# Chapter 13
# Emerging Rhizomatic Networks and New Ways of Connectivity

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**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)

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|---|
| **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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