The main purpose of this chapter has been to explore the idea of conceptualising networked learning, not as a certain kind of human activity, but as a way of framing human activities. The idea is explored by outlining four metaphors of society that are named the biosphere, the distorted reality, the community, and the market. Each metaphor introduces its own system of concepts, which can be used to frame networked learning in the sense that attention is directed in a certain way and certain kinds of questions about networked learning are raised.

Consider, for example, a chat conversation between two people. If the biosphere is used as a metaphor for society, it directs attention to how collaborative, co-operative, and collective inquiry promotes the connection between the two persons and vice versa. If the distorted reality is used as a metaphor for society, it directs attention to how the language that the two persons use and learn produces, reproduces, and transforms social categories and vice versa. If the community is used as a metaphor for society, it directs attention to the communities that the two persons are a part of and how these communities support the two person's learning and vice versa. If the market is used as a metaphor for society, it directs attention to how competition between the two persons and other actors transforms them and to whom this may be beneficial in the long run.

One consequence of using frames is that different understandings of networked learning may be used in parallel. Combining several views could make it possible to approach the complexity of networked learning in a more thoughtful, nuanced, and well-balanced way. This idea parallels an observation made by Bolman and Deal (2021): They argue that a lot of confusion and conflicts in organisations originate from the fact that different members of organisations unknowingly use different

frames and consequently are unable to understand each other. If this is true, problems arise not when someone's preferred frame is "bad" or "wrong", but rather when it becomes the only one that they are using.

Another key to success when trying to move beyond what Knox calls an impasse of ideology (Gourlay et al., 2021, p. 359) could be to make ideological assumptions visible and to transform them into knowledge interests and objectives. This makes it possible to discuss when and how different knowledge interests and objectives are mutually exclusive and when they, in fact, are complementary. Therefore, when explicating a frame, it may also be beneficial to try to identify ideological assumptions and to transform them into knowledge interests and objectives.

As an example, when using biological metaphors for describing social systems, it is likely that some kind of consensus theory is in use, where slow change is assumed to testify to shared values and silent agreements. If, instead, practitioners and researchers talk about society as a distorted reality, it could be that a conflict theory is in use, and that slow change is assumed to indicate that dominant groups successfully dominate other groups, but also, that this is something that may change abruptly if those dominated manage to take control. The first assumption may for example be transformed into questions about how and when shared values and silent agreements lead to slow change. The second may for example be transformed into questions about how and when tensions and conflicts lead to rapid change. Together, this opens for the development of a combined theory that considers both consensus and conflict, and both slow and rapid change. This would probably require that researchers and practitioners with both backgrounds contribute, and everyone may therefore feel that they can contribute with something valuable. Also, there is a potential that everyone may feel that the results of the common efforts are valuable to them. Together, this could promote collaborations.

Furthermore, a combined theory probably requires that the relationship between the concepts in the two original systems are sorted out, so that consensus, conflict, slow change, and rapid change becomes comprehensible and meaningful at the same time. That could be one way of putting the concepts to work, as Knox puts it. By extension, this might even

> allow the concept of NL itself to become 'networked': to make connections, to interrelate, to transform, mutate, and hybridise in response to the pressing issues of our time. (Knox in Gourlay et al., 2021, p. 359)

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Part IV
Networked Learning in Times of Lockdown

Chapter 13
Emerging Rhizomatic Networks and New Ways of Connectivity

Roland Hachmann, Thomas Kjærgaard, and Hanne Fie Rasmussen

Abstract This chapter introduces a framework for analyzing learning networks. It builds on findings from an investigation of students' experiences from and participation in online teaching during the Covid19-lockdown. The investigation is based on 32 interviews with students from a variety of University College Programmes As part of the interviews, the students were asked to share their experiences regarding learning through online participation. From the body of the empirical data, three cases were singled out for this chapter aiming to maintain a high degree of complexity and maximum variation. Through the contemporary theories within the field of Networked Learning, we aim to show examples of how the students were networked during the Covid-19 shutdown and the implications that emerging networks had on their participation in online educational activities. Furthermore, we suggest the utilization of the applied framework for analyzing how students are experiencing and expressing their perspectives on being networked. The main findings suggest that online teaching during the lockdown required students to establish new patterns of participation, thus, establishing new structures and ways to collaborate. This led to emerging networks supporting various aspects of their life setting as students and creating opportunities for engaging in new social configurations and learning.

Keywords Networked learning · Covid-19 · Rhizomatic networks · Teacher education · Online teaching · Pre-service teachers · Learning networks

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Introduction

On the 11th of March 2020, all higher learning institutions in Denmark were closed by the Danish government due to the Covid-19 pandemic. On a very short note, all educational activities had to be transformed into online activities. This meant that future participation and collaborations had to take place in online virtual environments, whether students had previous experiences or not.

In June 2020, a mixed methods research study on online teaching across universities and university colleges was conducted (Georgsen & Qvortrup, 2021). The focus on students' strategies for participating in learning networks was not investigated in the report by Georgsen and Qvortrup. However, access to their empirical data provided us with an opportunity to investigate more in-depth how students experienced the move from everyday learning to participating in fully online learning networks.

During our analysis of the interviews, we saw indications that the students' experiences could not easily be categorized within one specific way of understanding networked learning, but rather as shown by Dohn et al. (2018) to draw from different definitions to modify and create an analytical framework, which took into consideration that ways of being networked in educational settings are intertwined between different cases of 'networkedness', and dependent on how students respond to the requirements of the situation, through establishing emergent networks. The intention of the analytical framework is to contribute to the field by providing a novel way to capture the students' experiences of being networked and the emergence of new networks as part of their learning trajectories.

The chapter falls into five parts. Part one introduces the background for our study and the overall contribution of our work to the field of Networked Learning. The second part explains the related work and how theory from the field of Networked Learning provides input into how we studied our research question. This is further elaborated in part three, which also captures our analytical framework and presents our methodological considerations. Part four presents our analysis and finding using extracts from the empirical data to show, how different networks and ways of being networked emerged. The chapter concludes with a discussion of the findings, and the developed analytical framework, pointing at some future directions.

Learning in a Networked World

Today's world is, in many respects, networked, and the knowledge and skills needed to thrive in contemporary society have been widely debated and have led to the formulation of 'The 21st Century Skills' (Trilling & Fadel, 2009). The research suggests that the networks we are surrounded by require new learning strategies (Dron & Anderson, 2015).

Furthermore, how the world is networked, in several systematically related senses, has been highlighted (Dohn, 2018). The Networked Learning Editorial Collective (2021) has elaborated on how the Covid-19 lockdowns have reshaped our way of participating in different life settings, and from an educational point of view impacted how institutions should provide opportunities for learning and considerations on the role of technology, valued relations and aspects of knowledge. To do so we find the founding definition of networked learning suitable. Here networked learning is defined as:

> *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, 2004*)*

As de Laat and Ryberg (2018) state, this definition highlights the importance of both human and digitally mediated participation. Thus, networked learning is characterized by the notion of learning through and by "connections" and "connectedness" underlining that mere interactions with technologies and resources in isolation are not sufficient to fit within the definition. Networked learning, as an approach, investigates and analyzes connectivity that provides opportunities for change, emancipation, and development (Dohn et al., 2020) in the network, and not only exchange information or one specific form of knowledge. The analysis provided in this paper uses this definition as offset and is not focusing on the topology of the network, but rather, on the translations, exchanges, hierarchies, and interactions in the network. We utilize Jones' contribution to the definition of networked learning (Jones, 2015 p. 241) emphasizing the shared experience of solving problems and learning in a community that is facilitated by digital networks. In this sense, the "network" in networked learning consists of actors, both human and non-human, who contribute to the manifestation of the network and to the exchanges within the network.

A Framework for Analyzing Ways of Being Networked

The empirical data that supports this chapter and the analytical framework was developed after 84,000 students shared their experiences regarding learning and teaching respectively in a survey and thirty-two semi-structured interviews (Kvale & Brinkmann, 2018). The data was produced in the period from mid-September to the end of October 2020. The thirty-two students were interviewed individually, each for approximately one-hour duration. Participants for the interviews were selected strategically based on their answers in a survey. The aim was to address two parameters: academic subject area and attitude toward online teaching (Georgsen & Qvortrup, 2021). The interviews focus on the students' experiences with online teaching, perceived learning outcomes, and how they managed to establish a learning site in their homes. The interviews were recorded and verbatim transcribed in Danish. To utilize significant passages from the interviews in this paper quotes were selected, condensed, and translated into English.

We were interested in the emergence of digital networks, that is, which types of networks the students participated in as part of their learning trajectory during the Covid19-lockdown and how they supported the students' learning processes. The reason is that research indicates that the students' learning strategies for learning in networks are rudimentary and that they preferred to work individually (Georgsen & Qvortrup, 2021, p. 6). The variation of networked learning strategies may generate a polarized learning environment in the classrooms that challenges the teacher.

While conducting this investigation, the distinction between 'network' as people, situations or context, infrastructure, and as an actant itself, as proposed by Dohn et al. (2018), seemed promising and relevant as an analytical approach. Furthermore, we looked for whether the network was hierarchical or ahirachical curated or non-curated and whether the network was catalyzing a difference that is more than a 'fold' (Deleuze, 1993) of the existing matter, 'old wine in new bottles', that is, completely new relations and connection between the actors in the network (Kjaergaard & Hachmann, 2022). Dron and Anderson (2015) make a distinction between a *group*, a *net* and a *set*. This distinction is useful here because the cases vary from groups to nets and sets. The first case is a group because the members are related and share interests. The last case is a set because it is an ahierarichal network of 'desires' to share with 'strangers' who share a passion.

Dohn and colleagues used these distinctions as a way to map research within the field of networked learning both recurrent, contemporary, or emerging. They emphasize different understandings of what 'network' is a network of; how it is viewed as supportive of learning, and not least what it means for learning to be 'networked'. It is worth noticing that Dohn and colleagues' categorizations of the networked learning field are initially developed as descriptive categories. They may not have been used as analytical categories in empirical studies before.

Dohn et al. (2018) have devised a useful way for scholars to identify and categorize different and emerging themes within the field of networked learning. More specifically, they point to the development of different understandings of what 'network' is a network of; how the network is viewed as supportive of learning, and what it means for learning to be 'networked'. Further, Dohn and colleagues specify four themes that characterize research within the field. These are:

- The 'network' is a network of people – taking a view on learning networks as a social "web" of people that do not necessarily include the use of computers.
- The 'network' is a network of situations or contexts – emphasizing the connection between diverse contexts and situations, where different aspects of knowledge and patterns of participation are resituated and transformed.
- The 'network' is one of ICT infrastructure – focusing on, how technology provides means of connecting and supporting people and their learning.
- The 'network' is one of the actants – taking on an approach to learning that it is the result of concrete socio-material entanglement of physical, virtual, and human actants.

Building further on the original definition of networked learning by Goodyear and colleagues Goodyear (2004), they advocate for a broader and novel understanding of

different approaches to networked learning. For instance, they include approaches to understanding social learning processes by asking how people or students in our case develop and maintain a 'web' or connections of social relations with or without technology (what we label C1 in Table 13.1 below). Another example is networked learning understood as a student's learning arising from the connections drawn between situations and from the resituated use of knowledge and skills in new situations. Resituation of knowledge, perspectives, and ways of acting from known situations to new ones foster context-dependent patterns of participation (Hachmann & Dohn, 2018; Dohn & Hachmann, 2020) which we label as C2 in Table 13.1 below).

In our operationalization of the analytical categories, we found it to be fruitful not to see them as separate themes, but as intertwined ways in which students engage in networks. For our analysis, this meant that we had to revise our understanding and the way to use the different senses of being networked, which was proposed by (Dohn et al., 2018). Instead of analyzing the students' ways of being networked through mutually exclusive categories, we needed to look across the four types of networks. Thus, it was made possible to identify and share knowledge about the position each type of network occupies for specific participants at a specific point in their learning trajectory. The developed categories were processed as units of analysis in the following way:

It is important to stress that the use of the term 'category' in the framework is used as an analytical distinction to highlight diverse ways of being networked from the students' perspectives. It is not meant to categorize networks in the world. Instead, the framework tries to capture and constrain the complex ways of experiencing being networked in different life settings.

Table 13.1 Analytical framework, inspired by Dohn et al. (2018)

Category 1 (C1): Students' participation in a network of people: Is used to map the people included in the students' network learning strategies. It is introduced as a reference to network the students participate in, during their learning process along with other people. These networks can be formal as well as informal and include peers, classmates, study-group members, educators, university colleagues, and 'strangers'.
Category 2 (C2): Students' participation in a network of situations or contexts: Sheds light on how students resituate knowledge and patterns of participation in new situations and contexts. Information or communication technologies or learning management systems as well as other means can support this process, but they are not the focus of this investigation. It is introduced as a reference to the learning that arises from connections between situations and contexts such as class, courses, study groups or other situations facilitated by the university.
Category 3 (C3): Students' participation in a network of ICT infrastructure: Focuses on perspectives on the ICT mediation of learning, computer-supported collaborative learning (CSCL), enabling connections across space and time.
Category 4 (C4): Students' participation in a network where the network is an actant itself: Network as a catalyst of difference from normal. Emphasizes students' socio-material entanglement with objects and other people. Informal: Greater networks of 'strangers' in non-institution platforms – e.g., organized by hashtags or handles. Inspired by notions of the 'rhizome', 'line of flight', and 'plateaus of intensity' (Deleuze & Guattari, 1987, p. 22).

Emerging Networks

The data was analyzed by relating the interview data systematically to the complex phenomena of learning networks while maintaining an exploratory approach. We utilized a semi-structured interview guide and formulated questions that opened for systematic 'probing' (Flick, 2009). We applied an abductive strategy (Bryman, 2016; Schwartz-Shea & Yanow, 2012), where 'identifying disturbances' was introduced as a methodological concept. By disturbance, we refer to "instances or episodes (or "fields") of disequilibrium, instability, imbalance, disintegration, disturbance, dysfunction, breakdown, etc." (Miettinen, 2006, p. 11). Therefore, we looked for instances in the data that surprised us, and alternate ways in which the students expressed their experiences of connectivity in relation to their processes of learning and being part of networks. These were then explored further. The notion of a 'disturbance' as the onset for reflection is inspired by Dewey's definition of a 'disturbance'. Dewey suggests that a disturbance forces you to stop what you are doing: 'A disturbed, perplex situation temporarily arrests direct activity'. (Dewey, 1997, p. 110) The use of 'disturbances' as a methodological concept, acts as a catalyzing instance for analytical reflections and it presents possible insights into the students' experiences with new forms of connectivity and types of networks.

Initially, the interviews were analyzed by deploying an open and exploratory coding strategy focusing on the students':

- Development of strategies and competencies.
- Collaboration with fellow students.
- Coping with conditions, requirements, and opportunities in connection with the lockdown.

This showed that the students' choices and creations of networks indicated ambiguity between institutional networks and personal networks. This observation called for us as researchers to reflect on how to take this ambiguity and the emergent communicative needs of the students into consideration, when establishing different ways to identify ways of being networked.Second, we singled out three cases showing in different ways how students were networked during the Covid-19 lockdown. We prioritized diversity regarding the learning trajectories the students followed during the Covid19-lockdown, the kind of networks represented by the students, and how the networks appear to have supported their learning. The three cases represent great variation aiming to maintain a high degree of complexity and maximum variation in the analyzes (Flyvbjerg, 2006). Thus, we have emphasized variation and diversity in the selection of the three cases (Flyvbjerg, 2006), and the focus in each case is neither unique nor symptomatic of this particular student or education. The focuses that have been chosen in each case have been identified across the total empirical dataset. Therefore, the three cases are not comparing or contrasting the emerging networks, and it is important to emphasize that the purpose of the article is not to compare or contrast the three cases or the three teaching practices.

Instead, the cases can be read as the result of the abductive process of analysis. An analysis, we conducted to explore and gain knowledge of the students' experiences of being networked and the emergence of new networks as part of their learning trajectories.

Disturbed and Expanded Learning Networks

In the first case, we are introduced to "Anna" who follows a Bachelor of Public Administration program, which is offered both as an on-campus and as an online program. Anna is following the online program, and as the Covid-19 lockdown applied, she was already used to attending online classes and the most radical change was that her fellow students who used to attend classes on-campus were now attending the online classes as well. Due to the lockdown, however, a new practice and context for group work – breakout rooms – was introduced expanding the network of online participants. Anna was first skeptical of this change as she preferred to stick to an already established, and for her important network – her study group:

> In my study group, we know each other really well and we know what happens in each other's private life and such, and maybe we actually know each other better I think than if we had met each other on campus.

Another point of attention expressed by Anna was that the requirements for studying online are different from participating in courses on campus:

> It requires more self-discipline and yes it just generally requires a little more (...) You really must be present when you are online, because if you're mentally *checked out* then you miss pretty much.

When asked about participation and group work in online classes, right after the lockdown Anna explains that there was a clear split between, what she refers to as 'the online'ers' and the 'the others'. As the lockdown proceeds, the situation, however, seems to change for Anna:

> In the second module, we were put into mixed groups and got to know some of the others actually. So, there was also small talk, i.e., when we had to do assignments. So, you got to chat a bit about something else as well, and that is what we also did in the study group, right?

The case shows a student, who sees herself as primarily networked within an important network of people (C1) – her study group. During the lockdown, this well-known network was both expanded and experienced as being invaded by 'the others' leading to uncertainties. Further, the boundaries between the students following the program online and students that participate in the program on campus were initially reproduced in the now joint online setting, and breakout rooms are emphasized as a context (C2), that supported her in getting acquainted with the students she didn't already know from the online setting. The breakout rooms are identified as actants (C4) in the process of establishing these new online groups.

They are proposed to offer a particularly suitable structure for immediate and relevant workspaces for collaborations.

Anna emphasizes structure, routines, and people as equally important when it comes to being connected to her study group. In her opinion, the study group benefited from already being an online network, while the introduction of breakout rooms is experienced as a new way of framing collaboration. Even though Anna perceives the breakout room sessions as an opportunity to be connected with students she was not previously connected to, she also finds it to be a connectedness that requires a surplus of mental energy from her. One explanation offered by Anna is that it requires extra effort and self-discipline to establish and participate in an online study group, e.g., endurance, focus, and high attention to one's learning strategy. Anna points out that the challenge was even greater for 'the others', who were not used to online teaching and who had not yet – unlike Anna – developed personal online learning strategies.

Learning network Supporting the Development of Professional Skills

In the second case, we meet "Jane" who is enrolled in a 2-year Academy Profession program in Computer Science and is a skilled and experienced participant in several types of learning networks. Jane's overall perception of her study life during the lockdown is very positive and she doesn't find online teaching as more demanding than her usual everyday study life.

Jane has a very specific view on the role of the learning networks and her part in them:

> Many [of my fellow students] think that we are missing a bit when it comes to the social part of studying, but I must admit, that I am not here for the social. . .I think this [lockdown] has empowered me in terms of not being afraid of having to take jobs online.

Throughout the interview it becomes clear that for Jane the network and the people in it serve as a structure for engaging in the content of the course and the development of professional skills (C1) such as e.g., being trained in moving in and out of various online settings, participating in different ways, introduced to new mediating teaching tools, or forced to find solutions to problems in relation to database connections. Furthermore, Jane seems to have a special focus on establishing clear structures for cooperation within her study group (C1):

> It worked super well because we structured the day well. . . .When a task was given, we jumped into our [Discord] channel. Then we can share if there is something we struggle with. I think we're pretty good at it. We work super well together. We are a very good match" . . . If I pose a question in our chat channel during the afternoon or evening, then there is an answer as soon as one of them [participants] is online.

Jane is not using Discord to socialize in a community but perceives Discord as an effective platform for learning (C3). On the same note, Jane explains how it was

obvious for her learning network (the study group) to connect over Discord, as they already used it as a communication platform in the class. It is not only the study group that appears as a central actor but so does the joint Discord channel as well – as an agent being characterized as a part of a super good match. Here, Discord serves as an essential infrastructure for mediating exchanges that enable connections across space and time. It is perceived as a flexible and relevant context that facilitates her learning process during the lockdown, in a way that is different from her experience with learning on campus.

Jane also mentions Zoom as an important ICT infrastructure, by which the educator could support the students through synchronous screen sharing, drawing tools, and organizations in sub-groups. Again, the study group emerges as an important network that adds support to Jane's learning process. While PowerPoint is a well-known software that Jane recognizes and is familiar with from classes on campus, the video conference system features were new to her. And her favorite system was Zoom (C3), with the affordances of sharing content and communication in video, text, and audio all to support her learning approach. The Zoom infrastructure becomes a central focal point that enables Jane to commit to the academic content and establishes a situation where she is networked to both educators, fellow students, and the academic program at the same time. Jane appreciates being able to act intuitively during class, to be able to ask questions or ask the educator to elaborate on issues if she is in doubt or does not immediately understand the professional aspects taught. This strategy seems to be essential for her way of participating, as she appears to be very energetic. Precisely the connection to the profession and the professional elements appears to be particularly important to Jane and as she experiences that development of online learning strategies to a great extent, equips her for her future profession, she gets even more motivated. Though her motivation for participating does not seem to be driven by the desire or ambition to connect to a community with her fellow peers.

Instagram as a Learning network Agent

In this case, we are introduced to 'Kate', who studies nursing. During the interview, Kate explains that one of the challenges she faced during the lockdown, was related to the social aspects of her life as a student and the need for dialogue about both academic and social aspects of studying Nursing. During the lockdown, Kate, therefore, starts to post content related to a hashtag primarily deployed from a handle that The Nursing Students' organization already utilized on Instagram:

> [...] to form a relationship with the followers we now have [in Instagram], I started the theme 'A day in my life under the corona'.

Kate starts to share her everyday stories, challenges, and experiences with studying online nursing in seclusion during the lock-down under the hashtag: 'Follow [student name] for a day' on Instagram intending to nest and nurture social interaction:

> It [the posts] was a lot of this, well, I must have group work now, and I must have a lecture now and then all these things, and how I read homework and stuff like that, so you could kind of motivate each other, uh, so you just could get that little kick you might need.

Later in the interview, Kate continues:

> When you are in such a situation [lockdown], I just think that relating to someone on the same level [peers], uh, commenting on what kind of coping they kind of do. That's why I took the initiative.

The Non-curated Ahierachical vs. the Curated Hierarchical Network

Kate explains that the university provided a space in Teams named 'homework support', and that this space, curated and supervised by a lecturer, was intended for homework support and socializing (C3). However, only an average of 5 students participated. Kate explains that she hesitated to participate, as she found it a 'slight hassle'. Her experience of the Teams 'homework support' being a hassle is, unfortunately, not elaborated on in the interview. However, she does emphasize that the ease of using Instagram may have boosted the activity in Instagram. The experience of Teams being a hassle may relate to the design of the 'homework support channel' or the way Teams supports participation and the fact that it was teacher mediated. Teams as a tool is known amongst nursing students to be a learning platform designed to support communicative needs in learning processes in a hierarchical network, social media platforms are designed to support spontaneous needs for communication in ahierachical, non-curated ways. This also goes for Instagram, which as a network is characterized by the symmetry between human and non-human actors, where the ease and frequency of participation, thus, defines its power.

> But [in Instagram] we have actually got a lot of followers [...] right now we have 300 followers. It's far, far more than there are on teams and it's far more than the five [students] that were to. . . for the homework cafe [in teams]. [...] Well, it's just because we have institutional IT [...], and then we have this parallel track, right.

Kate explains that the intention with this shared hashtag was to establish an online space for exchange and community, where she and her fellow nursing students could share everyday 'lockdown moments' and promote academic dialogue organized through hashtags.

During the lockdown, this social network became more systematic and formalized through a weekly, designated student 'take-over':

> We called it "follow this class for a day" or "follow this student for a day" or "Follow Kate, fourth-semester student for a day". [...] Then I posted something, personal or academic, and received a lot of comments and feedback. And it was really good, it engaged people.

The network reached three hundred contributors on average for each post and since the network was organized through hashtags and a shared handle many of the contributions were from 'strangers', such as nursing students from other University Colleges. The network, thus, presented a different way of connecting peers and

strangers with shared needs that is facilitated by the affordances of Instagram (internet connection, app, and smartphone). A condition for the emergence of the network was that the contributors were equal participants and that the network relied solely on their participation. Thus, it created valuable exchanges and ties between the students and the network. Kate explains that she thinks the success of the activities relied on the convenience and ease of contributing and that the users of the hashtag found answers and a community to explore a shared 'set' of interests and needs. This leads her to suggest, that the university could apply similar strategies:

> I think they should use us, the students, as a means to reach more co-students than they can. Uh, because there have been a lot of monologues in relation to what they're conveying to us. I also think we could contribute a lot and then make a really good collaboration out of it instead. Uh, so I think that would be using us as a resource instead.

Here, Instagram is positioned as a 'non-human actor' in the network, not only did it provide the necessary infrastructure (hashtags and handles) for the learning network (C4) it also played a significant part as a facilitator of the network's outreach and accessibility. The hashtag and the handle became a plateau for various, organically emerging interests for networking such as social sharing, expanding connections, and academic support. This Instagram network did not only become an academic community in which students could engage in academic dialogue, but it also facilitated connectedness established through the sharing of feelings of seclusion and loneliness.

Discussions and Conclusions

From a general perspective, the three cases above represent a variety of ways the students were networked during the covid-lockdown and how different patterns of participation were applied to the new situation of their life as students. A few examples from the larger dataset have been highlighted to show how the distinction between network as *people (C1)*, *situations or context (C2)*, *infrastructure (C3),* and as an *actant itself* (C4) can be used as units of analysis to identify the kinds of networks the students participated in during the lockdown. The analyses of the cases show how expansions of networks set forth new requirements for participation and social configurations.

In the first case, the expansion was forced onto already existing and well-functioning communities, and it was initially comprehended as a disturbance of the existing practices within the communities, respectively. The fusion between the two communities challenged the students in the way that they had to establish new joint practices and development of new patterns of participation (Hachmann & Dohn, 2018). Self-discipline and engagement were promoted as key components for participating in the new networks and further that the social reconfigurations required negotiations of roles and expectations towards the network as a new setting for learning. The cases indicate that the students perceive the networks as a way to

enhance their professional development. For some students, the community aspects were primary offsets for engagement, while for others the digital infrastructure provided means for engaging in educational content more efficiently. It is remarkable, especially in cases 2 and 3, how the choice of network infrastructure (Discord and Instagram) is chosen for different reasons. Discord represents a way to create more fluent and efficient workflows while Instagram represents a means to create a network that provides care and support.

As stressed in the third case, the students were not particularly fond of the tools and infrastructures provided by the university. The Teams-group only attracted a few students whereas the social media platforms were widely utilized. Instead, they established these by other means (Discord, Instagram, Messenger, etc.). The cases indicate that online participation led to expansions of the students' repertoire regarding engagement in different kinds of network settings. Empowering them to deploy new ways of being networked that are initiated by themselves supplementing already established institutionalized infrastructures.

These choices were based on personal preferences instead of the University's it-strategy. The cases presented in this paper suggest that empowerment and agency are viable approaches for student-initiated choices regarding the selection of resources, platforms, and other tools. The empowerment of being able to create networks and the agency of creating their own networks lead to strong ties among the students.

The mirroring of physical teaching practices from teachers/program perspectives (Homework support, streamed lessons etc.) took background and the emerging networks presented in the three cases took foreground in the students' stories from the lockdown. Furthermore, the students express that this motivated them, intensely, to engage professionally in discussions and group work. As seen in the third case, this leads the student to suggest that the university could utilize a more ad hoc and asymmetric approach to establishing networks. In other words, suggesting that the university could learn from the student approach to networked learning described in the cases. Conversely, the students also acknowledge that the ephemeral nature of ahierachichal networks may evaporate once they become mandated by the university. Thus, the ahierachical network may only emerge if there is a 'line of flight' (a need for exchange), a 'plateau of intensity' (a space for exchange) and a 'rhizome' to transport the exchange.

Thomsen et al. (2016) find and discuss related topics regarding investigations of university students' motives for using tools such as Facebook, Dropbox, or Google Docs in relation to their work. They question whether educators and institutions should play a more active and critical role in promoting critical reflections on the students' behalf regarding the choices of tools and technological infrastructure. We would argue, that even though a more active role from an institutional perspective could prove valuable in some cases, it may also contest the very nature of an ahierarichal network as for instance C4 since they emerge when a need for exchange presents itself and rarely can be anticipated or formalized. In other words, the ahierarichal, rhizomatic network doesn't exist in an externally defined structure, it emerges when the psychological need and practical possibility for a network arise.

Future Perspectives

We would like to end this chapter by highlighting two points of attention that might be fruitful for further research and discussions in the field. The first question regards findings in the empirical data, whereas the second is of a more conceptual nature regarding the analysis framework of this chapter.

The first point of attention is related to how the choice of tool or technological infrastructure is in any way connected to the professional identity of the students. In cases two and three there were indications suggesting that the choice of network infrastructure was chosen for different reasons. The choice of technological infrastructure was not incidental; however, it wasn't completely free either. In case one the technological infrastructure is provided by the University, while in cases two and three the technology provided by the University is a background technology and the non-curated, ahierarchical technology is student chosen. Albeit, amongst a very narrow selection of choices since the technology should be a part of the students' already existing repertoire. In case two Jane explained how Discord was the right tool for herself and her fellow students in Computer Science to get things done efficiently whereas Kate pointed at Instagram as a way of promoting care and motivation in a lonely time. Looking briefly at Discord and Instagram as platforms it becomes obvious that they afford different possibilities for communication and community. Whereas Discord is described as a place for effective and easy communications between peers "going beyond casual talking", Instagram is described as a "simple, fun and creative way to capture, edit and share photos, videos, and messages with friends and family". Based on the data we asked ourselves, whether the students' choice of platform was chosen by chance or if there could be some form of logic. Unfortunately, the data is not rich enough for in-depth analysis, however, there seem to be indications that the choice of tool or infrastructure could have a relation to the professional identities of the students. For instance, that students in computer science would choose a platform initially developed for the gaming community seems like an obvious choice, whereas the use of Instagram provides the students with the possibility of nurturing social relations through sharing ups and downs during the lockdown. Following up on the research done by Thomsen et al. (2016) it would be interesting to investigate the students' reasons and motivations for choosing specific tools, and from an educational perspective to see how these choices are connected to the professional identities of the students. This could indeed inform both research within the field, but also provide insights for institutions on the needs and demands for technological infrastructure from a student's perspective.The second point we would like to address here regards the analytical framework itself. As stated earlier in the chapter we found Dohn and colleagues' approach to be a fruitful input to develop a framework for a more in-depth analysis of the data. It is important to stress that their work was not meant as an analytical approach to empirical research but to characterize the field of networked learning and its different perspectives and to point at challenges for future research. Converting the different understandings of networked learning into analytical categories to describe how

students engage in emerging networks may seem far-fetched and should be further discussed. However, we found that analyzing networks through a narrow-scoped lens was a simplification of what was going on in the students' practices during the lockdown. The mirrored practices from physical lessons from the teacher's perspective created a need for ahierarchal networks that could answer emerging questions and facilitate social connections that would be out of scope for the register in the teacher's lesson design. It was too unilateral to look only at how people were connected, without also looking at the connections between situations. It was too simplistic to only look at how digital technology provided an architecture for social interaction, without looking at the people and the role of the technology as an actant itself. From this perspective, the framework provided a more holistic approach to uncovering the students' experiences and perspectives. The question is whether the framework is fine-grained enough to be used on much richer data, and if not, how it can be further developed to do so? The use of the framework on the data created instances of overlapping categories. Because the data was not rich enough regarding our research question, it is difficult to determine whether a statement or perspective should be categorized in one or another category. This, on the one hand, underlines the need for a more holistic approach, but, on the other hand, it also questions whether the four categories of networks can contribute to a consistent analysis of learning networks.

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Chapter 14
University Teachers' Perceptions of Networked Learning During the Emergency-Remote-Teaching Period: A Phenomenographically-Informed Inquiry

Alejandro Acuyo Cespedes and Kyungmee Lee

Abstract This paper presents part of the findings of a phenomenographically-informed investigation into higher education (HE) teachers' perceptions of personal learning networks in the context of the recent Covid-19 emergency-remote-teaching (ERT). The pandemic-induced ERT period has magnified teachers' use of personal learning networks with an absence of a coherent institutionalized approach to ERT. Subsequently, there has been a diversity of teachers' networked learning experiences throughout this interruption of the status quo. The present research, therefore, explores the perceptions of 18 Academic English teachers at a leading English-instruction university in Kazakhstan that was forced to move online at the beginning of the concerned pandemic. The chapter reports the teachers' perceived benefits of using their networks for online teaching and learning—particularly for connecting to resources and people online. The results suggest that teachers perceive the benefits of network use in at least four different ways: (i) enabling flexible access to online resources, (ii) enabling flexible access to others, (iii) facilitating personalized and focused small-scale pedagogical interactions, and (iv) maintaining and developing a sense of belonging to academic communities. The chapter concludes by discussing the implications of the results for teacher professional development contexts and reflecting on challenges associated with the phenomenon.

Keywords Networked Learning · Emergency remote teaching · Teacher professional development · Personal Learning networks · Phenomenography · Covid-19

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Research Background

Higher education (HE) has long been experiencing a general trend towards digitalization as technology has continued penetrating university campuses across the globe (Englund et al., 2017; John, 2015). This trend has often manifested itself in university teachers' pedagogical contexts as the promotion of technology-enhanced learning (TEL) (Kirkwood & Price, 2014). For example, teachers are encouraged to enrich their face-to-face classroom experience by incorporating tools like interactive whiteboards (Kim et al., 2013) or game-based platforms such as 'Kahoot' (Smith & Kaya, 2021). The digitalizing effort in HE has also produced an increasing variety of course delivery modes, such as blended learning (BL) (Ryberg et al., 2018), whereby teachers are asked to engage with students across a combination of both online and offline spaces on a single programme. Despite this trend towards a more technologically enhanced environment, not all teachers have embraced this paradigm shift; some have resisted the trend (Englund et al., 2017; John, 2015; Krumsvik, 2014). The long-term digitalizing efforts in HE have not been successful as many teaching activities remain rather analogue (at least until the recent Covid-19 outbreak). Teachers' resistance to technology integration is often born out of their digital incompetence as they feel under-equipped to follow this trend (Krumsvik, 2014); but sometimes, it is a more attitudinal challenge for teachers who fundamentally disagree with imposing technology on their pedagogical practice (Kim et al., 2013).

University administrators and management teams have responded to teacher resistance by increasingly adapting their institutions' professional development (PD) programmes to include a greater focus on technology (Dysart & Weckerle, 2015). Examples can range from the relatively practical training of teachers to operate new learning management systems, such as Moodle (Kim et al., 2013), to the more fundamental tasks of exploring the pedagogical implications of integrating video-sharing platforms, such as YouTube, into their face-to-face lessons (Dysart & Weckerle, 2015). In parallel with such formal training activities, the practice of Networked Learning (NL), whereby teachers develop professionally through informal interactions with colleagues and online resources (Goodyear et al., 2004), has also taken place to one degree or another, especially ever since technology started penetrating teachers' everyday practice. Nevertheless, the impacts of teachers' NL on the changes in their pedagogical beliefs and practices related to technology have remained relatively under-researched due to the informal (and often private and personal) nature of NL practices. Thus, it can be argued that despite the great potential for teacher changes, particularly in technological settings, NL has been under-represented and under-focused on as a PD mechanism across universities.

The challenges mentioned above continued until the recent spread of the Covid-19 virus worldwide, creating a global pandemic that interrupted all forms of face-to-face human activities, including teaching and learning (Adedoyin & Soykan, 2020; UNESCO, 2020). As the majority of HE institutions had largely operated in their long-accustomed face-to-face settings up to that point, the early part of 2020 delivered an unexpected blow to this sense of normality (Acuyo, 2022; Lee et al.,

2021). This has led to many of these universities being forced to abruptly suspend their operations in the physical classroom and swiftly adapt to the online medium to meet the newly introduced social-distancing regulations. Many faculty-related challenges have arisen, ranging from their inadequate pedagogical preparation for operating online at such short notice (Carrillo Aguilera & Flores, 2020) to the mental health strain caused by the physical isolation and stress that many of these teachers suddenly found themselves living under (Leal Filho et al., 2021; Van Der Feltz-Cornelis et al., 2020). Despite these hurdles, the wide consensus is that most universities successfully continued operating in this relatively under-explored online environment throughout this ERT period. In other words, teachers may not have all been perfect 'swimmers', but few seem to have 'sunk' throughout this chapter.

While it may be true that, as of now, in 2022, when this chapter is being written, some universities have already reverted to face-to-face operations, questions remain about how the same faculty who long resisted technological integration had suddenly managed to 'stay afloat' during the ERT event. Many would argue that their learning networks, both in connection to other people and online resources, played a significant role during this disruptive event since institutional support was deemed minimal as universities were caught off guard (Hodges et al., 2020; Rapanta et al., 2020). That is to say, the notion that teachers were able to continue operating in this online environment that they were unexpectedly thrust into with little guidance from their institution likely suggests that these teachers relied on NL in the absence of more traditional forms of university support and PD (Green et al., 2020).

We argue that NL can be developed as a dominant PD platform to help teachers with the continuing transition to digitalization even after the Covid-19 pandemic, as it was during the Emergency Remote Teaching (ERT) event. This calls for greater exploration into the use of personal learning networks during the ERT period to better understand how this NL-inspired PD platform can be exploited in the longer-term future. By informing university administrators, as well as teachers, of how to promote and support NL practices among their faculty, this investigation ultimately seeks to facilitate teachers' effective transitions into an increasingly technologically enhanced HE environment.

Research Problems and Question

Three interrelated research problems have directly emerged from the above teacher NL scenario during the ERT period. Firstly, the practical, and individual level, problems include the notion that university teachers may not fully realize the crucial roles that online forms of collegial collaboration and resource utilization have played in their day-to-day pedagogical practice. This means that they are less likely to, for instance, proactively tap into their network connections for support and thus may feel more isolated as a result (especially in ERT-like situations). Secondly, there is a gap in our theoretical understanding of university teachers' learning practice, since a significant weight of existing PD literature focuses on NL from a student perspective

(Elmer et al., 2020; Mensa & Grow, 2020; Shim & Lee, 2020), as opposed to a faculty one in an ERT context. This partly neglects university teachers who unexpectedly or unintentionally find themselves in this online environment, either gradually as technology seeps into HE campuses or abruptly as a result of Covid-19-like scenarios. Finally, at the institutional level, HE institutions often prioritize formal and explicit PD practices such as certificated courses or documented observations at the expense of dismissing less visible practices, such as collegial collaboration or the use of online resources. This status quo of placing little value and emphasis on teachers' personal and private interactions that constitute NL, is likely to lead to an increase in the slow and less smooth shift towards the digitization of HE. It may also be fair to say that teachers are less likely to put sustainable effort into using and developing their networks without the approval and support of their institution once their immediate needs are gone (after the ERT event, for example).

To address these problems, this study explores the following research question: "What were HE teachers' different perceptions and uses of networks for learning and teaching throughout the ERT period?" More specifically, the authors are interested in unveiling 18 Academic English teachers' perceived benefits of using their networks for adopting, and coping with, the ERT during the Covid-19 pandemic. Using NL as a theoretical lens and phenomenography as inspiration for the methodological approach, this study intends to uncover variation across individual teachers' perceptions and experiences with NL during the Covid-19 pandemic, in a bid to use this to help teachers better-cope with HE's ongoing transition towards digitization. Before introducing the study design, the subsequent sections will briefly summarize two sets of literature closely related to the present phenomenographically-informed investigation.

Emergency Remote Teaching

A contrast between ERT and other forms of online teaching is challenging to present, given the overlap. Hodges et al. (2020) claim that ERT was born out of necessity at the beginning of the Covid19 pandemic in order to differentiate between the hurried struggle to rapidly shift courses that were originally intended for face-to-face delivery to an online format, from the carefully designed courses that are delivered by teachers experienced in online pedagogy. That is to say, ERT is reactionary and improvisational in nature (Bozkurt & Sharma, 2020), whereas other forms of online teaching are generally planned ahead for (Kentnor, 2015). Hence, for the purposes of this investigation, ERT is defined as "the use of fully remote teaching solutions for instruction or education that would otherwise be delivered face-to-face or as blended or hybrid courses, and that will return to that format once the crisis or emergency has been abated" (Hodges et al., 2020, p. 7). This definition encapsulates both the unforeseen nature of the phenomenon, as well as its acceptance as a temporary measure; albeit lasting longer than initially predicted by many institutions.

HE programmes that are originally intended for online delivery of some kind, whether this is entirely remotely, using a combination of face-to-face and online delivery as BL suggests (Garrison & Vaughan, 2008), or by using technology in the classroom to improve elements of a face-to-face course as TEL implies (Kirkwood & Price, 2014), undergo rigorous preparation before the start date (Kentnor, 2015). Means et al. (2014) describe the range of moderating variables that are considered when designing an online course, including the synchrony of the program (asynchronous vs synchronous), the pacing (self-paced vs class-paced), instructor role (active vs passive) and so forth. The 'emergency' part of the ERT acronym, on the other hand, highlights that, in many ways, it is the very opposite of a conscientiously designed course intended for delivery in an online space, since there is little time to consider these variables in advance (Mohmmed et al., 2020; Rapanta et al., 2020). The rapid and unforeseen shift from physical to virtual learning spaces during the initial Covid19 lockdown (Green et al., 2020), meant that teachers with little experience in online pedagogy were left to deliver improvised versions of their courses online (Carrillo Aguilera & Flores, 2020), that were originally intended for face-to-face settings, using little more than their home computers and support networks. It could thus be argued that the recent ERT period has produced a stressful scenario whereby teachers "are building the plane while they fly it" (Trust & Whalen, 2020, p. 193).

Another critical factor that differentiates ERT from other forms of online teaching is its association with temporariness. Planned online courses in various forms, whether they adopt a BL, completely online or any other format, have existed since the early 1990s (Kentnor, 2015). This means that these courses have benefitted from multiple rounds of feedback over the years (Meikleham & Hugo, 2020), originating both from student evaluation surveys and instructor reflection on the overall success of the courses in meeting their aims. These courses are, therefore, continually adapted and improved (Boud & Molloy, 2013), and a common understanding among the stakeholders is that the programmes are there to stay in the long term. In contrast, ERT is seen as a temporary measure taken by institutions to help them cope with an unforeseen event disrupting face-to-face courses (Hodges et al., 2020; Toquero, 2021). The mutual understanding among students, faculty and other stakeholders is that ERT will be used as a crutch, enabling programmes to continue, albeit under a 'new reality' that is assumably less than optimum. The common association of this 'new reality' of ERT, resulting in inferior experiences for students and teachers to those under the usual physical settings, is often excused by the collective assumption that ERT is a short interim before returning to 'normal.'

Networked Learning

NL exists in an educational context in which different technologies are embedded in HE (Cutajar & Montebello, 2018; Networked Learning Editorial Collective, 2021) to create a learning space that is non-binary. Face-to-face course participants are just

as likely to collaborate in the virtual world via social media outside the classroom as online course participants are to arrange physical meetups. With this in mind, NL is defined as "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). We acknowledge that in the last 20 years, "the world has radically changed" (Networked Learning Editorial Collective, 2021, p. 327) and that it is therefore important to reflect on the potential evolution of this seminal definition.

A prime reflection is Goodyear's own considerations regarding the inclusion of collaboration and cooperation into the redefinition of NL, as groups of individuals use technology to unite behind challenges (Networked Learning Editorial Collective, 2020). The long-term benefits of technology-mediated teamwork extend beyond merely adding connections to one's list; thus, the new considerations emphasize technology-mediated human relationships more than the connection to online resources. Another important development to the NL definition is the understanding that there may not always necessarily be a binary 'yes/no' answer as to whether something can be constituted as NL. Instead, Bali, Gachago and Pallitt argue that NL can take various shapes and thus be measured according to different dimensions (Networked Learning Editorial Collective, 2021). An NL experience can be structured or unstructured (facilitated or unfacilitated), but it can be defined as NL in either case. Therefore, rather than questioning the dichotomy of whether a particular interaction might fit under the definition, it can instead be measured against "a range of dimensions which characterize NL experiences" (Networked Learning Editorial Collective, 2021). In this sense, we have also reflected on Bayne's views on the potential constraint that an over-focus on defining NL can place on researchers as they attempt to pin-down and pick the term apart (Networked Learning Editorial Collective, 2021). Therefore, the simplicity of the adopted definition and subsequently its applicability to this study's PD and HE focal areas (Dohn et al., 2018), is the primary rationale for its adoption.

In addition to the evolution of definitions, it is also worth remembering that the focus of this study is not on the technology itself but rather on the way in which it is used to bridge these connections (Networked Learning Editorial Collective, 2021) for teacher learning. Interactions between network connections may not always be purely online (Dohn et al., 2018); NL can occur in a BL context which partly involves face-to-face contact with people and physical resources. This web of connections is unarguably central to NL (Jones, 2015); the connections link between an individual and resources as well as an individual and other people, one is not enough to constitute NL (Carvalho & Goodyear, 2014). More precisely, technological affordances, such as enabling individuals to quickly share resources through social networked sites like Twitter, have already shifted the focus of the connections away from content and pushed it towards connecting like-minded individuals who are likely to share resources and expertise (Brown & Adler, 2007). In this sense, NL emphasizes social learning and dialogue (Ryberg et al., 2012) that requires

person-to-person interaction, which strengthens the notion that human connections are generally perceived as more valuable than resource ones (Goodyear et al., 2004).

As argued above, NL can manifest itself in different forms according to different scenarios and purposes for which individual learners tap into their personal networks. For instance, Lave and Wenger's (1991) Communities of Practice (CoPs) concept revolves around the close collaboration of individuals on a common task (Hofer et al., 2021). Interactions observed in CoPs can look similar to NL as some can be mediated by technology, especially in the current digitalized society (Networked Learning Editorial Collective, 2021). However, this relatively narrow conceptualization of CoPs, often setting up boundaries around a single intimate learning community, does not embrace the NL's broader idea of networked individualism (Jones, 2012) that is at the heart of this investigation. This latter concept essentially portrays a different use of networks, whereby an individual dips in and out of a range of wider webs than the single tight-knit set of connections that typically characterizes the process of individual participation in a particular CoP (Lave & Wenger, 1991). Technology's penetration into HE (Cutajar & Montebello, 2018) means that the use of networks, or personal learning networks, more specifically, is likely to take place both online and offline, as technology has now become omnipresent across many university campuses. The research aims to shed light on how this set of micro-interactions with a wide variety of people and resources over the ERT period has been perceived and approached by teachers.

Methodological Framework

Phenomenography is a research approach that seeks to unveil a plurality of ways in which a single phenomenon can be perceived (Akerlind, 2008; Cutajar & Montebello, 2018). The methodological focus is on the participants' self-articulation of how they themselves view the subject in focus at that particular time, usually through the channel of a semi-structured interview (Yates et al., 2012). While this perception is likely to differ from one participant to the next, some individuals tend to share certain perceptions with others. This results in a finite number of differentiable themes, known as categories of description (Örnek, 2008), representing the variation of the participants' perceptions. At the end of the phenomenographic investigation, the structural relationships between these categories are established in the form of visual representations known as outcome spaces (Hajar, 2020).

The pyramid-shaped outcome space in the section "Findings" (Fig. 14.1) represents how the participants perceived the phenomenon of NL in the context of ERT during the Covid-19 pandemic, with a particular focus on the benefits of this network use. It encapsulates the four description categories derived from the collected data and represents the researchers' understanding of how this can be understood through a NL lens. This pyramid does *not* offer a rigidly linear representation of how the authors expect every teacher to perceive the benefits of NL, nor is its aim to prescribe a precise one-size-fits-all roadmap. What the pyramid below *does* provide, is a

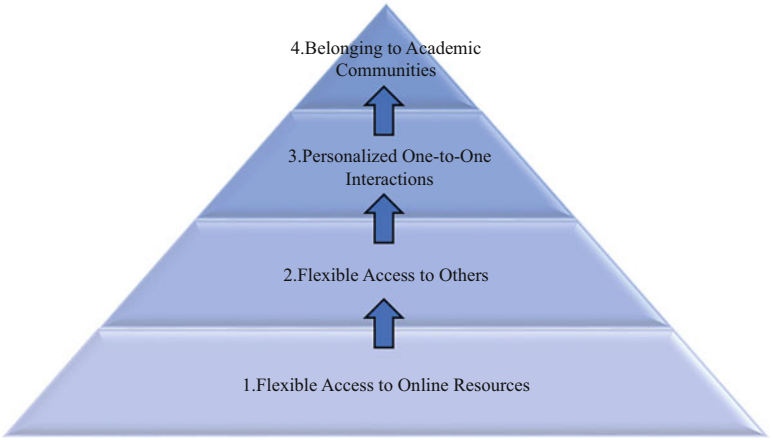

Fig. 14.1 Description categories pyramid

NL-informed visual representation of how individual teachers may perceive the target phenomenon, depending on their own values and local contextual settings. The focus is on the perception variation across individuals.

While this investigation is heavily based on phenomenography, it cannot be described as purely phenomenographic in the sense that the paper focuses on the variation of the individual experiences of participants, rather than across the interviewees as a group. Also, the emphasis is not on each participant's overall perceptions of the target phenomenon of NL, but specifically on its benefits. Despite these subtle differences, the main reason for adopting a phenomenographically-informed inquiry method for this investigation is that it is not our aim to unveil a single narrative about the NL phenomenon shared among the teacher participants, but to uncover a variety of different ways in which these interviewees perceive the same phenomenon (Marton, 1986; Rands & Gansemer-Topf, 2016). It is grounded in our belief that the NL phenomenon has been experienced by individual participants rather differently during the Covid-19 pandemic when they were physically separated and isolated, thus consequently, there should be great diversity across their perceived value of the phenomenon.

Phenomenography is a non-dualist method (Hajar, 2020), which is well-aligned with the constructivist and interpretivist research paradigm employed in this study. We accept a plurality of different 'truths' according to each individual's beliefs, rather than a dichotomy between 'good' and 'bad' versions. Even for those who reject these ontological and epistemological assumptions by believing that there is only one objective truth, it is difficult to deny the value of having insight into an array of different interpretations. By reviewing alternative perspectives to one's own belief, one may eventually change their own view (Örnek, 2008). Therefore, we argue that it is valuable to all researchers, regardless of their research paradigm, to gain a more informed collective understanding of the different ways in which their

focused phenomenon can be experienced, rather than be blinded to all but their own interpretation.

Data Collection

The qualitative data was collected from a leading English-instruction university in Kazakhstan. 18 English for Academic Purposes (EAP) instructors from the university's foundation programme were chosen using a purposive sampling strategy (Khan et al., 2019). It is a common approach to participant selection in qualitative investigations, where each interviewee can yield rich information (Palinkas et al., 2015; Yates et al., 2012). While these local contextual factors may seem niche at first glance, the authors feel that the data is widely applicable to other contexts. Despite the physical setting being a university in Kazakhstan, the purposively sampled participants represent a wide spectrum of different nationalities, experience-levels, qualifications and teaching philosophies. Moreover, the university itself collaborates and partners with a range of external institutions from different countries and with diverse visions. Most important of all, is a reminder that the focus of the investigation is not Kazakhstan, EAP or Covid19, but on how this specific set of factors can be combined to produce lessons that apply to HE stakeholders grappling with the technologization of HE more widely across a range of local scenarios.

Participants were recruited via an email sent by the first author. This invitation provided a detailed description of the study in the attached 'participant information sheet', which emphasized the optional nature of participation. 18 participants in total, which fits within the recommended 15 to 20 range for phenomenography (Trigwell, 2000), agreed to participate in a semi-structured interview. All agreed participants signed a participant consent form and Lancaster University's research ethics committee subsequently granted the ethical clearance for the project. The interview duration was intentionally left open, between 30 and 60 minutes as stated in the participation information sheet, in order to cater for both loquacious participants who may easily have discussed their perceptions of networks for the full hour and laconic interviewees who may have struggled to reach half an hour (and for everyone in between these two ends of the spectrum). In the end, most interviews lasted around the 45-to-50-minute marker. After conducting 18 interviews, we became confident in reaching the data saturation as the repetition of themes emerged and thus began the data analysis process.

Data Analysis

Phenomenographic analysis requires the researcher to engage multiple times with transcriptions and produce "qualitatively different conceptions of the phenomenon

of interest" (Sin, 2010, p1). This iterative process (Akerlind, 2005) means that phenomenographers have to stand back and analyze each participant's perceptions both individually within the confinements of each separate interview and collectively in relation to the perceptions of the other participants' interviews (Hatch, 2002). This latter collective interpretation of data is particularly important (Cutajar & Montebello, 2018) as similarities and differences in the perception of the phenomenon cannot be identified by merely analyzing each participant's transcript individually in disconnection from the others. We have followed the steps below, which do not represent a rigid and linear process. Instead, they highlight a "circular and iterative" process (Casey, 2016, p. 77). It has also been our attempt to be led by the data without relying on pre-existing assumptions.

Step 1. Transcript RQ Summarizing Excerpts

Despite the researcher (the first author of the present paper) being somewhat familiar with the participants' individual accounts from the preceding transcription process, it was decided that short, summarizing excerpts for each transcript would provide a useful starting point. This involved reading each transcript, whereby the researcher skimmed through it with the RQ in focus. All excerpts deemed relevant and summative of the participant's perception of the area of the phenomenon targeted by the particular RQ were highlighted according to a colour code. Once all summarizing (and related) excerpts had been highlighted in one transcript, the process was repeated with the subsequent transcript.

Step 2. Tabled RQ Excerpt Comparison

Still within the context of their respective transcripts, summative RQ excerpts were selected from the colour-coded data and tabled. Despite the excerpts still being divided according to individual participants' transcripts at this stage, the tabling of this data facilitated the comparison and contrasting necessary to progress onto the subsequent step of identifying categories of description from a combined data pool. That is, the side-by-side presentation of excerpts that resulted from this second step enabled the researcher to remove the boundaries between separate transcripts in the subsequent third step.

Step 3. Generating Initial Categories of Description

Through the combination of reviewing the excerpts in the tables mentioned above and re-visiting the individual transcripts, the researcher began to produce preliminary categories of description to represent qualitatively different ways in which the participants could experience the target phenomena. This required a step away from individual transcript context and towards identifying perceptions identified at a collective level from the participants as a whole (Hajar, 2020). This step resulted in 4 draft description categories applicable to multiple participants. Again, these categories were placed into a table with matching representative excerpts extracted from different transcripts.

Step 4. Refining Categories of Description

Before producing an outcome space, the description categories that resulted from Step 3 were reviewed one by one and re-enforced with evidence from the transcripts. This connection between the two steps is highlighted by Rands and Gansemer-Topf (2016) in their statement that "initial descriptive, or "draft," categories help guide the next phase of the analysis" (p. 11). Thus, the researchers cross-checked the preliminary description categories against the information from each transcript, both coded and uncoded (Bowden & Green, 2005), in case they had missed items in the initial coding.

Step 5. Determining Outcome Spaces & Step 6. Determining Structural Relationships

The outcome space is essentially a visual presentation of the description categories (Hajar, 2020). It brings together all of the different descriptions to determine the structural relationships between these variations in how the single phenomenon in question can be perceived (Akerlind, 2005). Instead of stating these in list form, the outcome space uses visual cues, such as arrows and shapes, to present how these categories are interconnected. Once outcome spaces were established, the researchers began to look for possible connections and relationships between them. The two authors of the paper collaboratively conducted these two steps.

Step 7. Review

This final step involved the researchers revisiting the transcripts and the tables generated in the previous steps to ensure that the categories and structural relationships were constructed as accurately as possible. To achieve this, the investigators took a break from the data analysis process to clear their minds and then re-attempted steps 2 and 3. This allowed them to compare their earlier outcome space with the revised one and make changes until stability was achieved in terms of categories and their relationships to one another (Trigwell, 2006). By this stage, the researchers had engaged in multiple reiterations of the data, involving the non-linear analysis cycle of re-reading, re-testing and re-comparing described above (Rands & Gansemer-Topf, 2016). Therefore, they could be reasonably confident that no key categories or structures had been overlooked.

Findings

The categories of description presented below represent the refined themes that emerged at the end of the data analysis process for the study's RQ: "What were HE teachers' different perceptions and uses of networks for learning and teaching throughout the ERT period?" with a focus on the benefits. The four inter-related themes below therefore represent the respondents' perceived variation of how NL can be advantageous to them as teachers. The hierarchical relationship between these

categories is presented in ascending order of complexity and sophistication of their perception within a NL framework. The first category represents the most basic benefit associated with teachers' network use, whereas the fourth category depicts the most advanced NL reward. We argue that in order to scale to the highest category, teachers usually first perceive and access the first three categories. As previously stated, this outcome space does not claim to provide a fixed or prescriptive linear model that represents all teachers' journeys, but instead offers a visual representation that is inspired both by the collected-data and by NL theory of how individual teachers can perceive the target phenomenon according to varying local factors and individual values.

Category 1. Flexible Access to Online Resources

The main features associated with this first description category revolve around the use of networks as a bridge to existing material that can be retrieved conveniently from one's home workstation. This appears to be the most basic benefit that teachers associate with their use of networks. These sources include official PD webinar recordings that are part of ongoing developmental courses for teachers tackling the latest issues that have emerged, or raising debate over current trends in practice. Despite there being other teachers on these online courses with whom to participate with, faculty appear to exploit asynchronous engagement with the resource banks attached to the programmes instead, since this can be done more flexibly and without having to rely on another person. Some teachers even archive some of the course material themselves by recording or screenshotting important elements, to then be able to access flexibly at a later date.

> Webinars and conferences that are almost weekly there Thursday one or two TELSIG [PD organisation], I would go to those almost every week... Because yeah so everything was online and on zoom [conference software] basically at this point so um I attended conferences webinars a lot more than I normally do... Almost every week, I was doing something oh yeah then also I also did two courses online courses for you know they were... professional development type courses specifically related with EAP. (Participant 1)

> I actually record the lessons... On my just on our little recorder, and I also um print the screen... So I made it so to that extent I'm doing something I'm engaging more I'm able to go over the lesson again and listen to what the tutor said and what we said and look at the print on the on the screen. (Participant 3)

> My hours are a little bit more flexible now. I feel like I have a yeah it's mostly with time, I have a greater choice in when I want to do things. (Participant 6)

> Professional development, I suppose it's made it easier in a way, because you can attend various conferences or seminars, or whatever from wherever you are, irrespective of where it's being held. (Participant 7)

Online resources can also be accessed via comparatively informal channels, such as media-sharing websites like YouTube, for teachers to readily access at a time that suits them without the need to formally join an online course. These platforms

contain instructional videos that offer guidance to faculty on using the latest online platforms for instance. Similarly, teachers can access online material via other channels outside of a formal PD course, such as an editable wiki page or a forum that posts step-by-step guides on troubleshooting commonly used tools like Moodle.

> I'm... being very thankful for Russell's Stannard's... website [on teacher PD] where he goes through lots and lots of tutorials on things that I wasn't familiar with. (Participant 11)

> I've learned a lot about Moodle [LMS] through... almost like a wiki they have this... Information page and that's kind of where I learned things and then also there's Moodle forums... And that's where that's where I usually find the answers to questions that I don't know. (Participant 6)

Lastly, it can be noted that some teachers access online resources via social media repositories. These can come in the form of videos or instructions that are regularly uploaded to a popular platform such as Instagram or Facebook for instance. Teachers can 'follow' influential figures in their field and thus access their material asynchronously if and when they feel the need.

> When it came to this like psychology and hobby because I follow, like many... professionals in this field by Instagram they have... it's very useful in terms of psychology and coaching... That they have their own lectures online and then they save it, you can watch it, so I think that was very helpful for me. (Participant 18)

Viewed through a NL lens, this concept of online resource-sharing is described by some authors as 'working smarter' (Kearney & Maher, 2018; Schuwer & Janssen, 2018), in the sense that cloud ecosystems, such as the Google Drive platform adopted by teachers in this study, can facilitate the recycling of resources (Gislev et al. (2020). The material reward obtained through the legwork of a minority of teachers can thus be shared and experienced by the majority of their colleagues.

Category 2. Flexible Access to Others

This second description category is centred on teachers' use of their personal networks to interact with other like-minded professionals, as opposed to only engaging with online resources as in the first category. Rather than limiting engagement to the basic asynchronous access of material, teachers describe their networks as tools with which they can keep their fingers on the pulse of current trends and practice by staying informed on how other faculty are tackling emerging issues. This includes interacting with current colleagues and acquaintances, but also extends to connections from previous workplaces and institutions with whom some faculty seem to maintain contact with, even after they move onto a new job.

> By the way, I'm engaged each week I meet, I have a Russian course which up with another with our colleague from engineering..... .meet our Russian teacher online twice a week for an hour and that has been going on since the pandemic I also meet a cousin of mine and we studied Greek together and online... This is with zoom with it, no, this is with Skype [conference software]... and so I, so I am engaged in online learning. (Participant 3)

> Very well developed network, like in this area yeah in this field, yet, so what I have is my professors and my teachers and the students, with whom I studied in Colorado so... We asked questions I asked about you know about different things it's like you know my it's my basically foundation. (Participant 5)

Teachers describe how this interaction with others is often undertaken in a flexible manner that can be molded around their individual commitments. Aside from being able to use online communication to eliminate physical geographical barriers that facilitate engagement with others in faraway destinations, NL also offers flexibility in terms of the number of participants that can join and then leave group activities at their own convenience depending on the evolution of their needs and preferences. It appears that the dipping in and out of online networks is more flexible that in traditional face-to-face engagement with others, given the reduction in planning and physical travel involved when switching between social groups online.

> I like the flexibility a lot... More flexible, I mean, for example, there are like some webinars that I had to attend and they were from because of time zone you different time zones, for example, some of them were I didn't know like... I could attend this webinar... And then I can switch to like 15 minute break and my lessons for us right which I wouldn't be able to do if I was in class, of course, or I had to go to my office or commute time you know preparation, all this paperwork printing bringing opening classroom and so on... I just found working from home, but as I said, more productive. (Participant 13)

> There was a wider group, and then it a few people fell off and now it's just myself and this other colleague [in an language learning group]. (Participant 3)

Lastly, it appears that some teachers value the flexibility of participation that they associate with online network interactions. Rather than face the pressure of being very actively involved in every discussion, some faculty appreciate the option of more passive interaction that online engagement facilitates. This can enable engagement not only between faculty, but also with their students.

> There's a bit of a distance, with this online, I think, which allows you a bit more breathing space to think about what you're going to say to prepare a bit without a person actually physically right in front of you observing you... Even for me that can make things easier and I think for some students, especially the shy ones that can make them feel about a lot more relaxed. (Participant 15)

In the context of NL literature, some authors are quick to remind readers of the precedence of people over resource connections (Carvalho & Goodyear, 2014; Goodyear et al., 2004) and that NL cannot be comprised solely of the latter type. However, other authors draw attention to the greater level of complexity and unpredictability that reliance on people connections entails. The question of reciprocity for instance (Schuwer & Janssen, 2018), can be difficult to plan for and address, since teachers may feel that the success of their NL is contingent on others' willingness and ability to engage.

Category 3. Personalized Small-Scale Interactions

Once teachers have been able to benefit from the increasingly flexible interaction with online resources and with other professionals as described in the previous two categories, they are more likely to progress onto the advantages of experiencing more personalized encounters with others. This category of description targets the intimacy that teachers often associate with their use of networks to engage with small groups or even individuals. Some of the participants mentioned colleagues by name, with whom they had experienced helpful and supportive personal interactions with throughout what they perceived to be a challenging ERT period. These one-to-one encounters take place across a combination of different mediums that include online contact, telephone conversations and face-to-face meetings.

> Support from colleagues, I would say that was the key thing to get me through the year... I contact most [teacher 1], as I said, is a neighbour and a friend... And he's on the technology team... And I see you know [teacher 2] and [teacher 3] went out for pizza the other night. (Participant 2)

> My supervisor [teacher 4] is very supportive and always you know... a phone call away. (Participant 2)

> In a team meeting, I would open the camera because I would like to see my co-workers that I would like them to see me it just feels like Okay, maybe we have to see each other... (Participant 12)

The interviewed faculty members extended this favourable perception of one-to-one and small group interactions to include engagement with their students, as well as with their colleagues. It appears that individual tutorials for instance, whereby teachers meet their students to discuss bespoke feedback that applies uniquely to the individual pupil, have been notably more personal and intimate during the work from home period. Some teachers attributed this sensation of closeness to the notion that they are connecting to their students from one living room to another with minimal interruption. That is to say, there are minimal physical distractions, such as waiting rooms or noise from the classroom next door, in between the teacher and the student.

> I was amazed at how in tutorials one was able to relate to the students and to stay, true to a create, if you like, a pedagogic encounter are a personal encounter I was, I was taken aback by that. (Participant 3)

> [Tutorial] was more personal... In the group, where you know you're talking to the group so they got into the habit of not putting their video on... But when it was one to one it probably felt more personal and they wanted to you know to see you. (Participant 4)

> It was a bit, especially given feedback was a bit more direct and easier to do because it was right there the student or yourself could share the screen [on Zoom] and you could see it at the same time. (Participant 6)

> I think, being at home, being in whatever they chose to wear which was... Probably rather than formal attire... less formal than they would be in class, and you know just they're being able to have their snacks or whatever um... I think there was a lot more, it was a lot more

> personable and it was really valuable to see what was going on with the students' lives to be able to observe that in the room. (Participant 14)

Some teachers associated these more personalized encounters as being the result of having longer periods of time to dedicate to the meetings. The eliminated travel time between home and campus for instance due to the work-from-home mandate, meant that tutorials could be extended.

> I think that the half hour tutorials are very good. . . felt was sort of more intimate in a way. . . they're facing you they've got to face you they've got to have their cameras on they gotta talk and you know you can ask direct questions, and they have to answer. (Participant 9)

Patterns in NL literature point towards some teachers' avoidance of larger online gatherings, in which greater vulnerability can be perceived (Acuyo, 2022; O'Keeffe, 2018). Examples of this include social factors, such as the fear of a public confrontation (Ranieri, 2019), but can also include technological limitations, such as the notion that few participants are likely to have a the opportunity of direct input in these larger exchanges (Kidd & Murray, 2020). This can help to explain the perceived value that some teachers place in smaller-scale and consequently more personalized online interactions.

Category. 4 Belonging to Academic Communities

The final and most sophisticated benefit associated with network use, often experienced once teachers have reaped the rewards of flexible access to resources, others and established more intimate encounters, is a sense of membership to professional communities. Faculty experience increased confidence as their networks enable them to compare their views and practice with those of others. This can help to validate their pre-existing approaches to teaching, as well as to expose them to novel ideas that they may have not had the imagination or assertiveness to test out without the feeling of protection and belonging to these professional communities.

> [Online conferences] it's just great to hear what other people are doing out there. . . kind of cool just to see kind of compare yourself okay what how do I match up with what everyone else is doing. . . it's nice to hear that actually they face the same challenges that we do. (Participant 1)

> To get you know different sources or different you know opinions, because you know, like it helps it helps me in anchoring my own decision. (Participant 5)

> I had the opportunity to complete that course and explore different ideas and develop my own awareness, you know, both in terms of training, the learners on doing helping them. . . I found it quite useful professional development experience to apply some of the skills that I learned on that course. . . just checking your existing knowledge with others. . . Whether your interpretations are correct yeah engaging with the community to certain assumptions that you've built up over time, the extent to which. . . There is a consensus about them all, whether you need to adjust your own thinking is always useful. (Participant 17)

Some faculty went further by extending their use of membership to these professional communities to cover personal, non-work-related matters also. This signals the increasing confidence and support that this sense of belonging to a wider group can offer teachers, as they feel safe enough to share views on aspects of a more personal nature.

> It was just mutually beneficial that we. . . . . help each other. . . teaching and learning so and then, in addition, just some things like personal things came. . . that are not directly related to work. (Participant 5)

The contrast between the initial 'visitor role' (Cutajar, 2018) perceived by many teachers in their early interaction with a new community, versus the more established full membership status that can be achieved through regular dialogue is pertinent to NL. The nuances of the evolution of a teacher's social identity in relation to their community can manifest itself in a range of tangible ways that include a greater sense of self-confidence (Peacock & Cowan, 2019) and an increased likelihood that they will attend, and presumably engage, in meetings (Kotera et al., 2020).

Conclusion

This investigation aims to contribute to the following three interconnected areas with the problems mentioned above in the earlier section of this paper. On a practical level, technology-mediated networks enable university teachers to better utilize online resources and connections for their learning and teaching. Such networked learning can mitigate immediate challenges teachers encounter in unexpected calamities such as the Covid-19 pandemic ERT. In the longer term, such networks can help university teachers adjust to the gradual slide towards increasingly digitalized HE contexts. At a theoretical level, this research has spotlighted how NL has been perceived particularly by teachers who could not (did not) adopt a paradigm shift towards technology-enhanced teaching and learning before the ERT period, when they were suddenly pushed into the unfamiliar online space by the abrupt event of Covid19. As the four description categories suggest, these teachers place great value on interaction with both online resources and other people within their networks during the ERT period.

While the first category centres on the benefits of accessing online material, it should be noted that NL essentially emphasizes social learning and dialogue (Networked Learning Editorial Collective, 2021; Ryberg et al., 2012); the connection between an individual and online resources alone cannot be considered as a complete aspect of NL (Carvalho & Goodyear, 2014). That is, the interviewed teachers perceived the interaction with others, both colleagues and students, as the main and more important benefit of NL. This finding aligns well with a core NL principle that focuses on human connections (other than resource ones, see Goodyear et al., 2004). However, it should also be noted that the most sophisticated category of community membership is built outside the interviewed teachers'

institutions, which would not be possible without the online communication medium. Networked learning effectively facilitates teachers' flexible interaction with a greater number of other professionals beyond their immediately accessible physical environments.

We argue that universities can establish more realistic and practical PD practices and policies that enable their faculty to better support each other in the current HE environment, where technology plays an increasingly vital role; be it in an 'emergency' or a regular context. Universities need to move away from their 'normal' PD practices, which are often limited and bound by physical spaces, such as campus, to NL-based practice by legitimizing and promoting teachers' informal and personal PD practices. Looking to the future of digitalized HE, it is this sense of belonging to multiple professional communities that institutions should aim for, enable their faculty to value collaboration and become legitimate and competent members of professional communities.

In terms of perceived challenges related to the aforementioned benefits of NL, we argue that the immediate, and often most obvious challenge, is connected to the varied technological proficiency seen across faculty. Despite the gradually increasing availability of technology-related PD, this is often still inadequate to match the demands of HE teachers (Fernandez Batanero et al., 2020). This means that teachers lacking the technical skills (Falloon, 2020) to operate collaborative software such as Microsoft Teams for instance, or the online pedagogical skills (Dysart & Weckerle, 2015) to make a tutorial student-centered, are unlikely to unlock some of the more sophisticated NL benefits of personalized interactions or a sense of belonging. This is because their capacity to interact with others will be limited by their digital (in)competence. A less obvious perceived challenge relates to the sense of isolation that some teachers attribute to NL, as they can sometimes struggle to feel connected to, what often appears to be, people on a screen. The lack of frequency and spontaneity that is often associated with online interaction exacerbates this, as can the diminished social cues and non-verbal gestures that are characteristic of online communication. This highlights a gap for future research.

Finally, it is important to highlight that, despite the wealth of themes explored in this study, there are notable limitations. The investigation was restricted by the fact that it was conducted throughout the Covid19 ERT period, which means that the longer-term implications of NL are still to be seen. Also, the study was subject to temporal restrictions, which means that the authors were constrained to 18 participants in terms of the amount of data that could realistically have been analyzed during the timeframe of the investigation.

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Part V
Conclusion

Chapter 15
Conclusion: Emerging Themes in Sustainable Networked Learning

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Abstract In this concluding chapter we point to themes that emerge from the chapters in this book on sustainable networked learning. The themes cut across different sections of the book, indicating their wider significance. These themes are Lasting effects of lockdown online teaching; Digital sustainability for the future; Future roles of networked learning in society; Balancing utopia and dystopia in visions of AI and open data; Speculative methods in research, education and design; and Balancing qualitative and quantitative data in the research of networked educational settings: Studies at the community and project levels.

Keywords Covid-19 · Lockdown teaching and learning · Digital sustainability · Future · Networked learning research · AI · Open data · Speculative methods · Qualitative data · Quantitative data

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Introduction

This book is focused on sustainable networked learning. The body of the book deals with individual, sociological and design perspectives on this issue through a set of chapters, organised around four main themes: *Data and datafication*, *Sustainable learning design*, *Sociological perspectives on Networked Learning*, and *Networked learning in times of lockdown.* The aim of the concluding chapter is to point out further themes that emerge from the chapters in the book as questions to be explored in the future, at the next Networked Learning Conference in 2024 and beyond. We have identified a set of themes that cut across different sections, indicating their wider significance. These themes are *Lasting effects of lockdown online teaching and learning?*; *Digital sustainability for the future*; *Future roles of networked learning in society*; *Balancing utopia and dystopia in visions of AI and open data*; *Speculative methods in research, education and design*; and *Balancing qualitative and quantitative data in the research of networked educational settings: Studies at the community and project levels.*

Lasting Effects of Lockdown Online Teaching and Learning?

Looking across the chapters in this book, one immediately striking observation is the number of times the terms "COVID-19", "the pandemic", and "lockdown" are mentioned. It is, of course, not surprising that the terms are mentioned in the two chapters in "Part 4. Networked learning in times of lockdown", as this part reports research on Networked Learning during the COVID-19 lockdowns. It is noticeable, however, that more than half of the chapters – in a book published more than 3½ half years after the first lockdowns were initiated – also reference this situation. Now, the production history of the chapters – and the timeframe of book publishing – could be brought forward as an obvious explanation: Chapters were initially, in a prior version, submitted as papers for NLC 2022, 6 months before the conference (October 2021). At that time, lockdowns were still in effect in many countries and a realistic possibility in others in the months to come. Still, these original papers have been revised over several rounds, and many other initial formulations have been substituted in that process, before the acceptance of the final version as a chapter in Spring 2023. At the very least, the perseverance of references to the pandemic is indicative that the months of remote teaching have for many become a focal point and outset in reflecting on and designing for teaching and learning, as well as for investigating the opportunities and risks that technology poses for this. Moving beyond the immediate context of this book, a simple Google Scholar search points in the same direction: At the time of writing, the search for *post-pandemic learning* gave 64,300 hits and for *learning "after COVID"* 59,100. Of these hits, 17,400 *post-pandemic learning* and 17,500 for *learning "after COVID"* were from 2022 until day of search (March 23, 2023). Similarly, *post-pandemic teaching* and *teaching*

"after COVID" gave 40,300 and 27,700 results, respectively, with 16,700 for *post-pandemic teaching* and 13,400 for *teaching "after COVID"* being from 2022 until day of search.

A closer, more qualitative look at what is said in the chapters in this book, upon mentioning COVID-19, further supports the interpretation. Thus, Carbonel explicitly introduces her research as "part of the movement towards re-thinking the university of the future following the upheaval of emergency remote teaching during the COVID-19 pandemic" (Carbonel, this volume, p. 107). Similarly, one of the case studies reported by Wichmand et al. concerns a course entitled "Leadership, education and technologies – Post COVID-19". The course builds on – as the authors phrase it – the fact that "[d]ue to COVID-19 and the shift to remote learning, educators and educational institutions have gained much experience with teaching with technologies" (Wichmand et al., this volume, p. 152). And Lee and Bligh feel compelled to explain that, "the description [of the educational programme they investigate] reflects the situation before the COVID-19 pandemic" (Lee & Bligh, this volume, p. 176). On the critical side, Ross and Wilson, with reference to Beetham et al. (2022), point out that "the pivot to online teaching, learning and assessment during the COVID-19 pandemic has exacerbated many existing issues [of surveillance] and ushered in new forms of surveillance" (Ross & Wilson, this volume, p. 23). Likewise, Jandrić and Hayes emphasise that the advent of the pandemic have brought postdigital-biodigital challenges to the fore that have hitherto had only an implicit (albeit strong) focus within Networked Learning research (Jandrić & Hayes, this volume).

On the other hand, Matthews grounds his argument for the Modus 3 university (i.e., the university as networked and entangled with society) in part on the observation that "the hopes of many coming out of the 2020 COVID-19 pandemic following the reliance on networked communication technologies have arguably (at least not yet) failed to be realised" (Matthews, this volume, p. 189–190). Certainly, as pointed out repeatedly throughout the book and as we discuss in the Introduction, the use of networked technologies to support teaching and learning has a decades-long history prior to the lockdowns in 2020. Indeed, the "emergency remote teaching" (Hodges et al., 2020) set in place to accommodate the sudden need for online teaching in many instances had a fairly "broadcast" disseminative nature, with little support of individual students' learning process, let alone of their collaborative development of understanding. In this sense, "emergency remote teaching" often had little to do with the communicative practices recommended by research within Networked Learning, Computer-Supported Collaborative Learning, Technology-enhanced Learning and similar fields. However, it is worth noting in the two chapters of "Part 4. Networked learning in times of lockdown" which deal specifically with the COVID-19 lockdown, that there are also nuances to this broader picture. Acuyo Cespedes and Lee, investigating a teachers' perspective, noticed how teachers relied on or established forms of networked learning together, for instance by relying on peers and engaging in online communities to learn from others to develop their teaching. Likewise, Hachmann et al. show how students established new patterns of participation via establishing new structures and ways to collaborate.

For example, a nursing student latched onto an existing hashtag on Instagram initiated by the Nursing Students' organisation and used it to share stories of the experience of studying online. Other nursing students began contributing, and the hashtag became a "learning network agent" (p. 233) and an "online space for exchange and community, where she and her fellow nursing students could share everyday 'lockdown moments' and promote academic dialogue organized through hashtags" (p. 234). The hashtag thus became what Acuyo Cespedes and Lee refer to as a good example of networked learning where peers engage in "maintaining and developing a sense of belonging to different academic communities" (p. 241). In both the chapters of "Part 4. Networked learning in times of lockdown", it is worth noting that these learning networks were often formed outside institutions and engaged members of different institutions, rather than being institutionally initiated and curated. For Acuyo Cespedes and Lee, this leads to the reflection that the experiences from the COVID-19 lockdown should lead to rethinking the dominant forms of professional development within higher education. Thus, focus arguably should shift from formal courses towards an appreciation and support of teachers' collegial networking and access to valuable learning resources. Likewise, Hachmann et al. note that the students' alternative ways of forming networks "suggest that the university could utilize a more ad hoc and asymmetric approach to establishing networks" (p. 236).

These considerations raise the question what (if any) the long-term effects of online teaching and learning during COVID-19 lockdowns will be. Clearly, a multitude of teachers and learners have gained experience with utilising technology for educational purposes. The lockdowns have resulted in "existence-proof" across all academic domains that online teaching (and usually also learning) is possible. Pragmatic and creative solutions were invented to allow learning activities to take place that many teachers would under other circumstances have judged to "necessarily" require physical presence (e.g., for sports, art and music lessons). Many teachers ended up being quite proud of the teaching they managed to do (Bartolic et al., 2022). Others noted their experience of the online format as supplying different communication possibilities, not least for shy and sensitive students, and of allowing them to get to know their students in "new and good" ways (Qvortrup & Lykkegaard, 2023). Still, as Bartolic et al. level-headedly end their article "Pragmatic responses to an abrupt pivot are unlikely to provide a solid plan on which to build back better" (Bartolic et al., 2022, p. 530). And for many, the existence proof may only have concerned the *possibility* of online learning, but not its quality or viability as compared to established practices building on physical presence. Some teachers even had such a bad experience with remote teaching that they express the wish to never have to teach online again (Ní Fhloinn & Fitzmaurice, 2021). For these teachers, the existence proof definitely was the negative one that online formats provide possibilities of completely undesirable modes of teaching and learning.

Summing up, it is hard at this point to gauge whether the familiarity with technologically mediated teaching and learning developed during lockdowns will affect the future of networked learning positively or negatively. Even the positive experiences were in most cases not the result of educational formats informed by

research, as they were installed as emergency responses, and others – as explored in "Part 4. Networked learning in times of lockdown" – were more often than not initiated and living outside institutions. Thus, the question remains whether these positive experiences will provide impetus to seek research-based knowledge for future educational developments, or whether the experiences will themselves form the only foundation. The latter could well result in networked learning research not gaining the momentum after COVID-19 that one would unreflectively expect it to get. Put differently, the degree of sustainability for the future of learning designs based on the experiences of COVID-19 is difficult to assess at this point in time.

Digital Sustainability for the Future

Broadening the concern of sustainability for the future beyond the last section's focus on lasting effects of lockdown, in this section we look at how the chapters in the book contribute to the overarching theme of sustainable networked learning. All of the chapters offer insights into how Networked learning can provide opportunities for designing sustainably. They conjoin in viewing Networked Learning as providing prerequisites for designing for teaching and learning in the form of new sustainable spaces.

Wichmand et al. (this volume) see new materialised Networked Learning spaces as a part of professional development processes. These processes encourage the participants to implement the newly learned methods into their teaching practices after the formal courses. This involves broadening the scope of teacher professional development programs. Here, perhaps a space could be developed which avoids choice or embracing dualistic positions between strong, centripetal networked relationships and weaker, centrifugal ones, but rather acknowledge the messiness of Networked Learning processes. This would support teachers in developing sustainable designs across their strong and weak network connections.

This is in line with Acuyo Cespedes and Lee's emphasis on a space which focuses, legitimises and values teachers' personal and informal interactions of networked learning (Acuyo Cespedes & Lee, this volume). The authors highlight teachers' use of their network for flexible access to resources and for supporting interactions with colleagues and students and for removing barriers of time and space. These ways of interacting may provide potential for designing sustainably for the future by facilitating the transition towards the digitisation of Higher Education, moving beyond practices which are limited and bound by physical spaces to Networked Learning-based practice.

A space for sustainable designs is also described by Godsk et al. (this volume) as a sustainable Learning Design practice for Networked Learning. This design space supports educators' design decisions by highlighting the development of online activities that connect students' learning activities with educator feedback. Designing in this space provides ways to support educators' networking on module work and their reuse of designs. Relating to the points of Petersen et al. (this volume), this

Networked Learning space could also be benefitted by unboxing revision processes. This would work towards furthering an iterative progression in design-based intervention studies.

Lee and Bligh (this volume) contribute to the ongoing community effort to redefine Networked Learning towards the current postdigital context. They argue for a re-establishing of the community identity around the ideas of transformative Networked Learning and expanded Networked Learning design, applicable to formal educational settings, for teachers as well as educators, designers, trainers, tutors, and critical pedagogues. Such a re-establishing will involve creating new, sustainable spaces through empowering educators to initiate, deploy and expand new ways of being networked within established institutionalised infrastructures. Such spaces for sustainable design further resonate with Carbonel's ideas which emphasise the opportunities created through rethinking the university. Designing for a university for the future, she stresses, involves imagination about ways of being present in online education, and requires collaboration with teachers and educational designers (Carbonel, this volume).

In their study of the project Open Data, Wilson et al. (this volume) put forth the need to value equity and sustainability above economic productivity. Here, the creation of a sociotechnical system could enable access and actively encourage increasingly sophisticated and critical use of, ownership of and production of open data. However, if Networked Learning is to fulfil practitioners' aims and ambitions to develop educational spaces, practices and systems that work towards sustainable, socially just futures, there is a need to reflect critically on the technologies used.

Koole and Beaumier (this volume) follow this suggestion in their investigation of the ontological and epistemological – digital and analogue – characteristics of AR and VR. These technologies provide new ways to represent the physical world around us, thus widening the human-technology relationship and associated spaces for learning. A postdigital analysis of these spaces can open up understanding of the freedoms and constraints relative to sites of learning, activities, learner configurations, datafication, and representations of learning. Further, such a postdigital analysis could shift work and learning between the analogue and digital. In this shift, challenges such as failures or lack of resources may come about as well as new possibilities.

In designing sustainably for the future, Ross and Wilson (this volume) note that space should be given to investigating how personal, educational and institutional values intersect. Data Stories, for example, can allow people insight into different perspectives and relationships through collective action. Work in this intersection could support sharing and networking, providing knowledge about the different perspectives and thereby supporting design sustainability. Brandén's chapter further highlights the significance of investigating this intersection. Thus, Brandén (this volume) discusses that if practitioners and researchers investigate society as a distorted reality, this would open for the development of a combined theory that warrants both consensus and conflict, and both slow and rapid change. Researchers and practitioners with different backgrounds would contribute, which could promote collaboration in a new space that may support sustainability. According to Mathews

(this volume), new materialisms offer a perspective with which to analyse, theorise and influence practice in Networked Learning environments. Understanding the becoming of a networked learning environment in higher education comprises depicting how ideas and different modes that have developed historically can clash and entangle. Here, collaborative inquiry and joint action has particularly underpinned networked learning research and practice. In line with this, Hachmann et al. (this volume) discuss examples of how new structures and collaboration forms became established and sustained for students during the lockdown. This involved the expansion of networks, which encompassed new requirements for participation and social configurations. These changes result in new spaces which may be of importance when designing networked learning for a sustainable future for students.

Finally, Jandrić & Hayes (this volume) see Networked Learning as implicitly holding a long history of deep and successful engagement with postdigital-biodigital challenges in theory. The concept of convergence may help to focus research efforts on Networked Learning in a postdigital-biodigital age, which in turn could provide research contributions for a Networked Learnings space, and support designing sustainably for the future.

Future Roles of Networked Learning in Society

As a more specific focus of sustainability, many of the chapters in this book also directly or indirectly address the role of networked learning in today's society and beyond. Given the rapid digital transformation that we are currently witnessing in our societies, it is common for organisations, including educational ones, to attempt to integrate a wide range of technologies to support human action and learning. Ongoing digitalisation means that we not only need to reflect on how we use digital information and data (Wilson et al., this volume; Jandrić & Hayes, this volume) but equally as important how technologies impact the way we design, implement, structure and analyse our processes (Petersen et al., this volume; Wichmand et al., this volume; Blackmon & Moore, 2023). The integration of cloud technology for example has meant people have access to their digital assets and resources 24/7, regardless of their location. Instant availability has paved the way for media offerings like Netflix, transforming how people experience television, from an event located in the time and space of the living room to an event that is always-available, everywhere and on demand.

Over the past years, this on demand delivery model has then affected our experiences and anticipations within other areas of our lives, leading to a backwash effect on our expectations for societal institutions and private businesses alike. Correspondingly, this delivery model has already been applied widely to online education where people are joining online degree programs and MOOCs at their own leisure for learning and professional development (Eradze et al., 2023). Broadly speaking, the preferred approach these days is to have access to what I want, where I

want and when I want. This poses obvious challenges to networked learning designs focused on collaboration and shared knowledge creation.

Another recent development affecting the future role of networked learning is artificial intelligence. Since the start of 2023, in education especially, there has been a global debate on how to respond to generative pre-trained models, like ChatGPT (see Bozkurt et al., 2023). The question behind this debate as well as behind discussions of digitalisation and datafication is if and how do we combine human and non-human machine intelligence to support and/or advance the way we work, teach and learn. A recent definition of Networked Learning (NLEC, 2021) supports the idea of learning and knowledge action where, when and what I want, but, crucially, not in soliloquy, but instead through collaboration with other learners, in respect for and negotiation with their wishes of where, when and what. Thus, a defining characteristic of Networked Learning according to NLEC (2021) is that learning must be underpinned by trusting human and non-human relationships, which, further, requires convivial technologies (i.e., technologies that support human dialogue and flourishing, rather than, for instance, surveillance and control). Ongoing experimentation, research and the realisation of digitalisation in our society is driven equally by evolving technological possibilities and our imagination to use these technologies to advance our capabilities. This transformative process and the roles that networked learning can take to advance it positively requires ongoing reflection, and, in particular, engagement with critical theory to unveil – and preferably prevent – unforeseen and unwanted consequences (see for example Eguara, 2022; Brandén, this volume).

Balancing Utopia and Dystopia in Visions of AI and Open Data

Out of the previous section's considerations of digitalisation, datafication and AI, the further question arises how we can balance our visions for the future between utopia and dystopia. Many of the authors in this book aptly refer to our present era as postdigital (Koole & Beaumier, this volume), biodigital, and postdigital-biodigital (Jandric & Hayes, this volume). Certainly, the aggregation of data has had an exponential growth. There is no exact definition of "Big Data", but what earlier mainly was measured in terabytes is now sometimes measured in petabytes, huge amounts of data that the human brain can hardly visualise. Here, as with many other digital phenomena, Big Data combined with its extension, Artificial intelligence (AI), is a double-edged sword that could be beneficial as well as destructive at the same time. The more utopian vision of big and open data is presented in the chapter by Wilson et al. (this volume). In a society with digital literate citizens engaged in participatory design, the social justice ideals would be closer than in a society without transparency.

Conversely, in the speculative data stories that were gathered by Ross and Wilson (this volume), the darker and dystopian aspects of Big Data and AI are brought up. The findings are based on what the authors define as "Speculative methods for

researching networked learning futures" (p. 24), but this does not detract from the importance of the questions they ask about surveillance and scrutinising data. Quite the contrary, one may ask whether such questions could be raised without the epistemological distance provided by speculation. In particular, the authors pinpoint the need to query "What is being scrutinised/quantified?", "What technologies enable scrutiny?", "What is the purpose – e.g., monitoring, audit, resource allocation, control, comparison, correlation?", and "Who benefits?" (p. 27) At the same time, "[D]ystopian imaginings are not the same as resignation and not the opposite of hope" (p. 30). Rather, such imaginings are ways in which we can negatively inform our design practices: they form the constraints or boundaries that our designs cannot cross without becoming ethically, socially, organisationally and/or personally inappropriate.

Speculative Methods in Research, Education and Design

Speculative approaches to research such as the one employed by Ross and Wilson (this volume) have been used in the Social Sciences since the 1990s. In general, they provide a way of being structured in our proceedings, when we want to explore, investigate and imagine possible futures. According to Suoranta et al. (2002), the first examples within education are found in early 2000. The authors also describe a trend of engaging teachers and students in imagining futures as a step in developing new educational ideas. Such imaginaries often include digitalisation of education. Further, Lindberg (2023) points out that there seems to be "an accumulation of initiatives" aimed at understanding digital futures. Therefore, it is not surprising that the use of speculative methods has also emerged in the networked learning community. Ross (2022, p. 57) argues that the "complexity of learning requires creative approaches, including speculative methods". Speculative methods are a form of future(s)-oriented methods described by Cerratto-Pargman et al. (2023), p. 178) in the following way: "Future(s)-oriented methods aim to generate speculative accounts of users' educational experiences with technologies where the past is blended with the future points in time. They aim to reflect on our constitutive relationships with our present and past." Speculative methods can be used both pedagogically and as a research approach, according to Ross (2022). Within three of four themes in this book, we find examples of the use of speculative approaches or something very similar.

Thus, Petersen et al. (this volume) start their chapter by arguing that "fundamentally, research on networked learning is interested in finding new and productive ways of connecting people and their practices across boundaries in different contexts" (p. 126). Their emphasis on the continued interest in "finding new and productive ways" is noteworthy, because it indicates that design, design-based or design-oriented methods may always have been a valued methodological approach in the Networked Learning community. Another chapter engaging with speculative methods is the one by Brandén (this volume). The author offers four metaphors as a

foundation for four different frames that can be used for both the study and the design of networked learning. In particular, "frames can be used both to capture past and ongoing activities within a field and to directing attention in new directions and to put forward new questions" (p. 214). This interrelation of future direction with the past connects his approach to speculative methods as described by Ross (2022 p. 59). Thus, she proposes the complex interplay between the past, the present and the future as indicative of speculative methods. However, it is important to note that not all design approaches involve speculative methods, as there are further defining features of the latter in addition to the shared focus on the not-yet-existing. This is well articulated in the chapter by Ross and Wilson (this volume) who state that "speculative methods are not solely about designing preferable futures, but about revealing and developing insights about our current situation, what has led to it, and what might (conceivably) be different." (p. 25).

Finally, there are two chapters that already in the title include speculative methods, namely "Reconfiguring surveillance futures for higher education using speculative data stories" (Ross & Wilson, this volume) and "The future of presence in online education, a speculative design approach" (Carbonel, this volume). Ross and Wilson applied speculative methods to create and share stories about what the future of surveillance in higher education might look like from the perspective of students and staff. The speculative method was crucial for understanding different values around surveillance. The authors note that surveillance is sensitive and that for this reason, they collected the stories in ways that allowed the participants to be anonymous. For instance, problems such as digital resignation and fears about repercussions are sensible (both meanings of the term) issues that necessitate the development of new research methods. As concerns the chapter by Carbonel (this volume), she presents the result of six speculative design workshops where teachers and staff developed prototypes focusing on what presence and affective closeness could look like in future online education. Her main argument for choosing a non-traditional approach was that it enabled the experimentation with new ideas of the future that include "different beliefs, values, ideas, hopes and fears from today" (p. 108). She argues that if our beliefs and ideas do not change, it will also be impossible to change the future. Carbonel's evaluation of the use of speculative methods centres on the possibility they afford for broadening participants' ideas and opening a discussion vital to possible futures.

To sum up, speculative methods are one way to balance the dystopia and the utopia versions of the future of networked learning. There are probably several reasons why this specific volume contains a high number of interesting contributions utilising speculative methods. We have recently gained a lot of new experiences of online teaching due to COVID-19, and the development of tools like ChatGPT creates new waves of wanting to discuss the future of learning. Within the networked learning community, speculative methods could be useful in imagining and foreseeing for example how interactions between networked learners could change, as well as in fostering ideas for rethinking the interaction also between humans and machines.

Balancing Qualitative and Quantitative Data in the Research of Networked Educational Settings: Studies at the Community and Project Levels

Turning to the question of methodology, the chapters of this book include analyses of qualitative and quantitative data from networked educational settings in the early 2020s. In these chapters, the balance between qualitative and quantitative categories of data can be discussed at two distinct levels, at least: the project level and the networked learning research community level. To expand on the earlier reached grounds in the field, both these levels are important to take a closer look at and relate to.

Starting with the community level, this level is addressed by several studies in this volume. These studies tend to be discursive analyses of the concept of Networked Learning and its relationship to other ideas. The community level studies have a philosophical character and are built either on pre-existing data available in other scholars' publications or on reflections on the practice of networked learning (e.g., Brandén; Jandrić & Hayes; Lee & Bligh; Matthews, all this volume). This kind of analysis of networked learning has been part of the community since its inception and is valuable in bringing insights to the field, for example, concerning design aspects, frameworks, or ontological issues of networked learning. Such discussions afford an understanding of the qualities of human-human networks as well as human-nonhuman networks. Generally, these studies relate to the ongoing discussion of the definition of networked learning and particularly to the recent discussion in the last NLC conferences (e.g., Dohn et al., 2020; Jaldemark et al., 2022) and in two articles published in *Postdigital Science and Education* (NLEC, 2021; NLEC et al., 2021). Future work needs to consider whether specific methodologies are definitional of Networked Learning, and in particular whether and how data sources generated from AI-supported settings and learning analytics should change the definition. As mentioned by Jandrić and Hayes (this volume), bio-digital technology is a part of the networked learning field. Therefore, future biological and digital technological development may strongly impact the human-nonhuman intersection of networked educational settings and the possible data available from such settings. The community of networked learning researchers need to embrace and reflect on this development to be able to push the boundaries of our understanding of learning in networked educational settings. To fulfil the potential of this, it is necessary to include many categories of data. Thus, we expect that future publications within the networked learning community will combine the strength of artificial intelligence and learning analytics with in-depth analyses of semi-structured interviews.

At the project level, some studies in the present book use the latter data collection method, semi-structured interviews, in a single data category approach (Acuyo Cespedes & Lee; Hachmann et al.; Wilson et al., all this volume). Here, the authors have worked with transcribing oral data to print, a method commonly applied in educational studies. Interviews and their transcription will surely also have a place in future studies of networked learning, because of their potential to

reach deep insights into human attitudes and perceptions. In the chapters presented here, the data collection method was applied in the design of a convivial tool that should support open data in terms of networked data commons (Wilson et al., this volume); to reveal how rhizomatic networks of students emerge (Hachmann et al., this volume) and to collect university teachers' perceptions of networked learning and emergency remote teaching (Acuyo Cespedes & Lee, this volume).

Other studies at the project level applied several data collection methods, building on different approaches, such as case studies or mixed methods. It follows that these studies worked with several categories of data (e.g., Carbonel; Godsk et al.; Ross & Wilson; Wichmand et al., all this volume). Moreover, they also included a rich plethora of data in their analyses. Particularly the design-based and speculative studies benefitted from such a complex assemblage of data. The speculative approach of Ross and Wilson included hyperlinks, images, text and social media objects. In Carbonel's speculative approach, workshops generated data such as collaborative creation of written definitions, individual problem solving and development of prototypes (e.g., drawings, collages, a set of instructions), and oral and transcribed group discussions of the developed prototypes. In Godsk et al. (this volume), interventions were studied by including data from an assessment rubric with a 5-point Likert scale to assess the learning designs; semi-structured interviews with educators; and learner data in terms of time allocated for online activities, pass rates, perceived learning outcomes and their preferences for and against online materials. These studies are examples of the complexity of studying networked learning educational settings.

The Networked Learning community will continue to thrive if it finds a balance of studies that analyse qualitative and quantitative data. This does not necessarily mean that all studies should work with complex datasets: single-method studies will have a place, as well as studies that combine several data categories. Achieving a balance is important for pushing the boundaries of understanding networked educational settings and for building a strong networked learning community.

Final Remarks

In this concluding chapter, we have provided an initial discussion of questions that emerge from the chapters of the book as focus areas for future research: *Lasting effects of lockdown online teaching and learning?, Digital sustainability for the future, Future roles of networked learning in society, Balancing utopia and dystopia in visions of AI and open data, Speculative methods in research, education and design*, and *Balancing qualitative and quantitative data in the research of networked educational settings: Studies at the community and project levels*. For several of these questions, though the primary basis for articulating them can be found in a (varying) specific section, they appear more widely across the book. We take this as an indication that they are reflections on – and of – the contemporary state of affairs, societally, politically, and educationally. As Jandrić and Hayes put it in their chapter,

"Scholarly research is always closely related to its *Zeitgeist*" (Jandrić & Hayes, this volume, p. 44). More particularly, the issues, for instance, of developing sustainable ways of living; of meeting the lasting consequences of COVID-19 lockdowns (personally, socially and societally); and of adequately harnessing AI in the pursuit of valuable outcomes; permeate public discourse way beyond the realms of education and networked learning. In this sense, it is no surprise that they are also echoed in the themes highlighted for the next Networked Learning conference, to be held in Malta in May 2024: Under the overarching theme of *Networked Learning as a pedagogy of hope*, several sub-themes are articulated, including *Digital futures and environmental renaissance*, *Artificial intelligence, learning analytics and emergent digital technologies* and *Ethical and responsible innovation and research*. These sub-themes would seem to pick up where this book ends, and therefore, we hope, to development of this book's topics in submissions and discussions at the conference.

Further questions could have been emphasised as cutting across the books' chapters; both some that identify other contemporary *Zeitgeist* issues and some that point to more specific debates that persist in our networked learning community. An example of the former would be how hybridity of communication formats can be fostered and maintained continuously *in practice* – that is, how the potentials of hybridity can become sustainably realised in and for the future. Paraphrasing Wichmand et al., the question is: How can we design for the materialisation of hybrid communication? (Wichmand et al., this volume). As we discuss in the Introduction regarding NLC 2022 which was held as a hybrid conference, many issues arise in the realisation of hybrid formats. Given enough experience, some of these can presumably be anticipated and designed for in advance, such as the practical need for space onsite in which to participate in online sessions without disturbing other participants. Other challenges must be tackled every time – in situ, in the process – such as the issue of ensuring that online and onsite participants *actually* have equal participation opportunities. Not just in the set-up of the hybrid format, but in the communication patterns that emerge *in the use* of the hybrid format. Though a lasting effect of the COVID-19 lockdowns may well be a more general uptake of hybrid communication formats, it is an open question for our time what sustainable hybrid communication patterns can be, and how their development can be supported.

As regards specific debates that persistently arise in our networked learning community, an obvious example is the question of how to define the field of Networked Learning. Several of the chapters in the book reference this debate – and rightly so, as it is ongoing and (as alluded to above) was recently reinvigorated by the invitation for redefinition set out by the Networked Learning Editorial Collective (NLEC, 2021) and the subsequent combined community response in NLEC et al. (2021). However, for the purpose of a few last remarks; rather than pursue the question in full, we wish to highlight one aspect of it, which has received somewhat less attention: As Lee and Bligh note (this volume), focus in the discussion tends to be on the term "network" – what it means and how to support it – at the expense of the term "learning". A similar comment was made by Öztok in the previous volume in this series (Öztok, 2021). Referring to the characterisation by

De Laat and Ryberg (2018) of networked learning as underpinned by a range of theoretical outlooks, Öztok argued that "there is a need for more discussion on learning... since designing networked learning should ... be ... a careful pedagogical design, distilled through a clear understanding of what learning is." (Öztok, 2021, p. 12).

We agree with Öztok that specific designs require specific understandings. We also agree with Lee and Bligh that we need to focus on "learning ([as] the end)" rather than (only) on the "network ([as] the means)" (Lee & Bligh, this volume, p. 175). As our final comment, we would like to call upon the significance of exploring this issue more thoroughly: Is it possible to condense theoretical understandings of learning within the Networked Learning field into a common delineation? What would that delineation encompass – and what would it leave out? Would it mean that some activities previously categorised as "networked learning" should then not have that label – not because they didn't live up to the criteria of being networked, but because they were not activities of "learning" in the delineated sense? Alternatively, if a common delineation cannot be found, how do we expect specific designs to be useful across the multitude of theoretical underpinnings? Or is a variety of theoretical outsets in itself a way to facilitate the development of new designs for learning that can inspire and show their worth in practice, complementing rather than surpassing each other? We hope that questions such as these will be picked up in future discussions aimed at defining the role of "learning" within Networked Learning. Equally important, we hope they will spark metatheoretical reflection on how the three constituents of theory, design and practice interact within our field – and on whether and how these constituents combine to move the field forward.

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Index

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