UMEÅ UNIVERSITY

# MAINTAINING TEACHING

## Exploring te(a)ch-abilities with actor-network theory

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Department of Education
Umeå 2024

Dissertation for PhD
ISBN: 978-91-8070-414-4 (print)
ISBN: 978-91-8070-415-1 (pdf)
ISSN: 0281-6768
Nr. 135 at the Department of Education, Umeå University
Cover image: Ben+Sam, "Ghost in the classroom". Licensed under CC-BY-SA 2.0 / modified
Electronic version available at: http://umu.diva-portal.org/
Printed by: CityPrint i Norr AB
Umeå, Sweden 2024

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*In memory of Göran Fransson*

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# Abstract

The thesis investigates everyday teaching with digital technology during the Covid-19 pandemic in 2020 and 2021. The pandemic was one of the world's largest disruptions to everyday education with both health and education at stake. With the pandemic control measures affecting upper secondary education in Sweden, gathering in the classroom cannot be taken for granted and digital technologies accelerated and intensified everyday practices. The aim is to explore the relation of teaching and digital technology. How can we understand the ways in which digital technology and teaching become jointly experimented with to cope with pandemic uncertainty?

With an Actor-Network theory (ANT) approach, the thesis puts emphasis on how everyday teaching holds together at the pandemic intersection of routine and breakdown. The everyday teaching practices during the pandemic is an empirical focal point for inquiry into how they become enacted and, secondly, what the implications are for knowledge production when examining this novel educational practice with ANT's relational materialism. To answer these questions, ethnographic methods are used with an upper secondary school in Sweden from May 2020 to June 2021. The fieldwork consists of empirical engagements in school visits, interviews, and online observations. In line with recent ANT scholarship, the methodological approach is articulated as a *care-ful methodology*. It implies tracing vulnerable and stable relations that enact sociomaterial practice and acknowledging cuts and becoming.

The results show how a manifold of more-than-digital practices enact everyday teaching. The included studies in the thesis examine attendability and mundane rituals, lesson enactments of scheduling practices, and digital platforms that co-produce specific practices while obscuring others. Teaching in the pandemic challenges taken-for-granted notions of a rapid transition to distance and online teaching. By surfacing neglected aspects of everyday teaching with digital technology the thesis discusses how 'digitalisation of teaching' erases the local work of everyday teaching as an equipped practice. In conclusion, the proposal is made that *maintaining teaching* takes into account the materiality, abilities, care, and vulnerabilities that enact everyday teaching.

# Acknowledgements

There are several acknowledgements to make. First, I wish to recognise the students, teachers, and staff at the school I call Pine Grove for so crucially making this project possible. I also want to acknowledge Julia Veljkova who went out of her way as a PhD student to plant crucial seeds in me that PhD research was possible. I also wish to extend my thanks to the IT University of Copenhagen course organizers, teachers, and fellow PhD students on the course *Research, Interrupted - Methods and (Re)Design of Fieldwork in Anthropology and STS* for showing what taking educational action can look like in the immediate wake of a pandemic outbreak. 2020 was not a lost year of fieldwork after all.

At another decisive moment with this project, Anna Jobér suggested *te(a)ch* at my 90% seminar. Her and Peter Bergström's readings significantly contributed to the thesis. Anonymous reviewers have also generously given suggestions and encouragements, as have many fellow conference participants. Because reading can be a struggle, I want to acknowledge the Educational posthumanism reading group at Stockholm university led by Karin Gunnarsson. Tanya, your company and our long talks during and since the pandemic have been invaluable! Sanne, Linnéa and Jenny have let me be part of the Edu-ANT studies group, thank you for engaging curiosity and the work ahead.

Thank you to everyone at Graduate School of Digital Education (GRADE). Katarina and Karoline, thanks for sharing laughs and plans from the very beginning. At Umeå university, I was fortunate to have seminars with Ulrika Haake and Christina Segerholm and support from everyone at the department of Education. I also want to thank all my many dear colleagues at University of Gävle for seminar discussions, understanding (especially during the final months of writing this thesis), and generally never-ending engaging conversations.

My supervisors J Ola Lindberg, Limin Gu, and Karin Gunnarsson have been the most creative team to come up with how to organise supervisions for my project with all its ups and downs. Karin, you have taught me so much and it has been a privilege to work with you! Lastly, this thesis was made possible by family and friends, thanks for all your support, and Peter for your unwavering patience!

Stockholm, May 2024

# List of articles included in the thesis

I. Mörtsell, S. (2022). Sociomaterial explorations of attendance practices in 'schooling without schools'. *Learning, Media and Technology, 47*(4), 512–523. https://doi.org/10.1080/17439884.2022.2039939

II. Mörtsell, S. (2023). Lesson enactments: Maintenance in everyday educational practice. *Postdigital Science and Education*. https://doi.org/10.1007/s42438-023-00401-z

III. Mörtsell, S., & Gunnarsson, K. (2023). Caring Cuts: Unfolding methodological sensibilities in researching postdigital worlds. In P. Jandrić, A. MacKenzie, & J. Knox (Eds.), *Postdigital Research: Genealogies, Challenges, and Future Perspectives* (pp. 173–190). Springer. https://link.springer.com/book/9783031312984

*In declaration of authorship, I initiated the chapter and had the main responsibility for finalising it. Both authors worked on the conceptual development, analysis, drafting, and joint revisions in the review process. Both contributed with empirical material from different research projects.*

IV. Mörtsell, S. (2024). Mutual capabilities: digital platforms in unpredictable pedagogical encounters [Manuscript submitted for publication].

# 1. Introduction: Everyday teaching and digital technology

Therese: Well, I remember it because I was in the middle of a lesson that the Prime Minister had the press conference, and there was a student following it on the phone who burst out 'should we go home now?' (laughs). What?! It was just awful. So, from one moment to the next we had to go home. We had started planning for it a bit, but really no one knew what it would be like because nothing had been for real before then.

Sara: What were you thinking about your teaching in that moment?

Therese: I guess I thought it will just have to work somehow. I didn't feel any great anxiety, I just thought it would work out. The students have their books, and I have mine. I know how to post stuff on Teams, and I can give them assignments. But then… It will just have to be what it is. Our teaching is not suited to distance teaching, like, our teaching is based on attendance. It was different. No, the first weeks, I can tell you, were awful. I cried my way through many afternoons and evenings, because of feeling inadequate and not knowing if it was good enough, or how to tackle the whole situation really.

(Interview with Therese, teacher at Pine Grove upper secondary school, May 2020)

When I started thinking about doing this research into school teaching and digital technology, I thought about times when technology has taken teaching by surprise or, equally surprising, let it down. For instance, when school devices require charging or suddenly disconnect for whatever reason. I also thought about tedious administrative systems and poorly updated software that seem to rely on ever more clicks. Digital technology can radically change otherwise straightforward and routine tasks in an instant. Some everyday work around teaching and digital technology seems to repeatedly fall outside of what digital technology is expected to do. When digital technology is unsuccessful, it rubs up against the professionality of teaching in intimate ways. We, the technology and teacher, become something else.

In *Life in classrooms*, Jackson (1968/1990) showed the trivial liveliness of everyday classroom events. Yet, the mundane work of holding the everyday of teaching together has been relatively neglected in education research, despite being so familiar and recurring, or precisely for that reason (Buverie & Simons, 2017). Similarly, everyday teaching and digital technology have struggled to count as a critical pedagogical problem in the critical field of education research (Selwyn, 2014). A lack of scholarly attention to these moments is not so surprising as long as the assumption is that everyday teaching is reliably stable in itself. I remarked above that aspects of everyday teaching with technology can be strikingly ordinary and at times unexciting. In a way, I repeat a problematic assumption by suggesting that the *exceptions* in the everyday are interesting moments that might need some explaining.

This thesis sets out to explore the easily overlooked everyday of teaching and digital technology. To do so, I want to introduce what is a necessary entry point to this mundane educational landscape. My suggestion is a counterintuitive but, nonetheless, necessary inversion that the thesis is grounded in. What needs explaining is not change, instability, or interruption, but the reverse – how *something hold together* and become stable are the 'exceptions' that should call our attention (Bowker & Star, 2000; Latour, 2005). In light of this reversal, the educational landscape of everyday teaching can be re-evaluated. When the everyday is interrupted or otherwise destabilised, we are confronted with how exceptional (uninterrupted) everyday teaching is. The quotidian teaching becomes something altogether else. This is the opening to everyday teaching that I set out to explore with this thesis.

# Digital imperatives on everyday teaching

Ideas about technology and progress have strong influence over views and decisions on how teaching ought to change. Currently in Sweden, politicized expectations of digital technology echo in public debates as anxious demands for change either by connecting teaching to the real world or by reinstating an old one (e.g. Forsler & Guyard, 2023). The debates follow from two decades when 'new digital teaching methods' have been positioned as vital instruments in Sweden's race to become a leader of innovation and transformed competitive education (e.g. Digitaliseringskommissionen, 2016). The trend has amassed wide consensus and successfully harmonised available technology, progress, improvement, and international competition with teaching to the extent it has attracted limited critical scrutiny (Bergviken Rensfeldt & Player-Koro, 2020; Ljungqvist & Sonesson, 2021). I recognise this as a digital imperative on teaching. Historical studies into computers and society have addressed the annunciation of the 'new' as a repeated immediacy. Imperatives uphold a temporal order of rationalised notions to make digital what can be made digital and that 'the time to do so is now'. With a clear division of old and new, what becomes the only rational choice is to employ the digital solution (Rahm, 2019; Wormbs, 2010). In line with this scholarship, I believe it is necessary to destabilise a digital imperative also for understanding contemporary teaching with digital technology in locally situated everyday practice.

As argued by actor-network theory (ANT) philosopher Bruno Latour (2018), when a modernisation front is pushed forward by a global and future pole of attraction, the local is left behind and, by definition, can never make it. This particular idea of linear progress that Latour critiques can help highlight what a 'digital front' on teaching creates. It leaves behind new and *irrational* positions available for teachers and others wishing, wanting or having to make other choices than to ally with digital progress and those who offer it (Adam, 2019). Narrative elements of newness help drive a digital front. Edgerton (2008, p. ix) says that '[w]hen we are told about technology from on high we are made to think about novelty and the future'. Inspired by these ideas, I have looked for ways to temporally stage everyday teaching and digital technology as less moulded with stories of forward-moving progress.

Another reason to be hesitant to the 'new' is that technological promise always outlasts the failures that have come before. Discussing the impact of the educational technology industry (edtech), Chan (2019, p. 163) suggests that the history of teaching technologies is 'edtech's

disremembered pasts' and she asks how cycles of unrealized promises can be 'so repeatedly forgettable'. What technology can do to teaching is not solely a matter of projecting futures but crucially about building credibility and trust by wiping out past failures. De-emphasising innovation and newness can thereby help to acknowledge omitted pasts and perhaps make everyday teaching practices with technology less forgettable. As suggested by Bergviken Rensfeldt and Rahm (2023, p. 28) when they look into the history of politics of automation and artificial intelligence around teachers' work, frameworks and narrative elements of novelty do not have to wield the attention of education and technology research. It is not quite the same as dismissing hypes as altogether false, because they still hold hopeful openings to reframing past disappointments as something other than holding back the new (Chan, 2019).

By highlighting how some dominant assumptions about digital technology and teaching have been challenged, I want to make them a little more uncertain and destabilised. My primary interest is not in what improves teaching under a contested digital imperative but in how the *relation* of everyday teaching and technology is figured and repeatedly stressed in ideas of digital progress, regardless of the position taken. However, technology is not an inevitable force that pushes society or its teaching in a particular direction (Latour, 1991). Neither, as I will address in this thesis, can teaching be regarded as an inert part in this relation. I see two problematic dimensions of teaching-technology relationality that need addressing. Firstly, the problem of a dividing relation between digital technology and teaching on either side is that it is so intuitive and, secondly, the division appears particularly reasonable in the field of education. The ambition is not to find resolution but to explore how the dividing relation can be otherwise.

# The Covid-19 pandemic and everyday teaching

The empirical case for exploring everyday teaching and digital technology in this thesis is the Covid-19 pandemic. Therese, one of the teachers at Pine Grove upper secondary school, offers an entrance to this topic in the beginning of this chapter. Before returning to Therese's story, I want to outline a brief account of the pandemic outbreak and how it affected education and intensified digital technology in everyday teaching.

On March 10 2020, the World Health Organization assessed Covid-19 a pandemic calling on all countries to activate emergency response mechanisms (WHO, 2020). Among viruses that also sustain life on earth, the novel zoonotic SARS-CoV-2 virus was found to cause the disease Covid-19 in human hosts. Interdisciplinary research has stressed the pandemic entanglements of nature, homes, data, politics, and planetary health serving to amplify sensitivity to the planetary dimension of life to which Earth cannot be a static backdrop (Lemm & Vatter, 2022). The pandemic outbreak confronted governments around the world with how to provide schooling for children and young people while curbing the surging infection rates. Subsequently, the decision to close schools in Sweden was announced on March 17, 2020, and applied to non-compulsory education, upper secondary schools, and higher education. In August 2020, United Nations concluded that the Covid-19 pandemic was 'the largest disruption of education systems in history' (UN, 2020).

Considerable trust was placed in public schooling by the Swedish welfare state apparatus with pandemic control measures that surfaced how everyday teaching matters for responding, dealing with risks, and making schooling work locally (Lindblad et al., 2021). The capacity to provide public schooling can be regarded as a society's very coping with fostering its renewal in response to the world in ways not yet known (Biesta, 2021; Säfström & Månsson, 2022). The pandemic showed how this capacity played out in everyday teaching as a vital *site*, especially given that gathering in classrooms was not given, and also *by* teaching for making schooling possible as part of the scholastic technology (Masschelein & Simons, 2013). Unequally ravaged by the extraordinary circumstances, everyday teaching as in many parts of life meant suspension or ceasing to do thing. With digital technology, however, the situation rather intensified for everyday teaching to work, and that is the primary interest of this thesis.

Across Europe, the pandemic outbreak created a window of accelerated opportunity for a digital agenda (Cone et al., 2021; Grek & Landri, 2021). Microsoft Sweden, for example, released a blog post announcing that 4,500 teachers in 30 upper secondary schools in Stockholm, remarkably in only four days, had successfully pivoted to online and distance teaching thanks to the platform Microsoft Teams for Education. The post concluded that the early benefits of this 'pivot' were increased school attendance and the comforts of joining from the safety of the home to avoid harmful exposures (to Covid-19 and other perils) at school. According to the same post, Microsoft globally experienced an

unprecedented increase in number of users of the digital platform Microsoft Teams (Microsoft Sverige, 2020). As a digital education event, this thesis recognises pandemic teaching as prone to hypes of neutral and successful technology saving everyday teaching and schooling. With that same grammar of hype, everyday pandemic teaching is at risk of quickly being wiped from memory. How to make this topic 'less forgettable' has motivated the explorations to go into it and stay with *everyday pandemic teaching*.

There are a couple of things to clarify on how I regard everyday pandemic teaching within this thesis. Firstly, I want to stress that the everyday is not 'new', but it is brought into existence in atypical more or less school-aligned ways. By stressing this, I look to escape narrative elements of newness, innovation, and hype. I find that these elements lock everyday teaching inside 'a pandemic era' as a powerful explanatory context. Theoretically, I am not seeking something underlying that needs to be revealed but look to the possibility of following what may otherwise be silenced and pushed into the background of everyday teaching (Latour, 2005). In that sense, I regard everyday pandemic teaching as simultaneously novel and habitual. To recognise it, the pandemic is considered spatially as an *intersection of routine and breakdown* for everyday teaching. By taking the *everyday* as the object of study rather than the *exceptionality* of the pandemic, the approach overcomes a sharp temporal division of before and after the moment of pandemic outbreak. In other words, the global pandemic is inside the local teaching, rather than a surrounding context (cf. Law & Singleton, 2013). Everyday teaching becomes an uncertain practice and object of study whose otherwise invisible school-aligning work can be explored (cf. Star, 1990).

Therese's story is helpful to articulate how the reversal of everyday and exception is an analytic vehicle throughout this thesis and how the everyday teaching in the pandemic matters to it. Entering Therese's account are many ordinary and material things in teaching: lessons, books, posting stuff online, assignments, attendance, tears, etc. They are everyday material components to teaching that habitually remain unnoticed in the background but here come to life as vital components to everyday teaching as a practice heavily equipped in the fabric of school life. Therese is also part of this practice but for this thesis, teaching is not an individualising story about teachers. I have mentioned it as a problematic dimension but particularly reasonable to the field of education to centre on human actors, and it is especially conventional in studies of teaching and digital technology. While not dismissing that so

is also the case, my reading of Therese's story is not a reading about resignation or deficiency in competence or readiness. Instead of weaknesses, another reading allows for the intensities of uncertainty and ambivalence that run through Therese's story to become cues for making instability and indeterminacy of everyday practices intelligible (Latour, 2005; Law, 2004). The ambition is not to solve or pin down and, in that sense, eradicate ambivalence but allow it to be empirically valuable for this educational moment and of everyday teaching practices with digital technology more widely. For the same reason it is necessary to resist stabilising and taking the individual teachers for granted as the protagonists of this thesis.

Pine Grove is included in this thesis because it is an empirical case of the specificity of everyday pandemic teaching, not for supporting generalised ideas about secondary education, or all schools using Microsoft services, during Covid-19. In many ways, Pine Grove reflects the distinct Covid-19 approach taken by Swedish government officials to, rather than prohibit, inform and 'educate' and thereby place responsibilities on self-regulating citizens (Rahm, 2021). However, my primary interest is in the specificity and not in making generalisations. For example, when specificities with Pine Grove are taken into account, it becomes futile to categorise teaching as either online or 'classroom-based'. Consider for example that, although significantly quiet, Pine Grove was not empty of people who were 'locked down' at home. The pandemic restriction measures and guidelines allowed for some students to come to school even during the surging pandemic. For example, the introductory language programme had their classes at school and profiled sports classes were organised outdoors. Some students were also exempt from school closure and teachers did intervene on behalf of certain students whose home situations were potentially unsafe. Final year students Nina and Ellen, participants in this study, asked specific permission to be at the school when 'they just couldn't take it anymore' and would sit together in the school library and connect to their class calls on Teams. The school library was a vast area and staffed most days, it was a matter of commuting restrictions that stopped library staff to come in fulltime. The canteen was operating, and some teachers preferred to work from their school offices and near coffee machines. In response to such specificities, I take 'distance' and 'proximity' to be the achieved scales among negotiations of the many involved components, rather than a set assumption beforehand (Latour, 2005).

Several educational scholars inspired by Science and Technology studies (STS), critical studies in education and technology, and posthumanist

thinking have considered the pandemic a nature-culture phenomenon and what it asks of educational research. On the more-than-human forces of the world, educational posthumanist scholar Juelskjær (2020, p. 55) argues that pedagogical thinking 'has played and still plays a role in the staging of the human as privileged and "exceptional" beings in the world'. Therefore, she insists, it is a pedagogical matter how to manage the responsibility of living, relating, and acting in less destructive ways and irresponsible neglect with the world. Informed by Latour's (2018) *Down to earth*, educational scholars have responded to the Covid-19 exposure with *an earthly sociology of education* (Gorur et al., 2024a), and *an earth-bound study practice* (Vlieghe & Zamojski, 2020). Vlieghe and Zamojski (2020) propose that we can either align the Covid-19 pandemic 'with what we already know, or we can try to take seriously the unforeseen novelty of the situation'. Similarly, Selwyn reflects on what critical studies of education and technology can do:

> For example, what moments of online intimacy, flourishing and care were evident in the COVID turns to 'emergency remote schooling' during 2020 and 2021 that we might actually value and wish to nurture? (Selwyn, 2024, p. 56)

Inspired by these ideas, everyday teaching and digital technology can be given new and critical attention as to how it is constantly coming into existence and maintaining its existence. Rather than a naturally flowing force in education, teaching and schooling practices are made in the everyday with all its equipment and can be unmade and otherwise made. Subsequently, everyday teaching deserves consideration as such if it is not to disappear into a cemented background. This is why I'd like to draw attention to what Therese says about teaching as something that 'must work somehow'. This is of great interest to this study of teaching, how and what does teaching *become* in the everyday of an uncertain pandemic?

## Approaching everyday teaching with Actor-Network theory

My fascination with the many ways in which materiality constantly acts on teaching has led me to work with ANT and especially the philosophers Bruno Latour (2005, 2017), Annmarie Mol (2002, 2010), and John Law (2004, 2009). ANT allows me to explore two critical aspects of the research problem in this thesis, (i) the entangled relation of materiality and teaching and (ii) the mundane and everyday aspects of

teaching practices. I understand the mundane as the ordinary, worldly, and everyday practices we tend to not give much consideration, as well as objects that are rarely analytically relevant (Woolgar & Neyland, 2013).

I have introduced the inversion to examine how something hold together rather than to explain changes. It is an example of how ANT is a technique for turning things and questions inside out (Mol, 2010). For the purpose of this thesis, it serves to articulate that everyday teaching is not a given starting point that is merely there waiting to be known. Teaching is played out and held together somehow, somewhere in practice. ANT has emphasised for education 'that in any (educational) phenomenon, materiality – material relations – is critical to understand what appears to be happening socially' (Fenwick & Edwards, 2019, p. 2). This means that teaching is not taken for granted, nor is it understood as constructed, instead it is recognised as specific *enactments* of human and material entities that enable each other. In this notion of enactments, realities are performed through practices, which become world-making. This is ontological groundings that ANT shares with posthumanist educational scholarship on re-attuning to *pedagogical matters* (cf. Bergstedt, 2017; Juelskjær, 2020; Lenz Taguchi et al., 2020; Snaza et al., 2016). On the critical role of ANT for education, Decuypere and Simons (2016, p. 8) comment that '[...] knowledge is no longer so much about representing the facts one has obtained as it is about presenting how a practice comes into being'. Consequently, how everyday teaching practices become enacted in the pandemic is what I set out to study.

With this thesis, I recognise ANT assumptions as *relational materialist* (Bodén et al., 2019; Latour, 2005; Law, 2009; Mol, 2010). They are the groundings for how the exploration is carried out. As such, ANT is not a theory but rather a methodological sensibility. One way to think of this is that theory is not something to *think* but something to *enact* in research practice. Likewise, a methodological shift needs to allow for practices to become part of the *knowledge production* of research in specific and unexpected ways (Mol, 2002). What follows is that the objective cannot be to depict or represent a reality that Covid-19 caused. Neither is the thesis set up with an ambition to reproduce representations or reiterate critiques of teaching and technology in the pandemic. Instead, relational materialist work of ANT and posthumanist educational scholarship suggests that fostering responses with the world is a more urgent matter than reproducing old ones (Edwards & Fenwick, 2015; Gunnarsson, 2018; Juelskjær, 2020; Moberg, 2018).

The ambition with this thesis is to explore everyday pandemic teaching empirically and invite a re-thinking of why and how it matters. It involves exploring other stories about everyday pandemic teaching and consider wider repertoires for surfacing teaching-technology relationalities.

## Aim and research questions

In relation to the disruptions of the Covid-19 pandemic with intensified use of digital technology in schools, the aim is to explore the relationality of everyday teaching and digital technology. The thesis does so, firstly, by empirically engaging with novel and habitual teaching practices at one school during Covid-19 pandemic restrictions on education, such as school closures. Grounded in relational materialism, both human and material actors are taken into account for how and with what effect everyday teaching is accomplished with digital technology in this specific setting. Secondly, the thesis has theoretical and methodological ambitions. These are explored by articulating how relational materialism generates the knowledge production of the thesis project.

The aim is addressed by the following two research questions of which the first one is empirical and the second one theoretical-methodological. (1) How is everyday teaching with digital technology enacted in the Covid-19 pandemic? And (2) what are the implications for knowledge production when everyday teaching with digital technology is explored with relational materialism?

## Disposition

This thesis is an extended summary and discussion of the included studies (I-IV). Together they form a synthesis that addresses how everyday teaching and knowledge production become enacted in the Covid-19 pandemic. The extended summary is organised in five chapters.

Following from this introductory chapter is chapter two with related research on teaching and digital technology and the accelerated changes appearing with the Covid-19 pandemic. I also outline previous studies on the introduction of digital technology in everyday teaching with regards to how teaching and technology become relationally figured. With the outline of related research, the thesis' approach is specified. The thesis' methodology is then presented in chapter three. Drawing on ANT, I address how the ontological assumption of relational materialism

connects to knowledge production as intertwined and inseparable with several implications for how this thesis produces knowledge about everyday pandemic teaching. I also address the key methodological and analytic concepts. The implications build towards the methodology that I articulate as a *care-ful* methodology. The second part of the third chapter accounts for the empirical engagements at Pine Grove upper secondary school 2020-2021. Important decisions regarding analysis and materials as well as ethical considerations are discussed.

In relation to the overall aim of the thesis, the research questions are responded to in ways that each individual study cannot. For this reason, chapter four first presents brief summaries of each included study in order to articulate how they *and* this extended summary and discussion respond to the research questions. Chapter five concludes the thesis with a discussion on the critical capacity for different kinds of responses to teaching in the Covid-19 pandemic that the thesis contributes to. Interventions of maintaining teaching and its implications are discussed and concluding invitations to everyday teaching and technology are articulated.

The relational materialist approach invites experimentation with words and concepts. Rather than being decided and defined beforehand, words and concepts are developed in parallel to the exploration of empirical material in the thesis. This also makes it possible to put words at a distance if their baggage is unwelcome (Mol, 2021). A distance to baggage can come from single quotations marks and, importantly, in revising words, concepts, and forms. Some ways to revise words come in hyphenation to suspend conventional meanings (e.g. *care-ful*) and parenthesis to ambiguate otherwise clear divisions (e.g. *te(a)ch*). Another way to revise form explored in the extended summary is resisting acts of theoretical application with a dedicated 'theory chapter' in favour of practicing theory throughout, with gravitation in the first part of chapter 3 (cf. Bodén, 2016; Eidenskog, 2015).

# 2. Related research: Digital technology in everyday teaching

With this chapter, the topic of digital technology and everyday teaching is situated within two main areas of research, (i) critical studies of education and technology and (ii) relational materialist scholarship which includes ANT and posthumanist research of teaching and materiality. To show how I draw on previous research in these two fields, the focus is on how they variously allow for the study of everyday teaching's encounters with new and established technologies, including teaching in the Covid-19 pandemic. The outline of related research serves as an extension to those in the included studies and is intended to provide the entry points for exploring everyday pandemic teaching.

The related research is presented in four sections broadly according to how teaching and digital technology is primarily figured: as digital *means* to an end, as *regulated* in sociotechnical relations, as *performed* of sociomaterial relations, and as *repaired* in vulnerable relations. While these included studies gravitate towards the Nordic countries, and specifically Sweden, they are not limited to this geography due to the span of digital technologies and research into teaching and Covid-19.

## Digital means in relation to everyday teaching

Since the 1990s, digital devices have been promoted in Swedish policy as beneficial for teaching, as *means* to achieving various educational ends. In an early review, Riis (2000) highlights the shift from computers to internet-based information and communication technologies (ICT) in the 1990s as key for digital technology to become widely regarded in Sweden as socially and culturally significant to teaching. As means for communication, new ideas about what teaching could and ought to do, i.e. put ICT to effective use, became possible rather than what technical applications of word processing or specialised computer school programs had been able to raise until then. Specifically, ICT more powerfully supported articulation of *future* visions of education, as infrastructures for electricity and railways had done a century before. Stressing something of ICT's unique ability in education to amass harmonising economic, political, and educational goals, Riis comments that the remarkable volume of public funding invested ICT for schools in Sweden overshadowed all other efforts and reforms to improve teaching

and schools. With negotiations and explorations, everyday teaching becomes an arena where ICT plays out as mastered by some, adequately solved, or failed by others, argues Riis (2000).

ICT was seen as fundamentally supportive and enhancing tools for achieving effective teaching and learning in ways that had been unimaginable in the longer history of educational technology. At the start of the 2000s, there was considerable alignment with Sweden's neoliberal restructuring of education towards choice, privatisations, and personalised learning and Sweden heralded itself for taking the lead compared to other European countries (Gu & Lindberg, 2021). ICT provision also responded to an increasing 'digital divide' of unequal access, an issue in a way created by digital technology with itself positioned as a solution although other inequalities were entrenched (Macgilchrist, 2019). From the early 2000s, ICT investments were packaged into so called 1:1 distribution programs with schools implementing one digital device for each student in a kind of digital provision *en masse*.

Despite the large investments in Sweden, studies on what impact was made showed that there was no smooth transition or easy uptake of digital devices in everyday teaching (Olofsson et al., 2015). Research has in various ways addressed the significant gap between the envisioned transformed teaching and everyday teaching. Grounded in the notion that there is an attested lack of evidence that digital technology can transform teaching, Player-Koro and Tallvid (2015) focus on 'what actually went on in these classrooms' in a long-term study. The findings show digital support of traditional teaching and classroom management and change in terms of expansion of how communications happen over, e.g. email, rather than dramatically innovative changes. Based on classroom observations in 14 schools, Andersson and colleagues (2016) argue that everyday laptop use contradicts an idealised individual 1:1 use that the ICT distribution programs allude to since other classroom arrangements dominate, 1:2, 2:2 etc, including times when teachers use digital technology and students do not.

Research with sociocultural approaches stress that digital technology become tools among the available resources interacting with teaching and learning. The emphasis is on pedagogy as the primary driver for the change that technology enables. It renders perspectives on what can make teaching more successful in achieving technology-enhanced learning from 1:1 distributions (Håkansson Lindqvist, 2015b, 2015a). Occupied with questions about whether digital technology is working or

not for teaching, assessments of the outcome of technology use in classrooms suggest support and recommendations for realising the potential of ICT use, and what setbacks to avoid (Tallvid, 2016; Tallvid et al., 2015; Tondeur et al., 2017).

The everyday of teaching has served as an explicit empirical argument for exposing unrealistic promises with digital technology and problematising its effects. Insisting that 'state of the actual' holds more value for education than 'state of the art', Selwyn (2010) has brought attention to the latest digital technology exerting hype over ideas about what teaching ought to do. In *Everyday Schooling in the Digital Age: High School, High Tech?* Selwyn and colleagues (2017a) explore everyday schooling with sociological scepticism towards claims that schools are not doing enough to be successful with digital technology and that other educational and economic failures follow. They argue for developing an everyday perspective to problematise realities with digital technology in teaching. Based on ethnographic studies of Australian schools, the ordinary (instead of extraordinary) transformations of everyday teaching are foregrounded, concluding '[w]e found most teachers – from the technology-smitten to the technology-sceptic – to be making reasoned decisions to (not) use digital devices and applications in their classrooms' (Selwyn, Nemorin, Bulfin, et al., 2017a, p. 154). They highlight tensions around distractions, limited possibility to charge devices, and other maintenance issues for technical staff and intensifying effects on teacher labour and surveillance beyond teaching (Selwyn, Nemorin, Bulfin, et al., 2017b; Selwyn, Nemorin, & Johnson, 2017). By contending naive claims of radical transformation, rich descriptions of technology use in everyday teaching surface as vital critique of digital hype. Selwyn and colleagues (2017a) hold that it is not in defence of *status quo* but rather to defend public schooling's realistic means of change.

However, in contrast to the slow uptake of ICT to change teaching methods, research into digital automation of everyday teaching tasks remarks that there is little disagreement surrounding automation, such as automated monitoring of student attendance, even though there may be over-reach of authoritarian or commercial interest (Andrejevic & Selwyn, 2020; Selwyn, 2022). The rich history of automating teacher work has been revived with adaptive AI that repeats promises of Skinner's teaching machine as means to 'free' teaching and teacher's valuable time (Bergviken Rensfeldt & Rahm, 2023). Automation in teaching displays critical links to the mundane as it is often seen as innocuous and helpful for monotonous, routine, and manual tasks.

Furthermore, research has highlighted that administrative tasks and decision-making in everyday practice are not always distinct from teaching the way technology providers and software designs suggest. This is the case with attendance technologies and automations of roll-calling. Roll-calling can take on pedagogical functions in everyday teaching, yet the everyday practice of checking names on a list is with the imperative for automation positioned as outdated (Bodén, 2016; Selwyn et al., 2021).

## 'Learnification'

Scholars drawing on various critical approaches have raised the issue that when learning is allowed to dominate as the outspoken educational goal it renders a common-sensical approach to digital technology in teaching (Bayne, 2015; Knox et al., 2020; Macgilchrist, 2017; Selwyn, 2010; Selwyn, Nemorin, Bulfin, et al., 2017a). They find education and technology research specifically prone to a one-sided interest in digital technology as supportive, enhancing, and assisting means to an end of larger significance, i.e. individual learning, and rarely studied outside of this goal. The argument is that the preoccupation with learning, a 'learnification' that posits 'all education reduced to learning', unreflectively assumes digital technologies to have inherent *enhancing* capacity to support learning with no other or very limited consequence. The critique draws on educational philosophy and the recovery of teaching that acknowledges a wider role of teaching for study and practice in schooling, rather merely producing learning (Biesta, 2017, 2021; Masschelein & Simons, 2013; Säfström & Månsson, 2015, 2022; Todd, 2022).

The recovery of teaching calls significant attention to how digital technology becomes figured with teaching and drives change in specifically political ways. A techno-deterministic stance risks reducing teaching to acts of allowing for enhancing technology to do its job, and a 'backstaging of the teacher' (Macgilchrist, 2017). As discussed by Aagaard (2017, p. 1129), '[w]hen something good happens, we praise technology, but when something bad happens, we blame the students (occasionally, this blame also extends to their teachers)'. Instrumental notions of digital technology as neutral tools lead to placing responsibilities on users whenever promises are unrealised. Hamilton and Friesen (2013, p. 6) argue it is paradoxical that essentialist techno-determinist and instrumentalist notions find common ground in views of digital technology in education, rendering technology essentially

benevolent and always 'free of blame' while 'teachers are depicted as conservative, protectionist and hidebound'.

## Digital acceleration and Covid-19

When the education and technology field became confronted by new forms of teaching with the Covid-19 pandemic, it sought to identify the novel teaching practices in meaningful ways. 'Online pivot', 'transition to emergency remote teaching', and 'migration online' were some of the terminologies proposed to accurately capture the character of a speedy and relatively smooth change to teaching albeit in need of advice and support (Hodges et al., 2020; Rapanta et al., 2021). In the education and technology field, *emergency remote teaching* (ERT) coined by Hodges et al. (2020) in the pandemic's early stage became an especially compelling terminology to study higher education (Bond et al., 2021). It was less used outside this field of research and less used for teaching in K-12 education (Bond, 2021). In reporting on upper secondary school teachers' coping strategies, mixed experiences of teaching are highlighted, such as an immediate transition that 'went surprisingly well' but also brought with it unforeseen difficulties (Olofsson et al., 2021, p. 91). The 'overnight' character of change with Covid-19 gestures to how taking up digital technology was, if not easier, more immediate and convenient than before. As observed by Grek and Landri (2021), '[t]he shift to the digital was almost immediate: despite the institutional collapse triggered by the pandemic, digital platforms created a safety net for the emergency education and the "magic" of education going online'. Teachers' experiences of collaborative and creative actions taken on a micro-scale address the innovation of the transition to remote teaching (Lindberg & Haglind, 2021). Interviews have also documented the everyday efforts of 'keeping up the normal' with emergency remote teaching (Nilsberth et al., 2021).

Critical studies of education and technology have been vocal on how the pandemic accelerated already existing concerns, as 'a "perfect storm" for a massive increase in digital infrastructure' (Perrotta & Pangrazio, 2023, p. 6). Tensions around technology prior to the outbreak in 2020 seemed to diminish albeit not without unequal effects and concerns about losing trust in education (Bormann et al., 2021). Other issues were how the emergency could become a catalyst for state delegation of public education and an intensified market-orientation for solving and defining the problems of education (Ideland et al., 2021; Ljungqvist & Sonesson, 2021; Williamson et al., 2021; Williamson & Hogen, 2020). In Sweden, scholars identified a new and contradictory position created for the

education technology industry as both salvific and itself 'at risk' and vulnerable to pandemic pressures unless sufficient funding could be given (Cone et al., 2021).

Insofar as teaching was able to go on despite periods of closure, the pandemic seemed to generate confounded local teaching situations of preventing disorder (Williamson et al., 2021). Empirical ANT-inspired studies have highlighted some of the mundane aspects. For example, articulations have been put forth about improvisations and doing 'things on the fly' (Alarcón López et al., 2021), 'invisible participations' (Valasmo et al., 2023), as well as the well-rehearsed notion that teaching became 'just not the same' (Gourlay, 2022). Some of the critical topics will be further outlined in connection to sociotechnical approaches to digital technology and teaching.

# Teaching as regulated in sociotechnical relations

In this section, the primary focus is on studies that can be broadly considered as taking a *sociotechnical* approach, which have gained traction in critical studies of education and technology (Selwyn, 2024). The approach takes inspiration from ideas that emphasise technology as socially, politically, and historically shaped (Bijker et al., 1987). The gravitation is around poststructuralist interrogation into what discursive and knowledge-making practices digital technology produces that regulate everyday teaching in terms of, for example, surveillance, governance, and power. The tendency in sociotechnical approaches to regard the digital as a flawed aspect of contemporary teaching and education, rather than exceptional, can also be found in so called *postdigital* educational research (Jandrić et al., 2023; Knox, 2019).

In a review of 50 years of digital school reform in Sweden, Bergviken Rensfeldt and Player-Koro (2020) draw on sociotechnical imaginaries to address remerging struggles over curriculum content and imagined futures that fuel reform and school investment in technology. They show that the discursive work of 'innovation' and 'disruption' breaks with the past and that a tool-based curricular repertoire offers little room for any pedagogical alternatives. Compliance with the digital similarly aligns with suggestions by Pangrazio and Sefton-Green (2023) who link the calls for digital competence and literacy to sites of power and subjectification. They argue that the claim that technological skills have values for teaching legitimises the use of technology as a kind of 'soft power' on the teaching profession. When the teachers in their empirical

study of a new software ignore the screen, they do so with what seems to be a required justification. The authors stress that digital literacy is 'part of the governance mechanisms by which new modes of technological infrastructure impose certain kinds of power by foreclosing alternative ways of thinking and being' (Pangrazio & Sefton-Green, 2023, p. 197).

Studies oriented to sociotechnical interrogations have engaged with how specific forms of digital education in Sweden become produced as desirable solutions and how needs for change are constructed. Based in Foucauldian understandings of discursive power, Bergviken Rensfeldt and Rahm (2023) analyse the history of automation of teacher work in Sweden and how AI solutions become seemingly objective. By unpacking problems, studies point to how specific crises and educational limitations in Swedish schools are constructed with superficial cures of various viable technology and business opportunities (Carlsson, 2022; Ideland et al., 2021). Digital competence and AI literacy are examples of educational-political solutions constituted by policy as necessary to realise sociotechnical futures (Hanell, 2018; Rahm, 2023). The implication of these studies is that whatever influence digital technology and corporate power have on education, it is not an inevitable development but the sociotechnical effect of complex economic and political processes that create the problems by suggesting their remedies. How educational futures are shaped become not only a matter of teaching and schooling.

## Datafication and platformisation

The increasing prevalence of digital platforms in everyday teaching, often associated with 'BigTech' like Google and Microsoft, has attracted sociotechnical attention as ubiquitous digital infrastructures and actions of the powerful (Decuypere et al., 2021; Perrotta, 2020). Used in everyday teaching, platforms become sociotechnical arrangements that produce, define, and turn the data of educational practice into valuable commodities, surveillance, and exploitation. For a decentralised schooling system like Sweden's, Hillman, Bergviken Rensfeldt and Ivarsson (2020) have put forth that platform consequences for teaching reach well beyond enabling interaction.

As complex data infrastructures, platforms allow for the convergence of automated teacher's work, whose labour is hidden, and pervasive datafication that can be learnt from, quantified, and be acted on (Spina, 2021). Datafication has drastically changed educational governance and how students and teachers can be known and governable in particular

ways including the ordinary tasks of teaching and schooling (Williamson, 2016, 2017). The sociotechnical arrangements become powerful by ascribing scientific claims of objectivity in data and measurement, as argued by Williamson and Piattoeva (2019) in their study of socio-emotional learning (SEL) technologies promoted by OECD's international large-scale assessment instruments. They contend that with considerable objectivity-making of SEL, students become measurable in specific ways.

There is a methodological focus in sociotechnical studies into platforms to acknowledge the barely noticeable infrastructures, design standards, and algorithms as technical architecture, i.e. a programmed *plan of action* (Vanermen et al., 2022). The computational features of platform mechanisms and design are the interfacing Application Programming Interfaces (APIs) as the connective tissue of the internet and Graphical User Interfaces (GUIs) programming the connections with screens, schoolwork, and users. With a technographic analysis of Google classroom based on platform documentation and digital architecture, Perrotta and colleagues (2021) examine what they call 'platform pedagogy'. As an 'infrastructure of pedagogy', they point to Google classroom's role in shaping pedagogic participation. Instead of teaching, teachers become engaged in effectively coordinating tasks that the platform introduces into teaching. The authors detect a benevolent façade of Google classroom that is misaligned with its underpinning algorithmic surveillance, from which a 'reverse pedagogy' can emanate of service providers learning from users but not the other way around.

In relation to digital platforms, studies have also illustrated how they produce 'pedagogical authority' when embedded in assessment, instructions, and organising teaching. Teaching and the teaching profession is thereby regulated by distinct platformed relations and (de)professionalisation (Hartong & Decuypere, 2023; Perrotta, 2023). Subsequently, research into the sociotechnical effects of platforms across education sectors stresses a *platformisation* of education that, far from neutrally supporting, alters and streamlines the possibilities and functions of education (Decuypere et al., 2021; Decuypere & Landri, 2020; Dijck & Poell, 2018; Hillman et al., 2020). However, mixed in with the platform issues that platformisation captures is also the unpredictability of digital platforms in everyday teaching. This is recognised in this body of research by recent questions on how to keep the critical edge without opposing digital agendas on one side with situated teaching practices on the other, for example by privileging *a*

*platform gaze* from above onto teaching practices (Perrotta & Pangrazio, 2023).

## Science and technology studies (STS)

Influences from the interdisciplinary field of STS (Bijker et al., 1987; Bijker & Law, 1992) can be found in both sociotechnical and sociomaterial studies of digital technology in teaching. STS traditions have shown with a variety of poststructuralist approaches, as well as drawing on ANT, how sociotechnical systems and innovations are politically productive in different ways. As outlined above, these insights have helped sociotechnical systems, standards, and infrastructures become objects of research in their own right also in education research and not only as neutral means for education (Gorur et al., 2019).

Critical studies of education and technology have increasingly picked up on sociotechnical work in STS as inspiration for taking on digital education as an object of critique (Selwyn, 2024). It is regularly done in affinity with STS-related scholarship, for example with platform studies to interrogate the *politics of platforms* (Gillespie, 2010) and platformisation in education (Nichols & Garcia, 2022; Ramiel & Fisher, 2023). Another example is data justice, algorithmic systems, and public pedagogy (Swist et al., 2023). Furthermore, the orientation in STS to trace connections across disciplinary boundaries of technology, politics, and geology have influenced critical studies of education and technology to consider planetary and ecological effects of digital technology in education (Macgilchrist, 2021). On the prevalence of digital technology, Piattoeva (2021) comments that both the everyday of school and the governance of education systems become complicit in planetary damage. A compliance facilitated by the sharp division of 'society' and 'nature', she argues.

For sociomaterial approaches to digital technology and teaching, ANT is a theoretical strand from the wider field of STS that allow for sociomaterial methods and engagement with education practice (Edwards & Fenwick, 2015; Fenwick & Landri, 2012). Specifically, ANT's *relational materialist ontology* (Law & Mol, 1995) allows for relational posthumanist thinking in analytic engagements with digital technology in education practice. STS echo in ANT's critical emphasis on the research approach itself as non-neutral means of ordering and performing educational worlds, rather than representing the world from a distance (Decuypere, 2019; Decuypere & Simons, 2016; Landri & Gorur, 2022). I relate to sociomaterial studies in the following section.

# Teaching performed of sociomaterial relations

Sociomaterialist studies are coordinated around a relational materialist ontology in which a range of different labels circulate with close relation to ANT, such as posthumanism (e.g. Barad, 2007) and feminist materialisms (e.g. Haraway, 2008). They all address in a similar manner questions concerning everyday human-non-human entanglements and their world-making capacity. Although few studies in education write under the heading of relational materialism, and sociomateriality is more frequent, the approach has nonetheless increasingly been taken up to explore the material/ontological turn for education and knowledge production (Bodén et al., 2019; Fenwick & Edwards, 2019; Lenz Taguchi, 2011; Zembylas, 2017).

In education research, posthumanist orientations have empirically explored a wide range of practices, such as, early childhood education (Hultman & Lenz Taguchi, 2010; Lenz Taguchi, 2009), policy (Landri, 2015; Mulcahy, 2016), and higher education (Gourlay, 2021; Taylor & Bayley, 2019). Following Verran's (1999) classic ANT study on teaching in Nigerian classrooms, a relational materialist ontology informs studies of teaching to challenge established notions of the teacher as the agentic subject of teaching. Another commonsensical aspect of teaching that is challenged is that it starts in the mind. The argument is that with a post-anthropocentric stance, the heterogenous worlds of various everyday teaching practices can resurface (Buverie & Simons, 2017; Gunnarsson, 2019, 2020; Mulcahy, 2012; Mulcahy & Morrison, 2017; Röhl, 2012b, 2012a; Sjödin & Wahlström, 2022). Posthumanist sensibilities allow for recognising change in everyday teaching practices as constantly performed and that unscripted doings render 'possibilities for pushing the boundaries of what the teaching can become' (Gunnarsson, 2021a, p. 73). I am going to focus specifically on (near) teaching and technology studies that draw on ANT for its relational-materialist approach.

## The digital as sociomaterial

Specifically with attention to digital technology in education, ANT studies have emphasised the contingency of everyday practice and technology in which there are no boundaries between what is social and what is material. Thereby, successful implementations of digital technology in everyday teaching are not regarded in these studies as results of inherent technological features or whether teaching is accepting or not of the technology. Sørensen's (2009) *The materiality of learning* analyses the everyday of a primary school in Denmark and its

various patterns of relation with new and established technology. The ethnographic approach is sensitised to waning attention from students as well as exciting everyday school projects. A key point is that established technology like the blackboard and a bed-loft help the analysis of the newly implemented virtual software and computer use, and that it is necessary to overcome a fixation with 'the digital' in education research, Sørensen argues. Hembre's (2019) study of encounters with new digital devices in schools draws on the same sensitivity to non-digital materiality. For understanding significant variations of implementing digital devices, she analyses how availability of digital devices is performed of already established and distinct material practices with trolleys, elevators, and printing. These ANT studies of digital technology and everyday teaching argue for the impracticality of maintaining divisions between digital and non-digital materiality in everyday teaching practice.

Success of new technology is assumed not to rest with any one individual entity but rather regarded as a distributed effect across the heterogeneity of entities. Empirical studies have, therefore, sought to articulate the sociomaterial alliances performed of both human and material capabilities when new technology is introduced in everyday teaching and its surroundings. Showcasing this is Gorur and Dey (2021) in a study of an education platform in India and what makes it a used or not used innovation among teachers and other users. Drawing on ANT traditions, they engage with the ontological politics and mobilise a reversal of the trope 'user-friendly' to explore the ontological capacity of materiality to exert agency, with less obvious politics than human action, in reciprocal designer-system-user configurations. Enrolled as allies, users are *made friendly* to the technology. For example, the manual entering of data becomes an emotional duty for teachers to aid education reform 'even when it comes at a cost to them causing frustration, taking up time, requiring upskilling' (Gorur & Dey, 2021, p. 71). The study emphasises that in practice, data relations of trust and friendship are never settled but constantly shifting, rearranged, and subverted.

Shifting capabilities is the focus of Høvsgaard Maguire's (2019) ethnographic study of new adaptive algorithms in standardised testing that explores primary school testing situations. The development of the algorithms connects to ideas about differentiated teaching with pedagogical principles of organising teaching to meet individual student abilities rather than groups of students. '[F]or adaptivity to work adaptability is necessary', Høvsgaard Maguire (2019, p. 89) argues. What becomes stressed is how students and teachers with adaptive algorithms

become performed as *adaptable to the test* generating 'capability to respond to new and previously unknown sets of conditions'. Changes in the test technology echo in changes of teachers and students, and vice versa.

Wagener-Böck and colleagues (2023, p. 138) take on everyday automation in classrooms to 'centre the creativity, care and repair that goes into making "automation" seem to work autonomously and seamlessly in everyday, mundane settings'. They empirically study autocomplete in online searches, autocorrect in quizzes, and other mundane automation taking place in classrooms to argue that the making of automation rather unfolds as *sym-mation* to articulate made-with instead of made-independently. The study accentuates the doing *with* as a relation that shifts those involved in it. The concept has also been taken up to analyse AI technologies in classrooms (Stenliden & Sperling, 2024).

## Materiality as a blind spot

In response to recent calls for renewed repertoires of critique in critical studies of education (Gorur et al., 2024b), Landri (2024) advocates for going *back to the matter of education* by drawing on STS, ANT, and posthumanism. These calls have been heard over the last decades from sociomaterial scholarship claiming that materiality is repeatedly overlooked especially when it comes to the study of digital technologies in teaching (Bayne, 2015; Hamilton & Friesen, 2013; Sørensen, 2009; Waltz, 2006). They pinpoint *materiality* as a vital blind spot that 'digital education critique carr[ies] with it' (Selwyn, 2024, p. 53). Disregarding a wider role of things and materiality in education, Waltz argues (2006, p. 57), 'prevents the drafting a more careful articulation of their involvement'.

Likewise, Sørensen (2009) remarks that once, or when, a technology fails to fulfil its promises, it tends to fall out of what is interesting and meaningful for education and technology research. It manifests, she argues, a persistent neglect and erasure of materiality in education that prevents how insights to teaching and other everyday educational practices with technology can be re-generated. Sørensen links the, at the time, lack of research engagement with mundane materiality with a kind of humanist 'blindness' to how mundane materials, such as blackboards and online avatars, are productive, agentic, and performative of education in many more ways than what a particular implementation of

technology predicts. In the following, I address various studies into the vulnerabilities of everyday teaching practice.

# Repairing technology and teaching in vulnerable relations

Research has in different ways highlighted that there are vulnerabilities to everyday teaching and technology and how to address them. These studies are informed by care ethics (Noddings, 2012), feminist ANT (Mol, 2008; Puig de la Bellacasa, 2017), and some can be considered broadly as maintenance studies (Denis & Pontille, 2023). First, I consider care in teaching and technology and then move into research of breakdown and repair in education.

## Care in teaching

Within teaching research, there are different approaches to the notion of care especially when technology is concerned and how they acknowledge vulnerabilities. Scholars inquiring online pedagogy of care in higher education have taken inspiration from Nodding's (2012) feminist ethics of care as the central human relation necessary for teaching. Within this notion, care is exercised in humans and the caring relation is vulnerable to technologies. Taking technology to be in a competing relation to care, studies have engaged with how introductions of digital and specifically online technology with cameras and isolation can rob teaching of its crucial caring relation towards students and diminish the sense of connection (Adams & Rose, 2014; Burke & Larmar, 2021; Dadvand & Cuervo, 2020). Failure to care caused by intrusive digital technology on academic integrity has also been highlighted during the Covid-19 pandemic (Henry & Oliver, 2022). With a pandemic backdrop and as counter-view of uncaring neo-liberal educational institutions, Gravett, Taylor, and Fairchild (2021) put forth *pedagogies of mattering*. They argue for taking into account bodies and materialities in thinking about how teaching is impacted. By setting their analysis on care in the student-teacher relationship, the digital technology becomes a challenger of care in physical isolation.

Rather than taking a care approach in which technology is potentially causing breakages in human relations, another notion of care recognises vulnerability as a specific condition of life that includes technology and other non-human agents. This is found in teaching research that takes its cues on care from feminist ANT (Mol, 2008; Mol et al., 2010; Puig de la

Bellacasa, 2017). These ideas stress care as relational everyday practice. For example, doing the mundane work of care that our (vulnerable) lives depend on relies on complex technology and infrastructure, such as eating and washing our hands. It acknowledges that care embeds technology and generates livable worlds. Within these ideas, care in teaching is not tied to a human disposition, such as a caring teacher or confined to the teacher-student relationship, but emphasised as shifting and moving matter that overcomes captures of good or bad (Gunnarsson, 2022). This notion of care is taken up by education scholars as non-innocent aspects of teaching situations, for example children-animal relations in primary schools (Hohti & Tammi, 2019) and schools' promotion of young people's health (Gunnarsson, 2018). These studies foreground that the relations of education and care interfere with life and feed educational practices with ethical issues. Since education is tasked with the care of students and the fostering of a generation of young people, care studies emphasise the responsibility for their becomings (Bozalek et al., 2021). As the Covid-19 pandemic interfered with life, care practices became amplified (Lindén & Lydahl, 2021).

Drawing on the feminist ANT proposal of *Matters of care* by Puig de la Bellacasa (2017), Zakharova and Jarke (2022) suggest *Educational technologies as matters of care* as an account of relationality that includes bodily practice and distributed delegations of both people and things. With a case study in Germany, they explore how different modes of care become produced with the School Information System (SIS). As an educational technology, care work is required for SIS 'to maintain, continue, and repair their datafied schools as places of care' (Zakharova & Jarke, 2022, p. 96). The analysis situates digital technology as part of schools' local care arrangements and acknowledges the interdependent and shifting responsibilities of care and data.

## Maintenance and breakdown

The ANT notion to take breakdowns as vital empirical events has been taken up for exploring everyday educational practice (Moberg, 2017). Specifically for examining everyday practices with digital technology, Alirezabeigi, Masschelein, and Decuypere (2020) use breakdowns for investigating digital doings and smartphones in secondary school classrooms in Belgium. They note that there is limited research on what the presence of digital devices implies for everyday classroom activities. With attention to 'silent doings' beyond governance and evaluation, unexpected breakdowns during sociomaterial ethnography put ideas of seamlessness under scrutiny and thereby highlight ordinary patterns of

digital doings. One of the key situations is what the authors call a 'worldly' breakdown during a terrorist attack in the local city causing a rush of notifications in the classroom. Drawing on ANT traditions about *scripts*, the analysis demonstrates how student laptops perform both as an educational object, in line with the teacher's lesson script, and as a window to the ongoing events of the world. The terrorist attack becomes a moment in which scripts surface as students and citizens shift with each other in the breakdown. The authors conclude in a discussion on how silent doings of devices demonstrate that digital actors are indiscernible from the *schoolish* milieu.

Alongside breakdowns, innovation has played a key role in the study of technology and society within STS, including ANT-oriented studies, as moments when otherwise black boxes can be opened and become traceable. Recently however, the innovation centrism in STS scholarship has been challenged by a turn to maintenance as a vital and overlooked everyday relation of technology and society (Denis & Pontille, 2023; Vinsel & Russell, 2020). Exploring how technology is maintained in mundane 'form-keeping' practices brings into light other issues than those mobilised by innovation as fundamental narrative elements, e.g. change, adoption, and success or failure. By directing attention to a wide spectrum of material fragility, origin stories of technology become less dominant for understanding its relations to everyday practice (Russell & Vinsel, 2018).

As an area of STS research, maintenance studies address the very ordinary care practices of material things that are constantly taking place before and beyond breakdown (Denis, 2020). Critical studies of education and technology research has explored the role of repair and maintenance for pedagogic and material care practice. For example, Rosner and Ames (2014) present a case study of One Laptop Per Child in Paraguay where the distributed laptops were designed to be easily repaired. However, the everyday wear and tear had not been predicted and resources were scarce. Vandenabeele and Decuypere (2022) explore what they call 'minor public pedagogy' of repair cafés and broken everyday objects and in doing so expand on what educational practices with technology can be beyond an idea of singular use.

Albeit not primarily concerned with maintenance, Bergviken Rensfeldt and Hillman (2023) explore local platforms and effects on teachers' digital work and labour at four schools in Sweden. Combining STS with critical studies of education and technology, the study takes a starting point in technical infrastructures as partially working (and not working).

Close examinations into schools' data practices highlight the everyday labour and attention required and offer a relational take in which teachers' everyday work make platforming infrastructures work which, in turn, regulate teachers' work. The ethnographic fieldwork focuses on interruptions and repair situations in which distrust and repair effect extended workdays and missing attendance data. They conclude that platform work and routine changes become normalised as expected malfunctions in teacher work.

What becomes foregrounded in this research is how nothing 'on its own' can be considered durable. Scholarships of care and repair draw attention to the work involved for any everyday relations to run smoothly. This includes care as everyday material doings in teaching and breakdown and repair as everyday encounters with technology and education.

# Concluding remarks: a critical and creative approach

What this outline of related research acknowledges is that there is a variety of concerns with the rise of digital technology in everyday teaching. Those concerns vary with how technology is relationally figured with everyday teaching. I have addressed them broadly as *means*, as *regulative*, as *performative*, as *repaired*. By addressing them this way, different implications are emphasised for how problems become articulated and not, including for everyday teaching during the Covid-19 pandemic. To conclude this chapter, I will briefly summarise and discuss the outlined research as very broadly *critical* and *relational* to highlight the relevance to the approach taken in this thesis.

I want to start by drawing attention to how both research into digital technology as *means* and research addressing it as *regulative* can be considered to be critical. Yet, they sharply differ in the direction of the critique in relation to digital technology. A key question for assessing digital technology as means is, 'is it working or not?'. The outcome and *ends* are critically the changes in everyday teaching considered to be either beneficial to education or disproving claims of digital efficiency and hype. Claims have been made that everyday teaching is somewhat slow or mostly untouched by the influx of technology. As outlined, there is a tendency to take *use* of technology as the dominating principal and most reasonable coordinate of everyday teaching and digital technology; how much technology is used and not, if used in correct ways, or if use

should be improved or prevented. With the emphasis on use, the perspective on digital technology is largely uncritical, as neutral *means* and instruments.

The notion of neutral technology is in stark contrast to critical studies of education and technology. This field of research takes 'the digital' to be conceptually flawed and 'digital education' as its object of critique. Whether 'technology is working or not' is largely disregarded and matters become drastically wider than merely *use*. The critical take follows from the emphasis on technology as non-neutrally constructed with defining, disciplining, and governing effects on teaching for example. The technology industry figures prominently under scrutiny. However, less attention is given to what co-existence with digital technology can be for teaching. As Selwyn (2024) notes, why some digital technologies work for some people sometimes, i.e. how the digital becomes *means*, is a blind spot in this critical strand of research. In some respects, issues of digital agendas and sociotechnical systems overshadow empirical attention to how everyday education practices may alter those agendas and technologies. Regularly but not exclusively, digital technology becomes regarded as constructed at some point and then fairly stable and faithful to that (non-neutral) design.

The emphasis on the sociocultural, social construction, and discourses in critical education research put core matters of technology and education to be constituted in language, as argued by relational materialist scholarship (e.g. Lenz Taguchi, 2011). Relational researchers stress the inclusion of materiality in the *performative* relations of everyday teaching. It sets up digital technology as a thoroughly more unstable educational arrangement. The constant reciprocal exchange *of*, rather than 'between', the social and material is where and how digital technology constantly *become*. It is an open potential in which digital technology, humans, and teaching collectively can become more than they are supposed to. Relational strands of research direct attention to those relational effects. The mundane and digital is thereby invited as something never settled as one given thing but as becoming. Furthermore, paying attention to material relations of digital technology stresses vulnerabilities, care, and *repair*. Moreover, work on material care articulates that vulnerabilities, interruptions, and breakdowns are more of a condition than an exception to the fabric of life (Puig de la Bellacasa, 2017).

This somewhat crude generalisation into critical and relational research helps craft the position taken by this thesis. The interest is in what

relations and abilities take part in momentary teaching-technology durability and *with what effect*. Because the aim is not to identify what works and why with digital technology in everyday teaching, it is in line with much of critical studies of education and technology. But, as Selwyn (2024) asks, is it possible to be less predictable in critique of digital education? In response to that question, and to calls for new repertoires of critique in education studies (Gorur et al., 2024b; Landri, 2024; Selwyn, 2024), a relational approach with ANT offers creative potential. Just like many scholars in the field of critical studies of education and technology, I am curious about where materiality is and how critique can be extended to account for it, too.

For specifically approaching everyday teaching in Covid-19, my position is that although the framings allowed by 'emergency remote teaching' and 'online pivots' were timely and prolific, they take the spatial imaginaries of *separation* and *distance* as premises for a novel teaching phenomenon. New connections between vulnerability, intimacy, and trust contribute to everyday teaching risk being overlooked. Separation as grounds for interaction, I argue, leaves unanswered questions about teaching and technology relationality. In line with relational materialist scholarship, I argue it is necessary to include materiality to offer ways to not only 'think or imagine otherwise' but also *do* otherwise methodologically to explore what everyday teaching and digital technology becomes.

# 3. Methodology: A care-ful knowledge production

This chapter consists of two main parts that together account for the methodology of the relational materialist exploration into everyday pandemic teaching at Pine Grove. In the first part, I outline relational materialism to show how, with ANT, theory and methodology become intertwined and why they are presented here in the same chapter. The key sensibilities and theory-methodological concepts build to the articulation of *care-ful* research as the methodology that is put to work on everyday pandemic teaching. In the second part, I foreground the empirical engagements with Pine Grove upper secondary school and how ethnography, fieldwork, analysis, and ethical considerations become informed by a care-ful methodology.

## Producing knowledge with Actor-Network Theory

ANT comes from the so-called *laboratory studies* in STS in which Bruno Latour and others took ethnographic methods to study the practices in science laboratories that make knowledge about the world (Latour & Woolgar, 1979). The theoretical influences are poststructuralist (e.g. Foucault, 1984), and feminist materialist (Haraway, 1988, 1991), and the methodological inspiration to empirically follow ordinary practices have roots in ethnomethodology (Garfinkel, 1967/1984). As mentioned in the introduction, ANT is not strictly speaking a theory since it does not offer explanatory frameworks but instead it makes available a theoretical repertoire of sensibilities and resources for undertaking empirical study. The strength of ANT lies in its sensitivity to empirical specificity and not in predictability and rule-following, as Mol (2010) argues. It emphasises that each ANT study in education, and elsewhere, is open to bend and inflect the available intellectual resources in novel ways (Fenwick & Edwards, 2019). And it becomes central to account for how ANT is put to work specifically for each study, including this present thesis.

### Epistemology, ontology, methodology

With relational materialist assumptions, ANT holds that reality's richness, elusiveness, and flux '*necessarily exceed our capacity to know*' it (Law, 2004, p. 6 emphasis in original). So how, then, do we come to know reality and what is real? In a relational materialist ontology, objects and what is real are not the given starting points but effects of

their material and semiotic relations. Law and Mol specify why they speak of relational materialism:

> 'Objects, entities, actors, processes, all are semiotic effects: network nodes are sets of relations; or they are sets of relations between relations. Press the logic one step further: materials are interactively constituted; outside their interaction they have no existence, no reality'. (Law & Mol, 1995, p. 277 underlined in original)

A relational materialist ontology puts forth that existence (being) is to be related and that the relatedness crucially involves materiality and not only language. Subsequently, materiality is constituted in the webs of relation they form a part of. It follows in this assumption that reality is not independent, anterior, prior, or of a singular kind to the relations it is constituted of (Law, 2004). Drawing on Butler's (1990) notion of performativity, Mol (2002) suggests that objects and reality are performed in mundane practices. Her notion of *performativity* is a simultaneous and reciprocal two-way relation of enactment and reality. In other words, in a mutual relation, practices enact realities and vice versa so that when practices change, reality changes. Constantly and temporarily. Mol's (2002) proposal articulates practices as the mobilisers of knowledge by way of their performing of realities.

Research is thereby a very powerful set of practices. Because reality does not precede research practices, an important recognition in relational materialism is that research practices become part of performing the realities they explore, and measure, and so on. As an ontological assumption, relational materialism acknowledges that knowing (epistemology) cannot be privileged over being/becoming (ontology). The reorientation to materiality puts forth the two practices of knowing and of being as entangled and situates the approach in the ontological and material turn (Mol, 2014; Zembylas, 2017). What materiality becomes, or can do, is thereby not given in inherent qualities but a relational effect. This is stressed in the principle of symmetry, that humans, technology, or any entity, are *potentially* equally influential on each other (Latour, 2005). Subsequently, what a human or material entity can do or become is not an *a priori* assumption but rather an empirical one. For doing research, a relational materialist ontology yields an analytic shift from matter and human subjectivity in themselves to a decentring onto how they *become* of their relations. This is the idea of *actor-network*, an entity, or actor, becomes simultaneously as part of networked relations of a larger arrangement that is also an

actor (Bodén et al., 2019; Law, 2004). Knowledge production is thereby not a discovery or reveal from a distance of what was until then hidden, but rather about following, connecting, and relating.

In other words, when exploring everyday pandemic teaching from within relational materialism, epistemology, ontology, and methodology become intertwined. The practice of producing knowledge about teaching at Pine Grove cannot be separated from making particular versions of this practice. ANT is thereby a methodological sensibility, a sensitizing device, to how inquiries and methods in themselves produce network relations that constitute realities (e.g. Latour, 2005; Law, 2004; Mol, 2002), including education research (e.g. Decuypere, 2019; Fenwick & Edwards, 2019; Landri, 2024).

## Concepts shaping knowledge production

Following the above account of the ontological assumptions of the thesis, I want to bring this into practice with the concepts that have emerged as crucial in the work with this thesis and how they inform and become informed.

With the relational materialist approach that ANT invites, concepts are understood as ingredients that bring knowledge into being. At the same time, they are entangled with the research questions and help to unfold the research problem of teaching-technology relationality further. The key concepts for the methodology are *practices*, *enactment*, and *events*. Mol's (2002) work has been influential to all three. Throughout this study of everyday pandemic teaching the concepts make constant appearances, and this is also where and how the concepts get their flesh. Together they make up specific possibilities for producing knowledge about everyday pandemic teaching.

In exploring everyday teaching at Pine Grove, I take teaching to be achieved *of*, not after or thanks to, a range of overlapping and entangled repetitions of *practices*. Practices are '[t]he same patterns, or more precisely, patterns that are similar recur, and they go on recurring' (Singleton & Law, 2013, p. 262). Mol (2002) emphasises the importance of practices for ethnographic work by suggesting it is *praxiographic*, as being about following and relating practices rather than people. The practices of everyday pandemic teaching that I closely study are for example the rituals with school attendance, taking care of scheduling lessons with the digital platform, knowledge and research data practices

with screenshots, and platforming practices with web cameras, assignments, and notifications.

The second and related key concept is *enactment*. Enactment highlights how reality is performative in the sense of always becoming co-constructed within relations. Again, informed by Mol's (2002, p. 41) work, realities are not given or constructed but practiced so '[i]n practice, objects are enacted'. With this notion of enactments, objects become decentred among practices and get a contested present with methodological implications. Some of these contested and elusive objects in everyday teaching are space, lessons, and Microsoft Teams. It is with this concept that I can explore how teaching becomes *enacted* as relational-materialist effects of multiple practices and at the same time acknowledge that *enactments* are mutual and two-way relations.

I also add a third concept, *events*, to the list of knowledge producing concepts. This concept is tied closely to the empirical engagements and analytic work of tracing explained in more detail below. Mol (2002, p. 25) argues that empirical events help us focus less on 'who does the doing?' since they 'are made to happen by several people and lots of things'. In attending to the everyday at Pine Grove, the specificities of empirical events have stressed the gatherings of things and relations in which capabilities become exchanged. Events are enactments of entangled entities and relations that make the event happen, rather than regarded as individualized acts (cf. Gunnarsson, 2021b). Empirical events, extraordinary and mundane, are thereby not understood as taking place independently from the researcher but as enacted simultaneously of both empirical and engaged research practices. Events become important encounters of theory and practice.

# A care-ful methodology

Rather than seeking immediate results, practicing a relational materialist ontology means to cherish a slow process of knowledge and simultaneously recognise that the empirical engagements are world-making and not innocent or objective (Law & Singleton, 2013, p. 485). This is why this thesis aligns with some of the recent writings on ANT as *care-ful* research. Before saying more on what has inspired this thinking, I want to emphasise the care-ful methodology for two reasons. Firstly, a care-ful methodology is adapted to how this study is concerned with overlooked materiality in teaching-technology relationality. Secondly, by

foregrounding it as a theory-methodological notion it offers an escape from the oppositional thinking of applying theory to empirical practice.

Recently, care-ful research has been articulated by Law and colleagues Singleton and Lin to further decentre some of the problematics of ANT terminology in favour of its methodological sensibilities (Law, 2004, 2022; Law & Lin, 2020; Law & Singleton, 2013; see also Mewes & Lippert, 2024). The problematics with ANT have been highlighted by feminist STS scholars as being too network-oriented and limited to elite technical projects that systematically overlook non-standard experiences (e.g. Singleton & Michael, 1993; Star, 1990; Strathern, 1996; Wajcman, 2000). Drawing on this critique, care-ful research furthermore picks up on *care* as an ANT-informed concept specifically with the contributions by Mol (2008) and Puig de la Bellacasa (2017). Mol's (2008) *The logic of care* foregrounds vulnerability not as a deviant state of normality or stability. What it brings to methodology is that 'gathering knowledge is not a matter of providing better maps *of* reality, but of crafting more bearable ways of living with, or *in*, reality' (Mol, 2008, p. 46 emphasis in original). This poses a critical and creative task for the knowledge production of this thesis to also give strength to care in everyday pandemic teaching (cf. Mol et al., 2010).

Following this reasoning, Puig de la Bellacasa (2017) suggests *matters of care* as an expanded feminist addition to matters of concern (Latour, 2004b). She proposes that articulating research problems is more than a matter of concern; it also becomes a gathering of trouble, worry, and care that, importantly, effects how researchers account for the life of things. Law and Singleton (2013, p. 488) articulate care-ful research as sensitised to ethnographic surprise and 'laying research open to the uncertainties of the world' (cf. Haraway, 1991). Law and Lien (2020, pp. 8–9) put forth that 'the sensibility is one of educated awe'. For the field of education, a care-ful methodology offers an alternative thinking to 'design', which is relevant to both research methods and teaching practices. A care-ful methodology becomes a way of tending to and care for how divisions become made of research practices (Mörtsell & Gunnarsson, 2023).

As noted by Decuypere (2019) and Fenwick and Landri (2012), a pitfall with ANT in education research has been to merely *tell that* educational practices like teaching are enacted by heterogeneous actors in webs of relations without offering the empirical accounts to *show how* the social and material achieve this relational heterogeneity and with what effects. The pitfall highlights specifically for this thesis that articulating a care-

ful methodology relies on enacting the double movement that ontology comprises: (i) the theoretical assumptions about educational realities based on relational materialism, as outlined above, and (ii) the empirical practices and events of educational realities, enacted in the everyday at Pine Grove (cf. Marres, 2013; Zembylas, 2017). As concisely summarised by Franklin (2023, p. 25) on the gesture of this methodology, 'Latour calls on us to study carefully the world we find, not a world defined'. I turn now to the empirical engagement with Pine Grove for the remainder of this chapter.

# Empirical engagements

This part of the methodology chapter recounts the empirical work with Pine Grove. First, access and the fieldwork are presented as well as the ways I engaged with the participants and materials of the study, summarised in an overview (table 1). I also account for the entrances to each included study and demonstrate the analytic method. The final part of the chapter lays out the ethical considerations of fieldwork with a care-ful methodology.

## The Covid-19 pandemic and fieldwork

In order to explore everyday pandemic teaching, the thesis has followed practices of everyday teaching during periods of pandemic restrictions at Pine Grove, a fictional name of an upper secondary school in a small Swedish town. The ethnographic work allows for a close following and detailed examination of practices, events and relations that take into account the textures of the everyday central to a care-ful methodology and the research problem (Law, 2004, 2022; Law & Lin, 2020; Law & Singleton, 2013).

Since the objective with the ethnography in this thesis is not to compare or make generalisations, Pine Grove was not selected for specific reasons other than it would be possible to visit the school for the duration of the ethnographic work. This practical aspect of access, however, was severely hampered by pandemic restrictions. From a previous visit to the school, I had confirmed that Pine Grove provided teachers and students with personal computers, as most upper secondary schools in Sweden do (Skolverket, 2022). Programs in preparation of higher education were selected but with the pandemic adjustments to the entire thesis projects, this initial aspect of the project was dropped. Nevertheless, it accounts for the selection of these programs.

Hammersley and Atkinson (2007, p. 49) describe gatekeepers and sponsors of ethnographic studies. My initial contact was with one teacher I was told worked at the school by someone I knew. I also asked the school principal for permission, detailed below. I consider the school principal a sponsor, by informing the staff that my project would take place and it was up to teachers and others whether they wanted to participate should I approach them about it. The teacher I initially approached forwarded my information and I could approach other teachers. At one point, the teacher was concerned I would only get teachers enthusiastic about digital technology to participate and what could help avoid that bias. My response was that finding teachers who were likely to stay on the following semester was more important. However, the teacher's comment shows a gatekeeping function. Furthermore, with the restricted movements of the pandemic that soon followed, the project relied even more on this initial selection process.

Below, I account for how the field was accessed. With it, I want to draw attention to how the empirical engagements with Pine Grove followed the Covid-19 pandemic and in turn was given shape by it. Furthermore, although the research methods in this thesis are ethnographic, or *praxiographic* with emphasis on following practices (Mol, 2002), the care-ful methodology includes a couple of shifts to concepts with long traditions in qualitative research practice. The first one is the status of the *field* in ethnographic research practice, discussed below. The second one is participant observation and data collection that I theorise as *empirical engagements* (Bodén, 2016; Gunnarsson & Bodén, 2021). The latter is discussed after the following story about field access and 'being there'.

*Accessing a site on the move and 'being there'*

About a week after my initial contact with the school principal at Pine Grove via e-mail asking permission to visit for fieldwork, the Covid-19 pandemic of 2020 was in full operation. To my surprise and great relief, the school principal fairly quickly got back and gave permission but also raised the issue that 'studying the classrooms might be difficult right now' and did I have any ideas of how to modify the research to comply with the new pandemic regulations. The pandemic outbreak forced a reorientation of the thesis, as with most things of work, life, and school in 2020. To get a head start despite suspended formal access, I considered interviews in line with Moberg's (2017) ANT approach to paying attention to how interruptions happen. Subsequently, online interviews were made with teachers as an approximation of visiting classroom teaching at Pine Grove in May 2020 (see Appendix A and B).

When the new school year started after the summer, the teachers at Pine Grove did not expect another closure nor a second or third wave of the pandemic. It seems fair to say that no-one did. Even though classes had returned to school after the summer break, there were restrictions in place and during the days I spent in classrooms, crowded corridors, and small office spaces, our bodies needed to be kept at a regulated distance at all times, specifically the outside visitor's body. It was difficult to work out how to come up close to screens-in-teaching and even talking and listening to conversations became more or less impossible when maintaining an appropriate distance. Nevertheless, the visits allowed me to get to know the students and inform them about the work I was doing. In working out how to proceed empirically, I stayed in touch with three of the teachers over the phone. This gave the opportunity to ask what they thought about my joining the courses with a guest account in case the school were to close again. The teachers were surprised to see a second school closure in December 2020. With a guest account, I joined eight courses on Microsoft Teams taught by three of the interviewed teachers to a total of 63 students I had met during visits. I stayed on with these courses to the end of the school year in June 2021. In that time, I followed online calls, interviewed students and other members of staff, and visited the school when the pandemic circumstances allowed for it. Four of the teachers interviewed in May 2020 were interviewed a second time in June 2021, this time as 'walk throughs' with screen-sharing, which concluded my fieldwork.

In writing up the above arrival and exit story about field access as a singular coherent account (Hammersley & Atkinson, 2007), many cracks, unanswered e-mails, doubts and other textures become left out that are not as easily told about field access but nonetheless part of enacting a site on the move (Burrell, 2017; Gunnarsson & Bodén, 2021). It shows how the pandemic becomes, within this thesis, not an outside context but enacted of the local field-object.

In addition to uncertain pandemic restrictions, digital technology is another important field aspect of ethnography to consider. A classical understanding of the ethnographic field site is the tenet of 'being there'. With regards to the classical localities of education ethnography, specifically the status of the classrooms, 'being there' has for more than a decade been challenging for the study of education and digital technology (Landri, 2013). In digital ethnography, for example, 'being there' is destabilised in favour of a field site 'performed by connections and disconnections' (Beaulieu, 2017; de Seta, 2020, p. 84).

Among pandemic uncertainty and digital (dis)connections, what becomes important to acknowledge with a care-ful methodology is that the ethnographic movements I have employed to access, follow, and subsequently trace also produce the field-object of everyday pandemic teaching and researcher (Gunnarsson & Bodén, 2021). Mol (2021, p. 132) articulates that her field becomes shaped like a *trail*, rather than a region or 'field' (cf. Latour, 2017). The empirical engagements have followed everyday pandemic teaching across Microsoft Teams, PowerPoints, and YouTube etc. I have chatted and hung around with staff and students in classrooms, the school library, and small office spaces. The specific ethnographic movements thereby trouble and resist the category of 'online ethnography' (cf. de Seta, 2020).

## Engagements in observations and interviews

The thesis' ethnographic methods can very broadly be divided into observations and interviews although they are dependent on each other (table 1). Before each online call, the empirical engagement started with the course Team feed, for example, noticing the calendar booking, headlines, and sometimes other information. To notify which online calls I would attend, I agreed with the teachers to 'like' the scheduled post for that call. Notes were taken during the calls and when clicking my way to other materials implicated in teaching, such as assignments files or online links and materials. I regard the interviews as ethnographic by which I mean that they are moments to ask about something going on and follow up on brief discussions and events from before (see Mörtsell, 2024). As approximations to talking about things as they happen, the interviews became more 'interview-like' by setting them up as online interviews. The first interviews in May 2020 were in that regard different as they were done without any previous visits.

When relational materialism has been described as a sensitizing device for education research practice, it has come with the implication that data analysis is an encounter of theory and data in which they translate each other (Bodén et al., 2019; Decuypere, 2019; Jackson & Mazzei, 2012; Mazzei, 2013). Consequently, with a care-ful methodology, I understand empirical events as vital moments of data-theory encounters. This means that interviews, observations, and hanging out, as ways to empirically engage, are guided by an understanding of interviews and language as partial and entangled rather than as together forming representational aggregates (Mazzei, 2013). For observations, it means that they are not objectively done from a distance to 'uncover' or

'find' what is hiding from the researcher but an engaged responding with the workings and intensities of the world (Gunnarsson & Bodén, 2021).

The ethnographic materials are fieldnotes of around 45,000 words, interview transcripts, posted messages, photographs, e-mails and screenshots. Upon reading and re-reading fieldnotes, more posted materials were included and excluded, which further shifted the field-object enactments. I account for these engagements further below.

***Table 1***

*Overview of fieldwork with Pine Grove upper secondary school from May 2020 to June 2021*

| | **Ethnographic fieldwork with Pine Grove** | |
|---|---|---|
| | Observations | Interviews |
| | Eight courses, three teachers, 63 students, one school management meeting | Six teachers, two other members of staff, 13 students |
| May 2020 | | Online interviews with six teachers |
| Aug 2020 | Three days of school visits with classroom observations | |
| Dec 2020-April 2021 | 41 online class calls and adjacent *Teams* observations | Hang around with teachers at the end of online calls |
| Feb 2021 | One day school visit with teaching observation | Hang around with staff and students. |
| Feb-April 2021 | School management online video call | Online interviews with two other members of staff |
| March-June 2021 | Teacher interviews with screen sharing | Online interviews with 13 students and four teachers |
| April 2021 | Four days of school visits with teaching observations | Interviews with teachers on *Teams* in practice |

## Research accounts of openings

As discussed by Law and Singleton (2013, p. 488), *ethnographic surprise* is something to be sensitive to for a care-ful methodology. What does it mean, in this thesis, to lay the research open to the world and engagingly respond? By responding to this question, I want to account for the entry points to the included studies (I-IV) and demonstrate how empirical engagements become located.

*Attendance*

Here is a vignette from a spontaneous classroom tour in May 2020, about two months into the pandemic school closures.

> As the interview finished, and I turned the recording off thinking that the very informative interview was over, the teacher did something unexpected. He asked if I wanted a tour of his classroom. He then picked up his laptop with the web camera, turned it away from himself out into the room so that it was in my view, and scanned the space in a sweeping movement from one side to the next. The familiar view of an empty and abandoned classroom filled the screen. The space was uncanny. (From fieldnotes, May 2020)

Until this moment of confrontation, the classroom had not been part of the inquiry, merely rendered an abandoned container. But the scene was not empty, there were repeated sets of chairs-on-desks and student files neatly stored away. The uncanny space is enacted of the pandemic, bodies, the teaching, the movement of the camera, the screens, and the research interview. With the spontaneous classroom tour, what matters is the becoming of an uncanny classroom space, and not primarily that the teacher does something unexpectedly, but it also makes a difference. The event is a little bit uncomfortable and the (un)familiar classroom space becomes an effect of relational enactments that include the researcher. ANT would recognise the uncanny space as a messy and indeterminate object since it slightly disrupts the assumption that objects are either known or unknown but not both at the same time unless from different perspectives (e.g. unknown to the researcher but known to the teacher). For Law and Singleton (2013), ethnographic surprises are the workings of the world that shape research practice given it is sensitive to it and cherish slowness over immediately seeking results. In other words, rather than erasing mess a care-ful methodology fosters sensibilities to mess. The enactment of space and ambiguity of the uncanny classroom allowed the research to unfold with the

uncertainties of everyday pandemic teaching at Pine Grove to find a best way forward in a care-like manner of working *on* the world (Law & Singleton, 2013). Space and attendance became an entry to the first included study (I) about 'schooling without schools' (Mörtsell, 2022a).

*Lessons*

A while into following the online class calls of the eight courses, I ran into a practical problem. What should be put down on the spreadsheet to properly organise the fieldnotes about online calls? Was each call a lesson, part of lesson, online class calls and not a lesson, or something altogether else that I engaged with? On encountering elusive objects that do not clearly fit with research methods, Law (2004, p. 14 emphasis in original) asks '[i]s our vagueness a sign of methodological failure? The answer is, perhaps, but I don't think so. Instead, I argue that (social) science should also be trying to make and know realities that are vague and indefinite *because much of the world is enacted in that way*'. Guided by this advice, lessons as elusive objects could be engaged with in new ways.

Initially, my empirical engagement with online calls and everyday teaching at Pine Grove were shaped by thoughts about innovation and innovative pedagogical practices. However, innovation-centrism of the 'new' was missing out on the ongoingness of keeping the school-aligning arrangements 'the same'. Instead of deciding, prior to analysis, on a category to index the empirical engagements with 'lessons', here was the possibility to pause and suspend the mechanistic research registration and empirically follow how 'lessons' were differently enacted and *simultaneously* maintained in periods of pandemic restrictions at Pine Grove. This was the entry to the second (II) included study (Mörtsell, 2023).

*Discarded data*

Another ambivalent encounter was with the value of empirical materials. For instance, the empirical engagements produced an overwhelming amount of 'discarded data'. There were photos, screenshots, documents, and notes that I put aside from what was important and interesting but, nonetheless, they were difficult to ignore. One way to say this is that care-ful sensibilities invoke *insensibilities*, and they need to be acknowledged as taking part in knowledge production as the performativity of research. The discarded data served as a reminder about the possibility of alternatives and that care is a selective mode of attention in research (Law & Lin, 2020).

Being confronted with a 'meaningless' screenshot as an *uneventful event* opened up for exploring how knowledge production is world-making of a more-than-digital phenomenon like everyday pandemic teaching. In other words, the researched becomes rendered in specific ways rather than other ways. What are the implications of not being able to care for everything (Puig de la Bellacasa, 2017)? These ideas about knowledge production with a care-ful methodology are elaborated on in the third (III) study (Mörtsell & Gunnarsson, 2023).

*Digital platforms*

The Microsoft Teams platform participated in everyday teaching and research in both curious and mundane ways. And at times, it was a struggle to be curious about the digital platform. The fieldnote below is from being confronted with the screen interface.

> It is clearly obvious that there are functions in Teams that make it seem perfectly 'made for' education contexts. Does it 'have everything' for distance teaching? What has been erased for it to become such a 'tidy' representation of what teaching is? *(Fieldnote December 2020)*

Uploaded course materials, assignments, and assessments, and so on seem to frame and tame teaching at the interface. The act of noticing the digital functions as 'clearly obvious' enacts them as stabilising actors on a self-evident platform. As a research event, the fieldnote renders the platform as passive, ready to be used, and it becomes naturalised to a matter of fact that suggests objectivity. Wondering if it 'has everything' further stabilises the digital platform as ubiquitous and gaining coherence in its reflection of teaching that enforces it as intrinsically good for teaching. It becomes nearly impossible to imagine that the teaching-platform relation can be anything other than self-evident. Yet, as a matter of concern and care, it becomes otherwise (Latour, 2005; Puig de la Bellacasa, 2017). The fieldnote became an entrance to *platformings* in the fourth (IV) study (Mörtsell, 2024).

## Tracing as analytic method

With this section, I want to answer the question about what it means in practice to work with a sensitizing device in analysis within a care-ful methodology. The implication of putting a relational materialist ontology to work for ethnographic description is to recalibrate the level of analysis to specificities rather than generalisations (Zembylas, 2017). By demonstrating the analytic method as specific theory-data encounters in

both interviews and observations, I also discuss how the researcher position becomes co-producing within knowledge production.

The empirical engagement of responding in data-theory encounters as analysis is often called *tracing* in ANT-inspired work. The ways analysis becomes tracing is by avoiding jumping up or into readymade explanations such as context, level, or 'different perspectives', and instead seeking to be *flat* (Latour, 2005). Tracing becomes the analytic method of putting relational materialism to work on empirical events with attention to the meticulous associations and links that disentangle relations as they become momentarily enacted and in turn relate these events with each other.

To demonstrate tracing in this study of everyday pandemic teaching, I want to draw attention to a key analytic event. Below is an excerpt from one of the early teacher interviews, in which Emma talks about 'attendance performance' (Mörtsell, 2022a). Here, it is included to lay out the analytic techniques and situate the analyst and researcher.

> In my opinion, the transition we've made is from a school where we care a lot about attendance – you have to be here, I will register your presence and you'll get your study allowance and in practice no-one who is present at every lesson will ever fail a course, because we'll help anyone who is present to make sure they don't end up failing. So, from that to a school system where everything is about performance, at least to me, I think all of us do things a bit differently. I very rarely tell students to like a post to be registered as present, but instead say that we'll have a discussion and they'll be registered, as in an 'attendance performance'. (Interview with Emma, May 2020)

In the above event, there is a casual mentioning of *care* (sv. *vi bryr oss*), and a casual offering of a novel concept 'attendance performance'. The latter plays a key role in the study of attendance practices at Pine Grove (Mörtsell, 2022a). However, the former and causal mentioning of an everyday kind of *care*, is key to the overall concern of this thesis to do with everyday pandemic teaching. What becomes important to care about and how does that generate enactments of everyday of pandemic teaching? With Emma's story, care is involved in a qualitative description of everyday doings of teaching-technology relationality, not to do with more or less care or an outright lack of care. What are the workings of the world here? The event asks of the researcher to stay open to empirical surprise (Gunnarsson & Bodén, 2021; Law & Singleton,

2013). As an analytic event, it illustrates the ethnographic/praxiographic 'enfleshening' of concepts, in this case *care*, and lay out the 'how' of the analysis with encounters of 'data', i.e., the empirical-material world, and theory (Ballestero & Winthereik, 2021; Winthereik, 2020).

> [A]s we follow how things, people and projects become what they are, we encounter concepts. These concepts are part and parcel of the empirical-material world, and if we are willing to let them work as prototypes, they can become our companions as we parse relations and detachments. (Winthereik, 2020, p. 31)

As Winthereik (2020) proposes for ethnographers, care becomes within this thesis a companion concept for analysis and noticing relationalities and tensions, in which the researcher takes part in the becomings of research(er). Tracing also involves relating care with care literature on, for instance, technology and knowledge practices (Mol, 2008; Mol et al., 2010; Puig de la Bellacasa, 2017). As a public health care measure, I learnt at Pine Grove that school closures in crucial combination with digital technology brought safety to teaching in the pandemic. At the same time, there were frustrations with the technology and its unruly entanglements with everyday teaching. So, the consistently unpredictable modes of teaching were at the same time both praised and questioned. It seemed the technology simultaneously could and could not take care of teaching practices situated in the pandemic.

The way into a tracing analysis of the expressed frustrations was not straightforward. The practicalities of doing analysis started out with the computer-assisted qualitative data analysis software NVivo. The initial coding aggregated themes of sameness across the first interviews, namely that all teachers were troubled by their students not being visibly (re)presented. It hampered teaching. By tracking a high percentage of coverage, NVivo showed undoubtedly that this was the dominating theme. However, it raised two analytical concerns. Firstly, I was puzzled as to why I needed software to tell me this, and secondly, it overemphasised difficulties when the interviews were also overflowing with creative and irregular measures to teach. That kind of specificity was smoothed over in the quest for clarity favoured by the software. On qualitative research and coding interviews, Jackson and Mazzei (2012, p. 12) argue that it takes the analysis away from data ending 'up' in generalisations at the cost of flatness. The analysis was leading towards engagements with voice, distance, discovery, and representation which contradicted the relational materialist ontology. The data analysis

software was subsequently abandoned for a tracing analysis of what the interviews did rather than what was said (Mörtsell, 2022b).

The ambivalent and affective tensions of care, teaching, and technology became a lingering sensitiser for exploring everyday pandemic teaching and a mobiliser of ethical and practical engagements with knowledge production that looks to creatively articulate other possible realities (Mörtsell & Gunnarsson, 2023). Within a care-ful methodology, this kind of oscillated tracing of theory and practice enacts knowledge production and weaves together what becomes noticed and not. It emphasizes that methods enact, and mutually is enacted of, brackets and othering (Law, 2004).

## Ethical considerations

Within a care-ful methodology, the inseparability of tracing practices and producing knowledge about teaching at Pine Grove and making particular versions of this practice, and leaving out others, becomes intertwined with responsibilities and ethics. Law and Lin elaborate on this partiality in the following way:

> The message is that the weaves we see lie somewhere between the practices we are looking at and those of our own research. But there's another way of saying this: that to educate sensibilities is also to educate what we might think of as insensibilities. Necessarily, to look well is to look selectively. It is to learn, implicitly or otherwise, what can and should be ignored. (Law & Lin, 2020, p. 10)

Ethical considerations, then, become a wider sensibility of world-making knowledge production, as discussed above, than what is proceduralised in regulatory frameworks. Here, I will first say something about ethical protocols in connection to Pine Grove and then pay more attention to the ethics of a care-ful methodology.

### *Ethical protocols*

One part of research ethics to consider is in the scope of regulatory frameworks. The study of everyday pandemic teaching was subject to review by the Swedish Ethical Review Authority in accordance with Swedish legislation (Lag (2003:460) Etikprövning av forskning som avser människor, 2003). The regulations state that any research that uses personally sensitive data is to be reviewed and vetted before any data collection can take place. Ethnographic studies of students and

teachers fall within this scope since field notes and recording of interviews register a lot of personal information about the participants, even though such information is not the objective of the study. The approved proposal furthermore included screen recordings and acknowledgements of potential privacy invasion and plans for storing the data. The adjusted empirical engagements with Pine Grove in response to the pandemic restrictions were within the ethical parameters of the original ethnography approved by the Swedish Ethical Review Agency (approval 2019-06448).

The regulatory framework also states compliance with the information requirement. I first met with the students on visits to the school at the beginning of the school year in August 2020 and introduced myself as a PhD researcher and my overall interest in digital technology and teaching. The issue with presenting an ethnographic research project is that it is largely unknown what will be found, and the information given beforehand can only go so far in its descriptions and predictions on that. Nonetheless, with the onset of the second school closure in December 2020, I re-introduced the project and more specifically the method of following online calls and the course Teams (see Appendix C). All names of students and teachers are fictional. After this information with specifics on how I wished to engage with the courses, I checked in with each student individually on the Microsoft Teams chat service for informed consent and again in specific situations such as interviews and recordings. The continuity with the same group of teachers and students allowed for establishing rapport (Beaulieu, 2017).

*Sensibilities and cuts in knowledge production*

Ethical frameworks and standards regarding vetting, consent, and confidentiality are necessary and important for any qualitative research. At the same time, they are by themselves inadequate for guaranteeing an ethical research project since with a care-ful methodology, ethics cannot be decided or settled in approved protocols beforehand. This is because ethics are not taken to be confined to any one human or point in time. Instead, ethics becomes continuously enacted moment-by-moment in knowledge production, in what is noticed and recorded, in surprises and new questions that the research(er) responds to and becomes part of (Gunnarsson & Bodén, 2021; Law & Lin, 2020). Informed by Haraway (2008, 2011) and together with these ideas about ethical entanglements with responsibility, a care-ful methodology becomes moulded with sensibilities to take on and grapple with what is easily neglected in empirical events. These sensibilities involve doing justice to research objects, relations, and texts by care-ful reading, composing, and adding.

As summarised by Bozalek and Zembylas (2023, p. 63), '[r]esponse-ability is not about conscious intent but it comes from an ontological entanglement with the other'.

As the relations that enact ethical issues cannot be controlled or predicted, they need to be acknowledged with methodological sensibilities as they emerge. Some of the recurring topics at Pine Grove were health, well-being and bodies' symptoms of Covid-19. What should the ethnographer record and not about sick bodies in everyday pandemic teaching?

> In ending the call, the teacher suddenly changes the subject and asks how the students are doing *(sv. hur mår ni?)*. The teacher had tested positive for Covid some weeks earlier unable to return to the school, but now everybody is joining from home. The teacher says to us, perhaps it is better this way – that everyone is connected to the online call on Teams – so anyone displaying symptoms of Covid can join the call. For several months into the pandemic, the school had been closed for anyone with symptoms of infection. I understand from the murmur that some have been sick and, yes, now they can join. One student abruptly asks the teacher 'what symptoms do you have?'. (Field note, December 2020)

*What symptoms do you have?* This question stopped the typing on my keyboard and produced ethical questions about how sick bodies become left out and what boundaries and (dis)connections produce a study of everyday pandemic teaching. Inspired by posthumanist theory of Barad (2007), a productive way to consider boundaries and (dis)connections is as *cuts*. For a relational materialist ontology that assumes indeterminate relations are all there is, cuts are constantly enacted and play a vital role in rendering the world knowable in temporary manifestations of matter and meanings. The field note, symptoms of Covid-19 infection, curiosity, and the interrupted typing enact a cut that produces in one and the same move (dis)connections of both separating bodies-with-symptoms and relating those bodies with ethical questions about what becomes valuable and not for knowledge production of everyday pandemic teaching. The concept of cuts helps articulate that with a care-ful methodology drawing lines and boundaries become a constant ethical matter and never a final doing at a distance (Mörtsell & Gunnarsson, 2023).

Acknowledging that the research object is shaped of cuts and exclusions gives meaning to the unanswered emails and ignored chat messages amidst informing and asking for consent to participate in this research. I am also responsible for these and how they co-produce knowledge and fieldwork. Haraway (2004, 2008) stresses research practices as boundary-making affairs that initiate responsibility. This argument has been influential to ANT scholars who also point to the intimate links between knowledge production as world-making and the responsibility for more livable worlds (Latour, 2004a; Law & Singleton, 2013; Mol, 1999).

Sharing concerns with the participants in the research is not always the case, at least not in straightforward ways. With the empirical engagements with Pine Grove, tensions were at times produced in uncomfortably being asked to give 'expert' advice on how to better teach and engage the students online. I hesitantly suggested for students to take responsibility for both talking and listening in online calls. Moreover, to be asked as a novice researcher about what my interest 'actually' was in the teaching, called out that my objective did not seem to be in (instrumentally) making things better and perhaps not helpful at all. In response to this valid question, a mumbling of sociomateriality did little to support credibility and expectations seemed to temporarily clash as they can do in ethnographic work (Hammersley & Atkinson, 2007). But in these encounters, the researcher also becomes someone who takes the experiments of what happens in the laboratory of everyday pandemic teaching seriously with power to suggest correctives and who they should be directed at. The gatherings of relations co-shape me as the researcher and the world of Pine Grove, making me 'responsible in unpredictable ways for which worlds take shape' (Haraway, 2008, p. 36).

These ideas about ethics and cuts foreground the research account itself, the story told from the research (Latour, 2005). And, as Mol (2002, p. 25) insists, '[n]o text can go everywhere'. It becomes important to recognise that the research account plays an active role in a care-ful methodology and is not understood in a linear relationship of following from preceding methods merely reflecting a passive world. Knowledge production has wordly and ethical effects.

## Validity, rigour, and researcher subjectivity

Ethical considerations are not the only requirements of sound and robust research. Swedish Research Council (2017) stresses that systematic conduct and critical analysis are other musts for valid and

reliable research. For example, showing that the methods used in the study are fit for answering the research questions and objectives build towards well-trusted research. It is also stated that imagination and originality can make up aspects of quality in research.

Within the premise of a relational materialist ontology outlined at the beginning of this chapter, the methodology is sensitive to ethnographic surprise as well as to unpredictability, rather than to rule-following. Mol (2010) remarks that whereas adaptability may in other research approaches be taken to be a sign of weakness, it is the strength of ANT. So, what about objectivity? The ontological assumption that relations are all there is leaves no available outside position for a researcher to take and from which reality can be objectively examined. As mentioned previously, Haraway's (2004, 2008) work on situated knowledges and partial perspective articulates alternatives to objectivity that take into account relational materialist ontologies. This is what Law and Lin (2020, p. 10) gesture towards when they say 'to look well is to look selectively'.

A couple of times, I have emphasised *the workings of the world* in the encounters with Pine Grove. Furthermore, I have outlined that *tracing* the workings of the world enrols, or *enacts*, the researcher in empirical engagements. Choices and decisions are made, and materials become selected and deselected. Accounting for such sensitivities lends relational materialist research trustworthiness and rigour, argue Thompson and Adams (2020). More specifically, it is a sensibility that challenges anthropocentric research methods associated with qualitative educational research. Instead, *post-qualitative* research engagements acknowledge the responsibilities of *doing* research, rather than emphasising a thinking and reflexive stance associated with humanist research traditions (Gunnarsson & Bodén, 2021; Lather & Pierre, 2013; MacLure, 2011).

# Concluding on a care-ful methodology of everyday pandemic teaching

With this chapter, I have wanted to lay out ANT's intertwined notion of theory and methodology as informed by a relational materialist ontology. ANT's relevance is as resource and methodological sensibilities to research as world-making practices. These sensibilities become operationalised with the methodological concepts of *practices*, *enactments*, and *events*, which in turn get their flesh with empirical

engagements of following and tracing the everyday teaching at Pine Grove. I have qualified the ANT-informed approach for the study of everyday pandemic teaching at Pine Grove as a care-ful methodology in which tending to (caring for) how research practices are performative becomes emphasised. The empirical engagements I have described show how the field-site-object is not understood linearly as a representation in space that is selected in advance, but rather co-produced of the empirical engagements into specific versions of everyday pandemic teaching (Gunnarsson & Bodén, 2021; Law & Lin, 2020).

# 4. Findings: Unexpected openings

With this chapter, I account for the included studies in the thesis as its findings. Haraway (1991) calls studies the unexpected openings that can make one find a larger vision from being situated somewhere in particular. Next follows an overview of the included studies (table 2). In response to the overall aim of the thesis to explore the relationality of everyday teaching and digital technology, each study (I-IV) is then summarised. To conclude the chapter, I then elaborate on how they answer the research questions, (1) how is everyday teaching with digital technology enacted in the Covid-19 pandemic? And (2) what are the implications for knowledge production when everyday teaching with digital technology is explored with relational materialism?

## *Table 2*

*Overview of included studies*

| Included study | Object of study | Empirical materials | Analytic focus |
|---|---|---|---|
| I. *Sociomaterial explorations of attendance practices in 'schooling without schools'* | How are devices of repetition enacted in everyday teaching to make school closures *attendable*? | Online interviews with teachers at Pine Grove. May 2020. | Tracing how attendance enters and embeds the everyday teaching in different devices of school closure attendance. |
| II. *Lesson enactments: Maintenance in everyday educational practice* | How are lessons enacted of everyday teaching to maintain educational order at the intersection of routine and breakdown? | Ethnographic field work with Pine Grove mainly online. December 2020 – April 2021. | Situations of maintenance as material care in everyday pandemic teaching. |
| III. *Caring Cuts: Unfolding methodological sensibilities in researching postdigital worlds* | How do postdigital worlds become researchable with educational post-approaches? | Empirical materials from research blunders and discarded data from work with digital technology. | Modest interruptions and uneventful events in digital education research practice. |
| IV. *Mutual capabilities: digital platforms in unpredictable pedagogical encounters* | What work do digital platforms do with everyday teaching in the pandemic? | Screen-sharing interviews with teachers and focus group interviews with students at Pine Grove. March – June 2021. | Tracing how attachments and tensions perform specific *platforming* assemblages. |

# Summaries of included articles

This section gives a summary of each included article (I-IV) before moving on to how they respond to the research questions.

## I. Sociomaterial explorations of attendance practices in 'schooling without schools'

In this study I ask what strategies become enacted in the teaching practices during school closure to make school closure 'attendable'. To answer this question, the focus is on how school attendance within everyday pandemic teaching enacts ambiguities of 'right place and time'. In the teacher interviews, attendance became a tracer of the complex practicalities to do with everyday pandemic teaching. There were numerous articulations of strategies and tinkering with taking roll calls, dealing with late arrivals, and figuring out what can count for attendance and not when the classroom becomes left out of ordinary school attendance arrangements.

I approach the attendance practices at Pine Grove with Singleton and Law's (2013) definition of device, which recognises that it must not necessarily be machine-like. Instead, their definition attends to sociomaterial heterogeneity in 'a set of implicit and explicit strategies that work more or less repetitively to order, sort, define and arrange a heterogeneous but relatively discrete social and material field' (Singleton & Law, 2013, p. 26). With this understanding of devices, I explore the sets of strategies that achieve attendability at Pine Grove. Another inspiration from Singleton and Law (2013) to do with devices' repetitive mechanism that I put to work with attendance is that rituals become mechanisms of repetition.

The study traces attendability across three different but crucially related sets of strategies, or *attendability devices*. One set of strategies is the roll call. It evokes the sensing of a ritual, a mechanism of repetition in practices. Roll-calling *are you here?,* time, the online call and registration software co-produce attendability and late arrivals. The second set of strategy is what the teacher Emma calls *attendance performance*. Within this attendability device, teaching becomes closely intertwined with monitoring attendance, which is intensified at Pine Grove. How students perform in lessons and homework and submitting a rush of micro-tasks enact novel links with attendance and late arrivals become impossible. With the third attendability device, the relations shift yet again, and I call this set of mundane and debated strategies

'click like'. This third set of strategies emerge in tension with the other two and it becomes highly uncertain and controversial whether a 'like' on a post in Teams counts as attendance. My interest in 'click like' is that it nevertheless is practiced albeit with some hesitation from teachers.

I put to work Singleton and Law's (2013) ideas about *rituals of the mundane* to articulate that 'click like' in relation to other attendability devices for everyday pandemic teaching enacts a breathing space of momentary suspension that alleviates stress and pause the exposure of the online call and the rush of micro-tasks. Furthermore, enacted of ignorance and indifference, 'click like' becomes a ritual move that disconnects the efforts of students. Ignoring what students do, where they are, and how well they perform rubs up against the close monitoring of attendance in other attendability devices. The 'click like' enactment brings to the fore that a disciplining monitoring is more or less expendable to this attendability device. Contrasting and relating the three sets of strategies for attendability help me articulate that there are devices that actively obscure the notion that not actively engaging in schoolwork is also a reality of educational practice. This version of reality is however what 'click like' as a ritual of the mundane generates.

By studying attendance practices as devices, I make the point that registration of students is not a neutral practice that merely represents the number and names of attending students. The study also demonstrates that to understand the talk and tinkering with attendance as other to teaching misses the point of how everyday pandemic teaching becomes enacted. Teaching is at times the qualifier of attendance. Empirical events at Pine Grove enacted presence and attendability as multiple. By this I mean that in the classroom (here) always include somewhere else (there). Late arrival is sometimes part of the enacted attendability but not always possible, such as with the contested attendability device that I call 'click like'. Attendability becomes the relational effect of and multiple spaces simultaneous both contained and distributed.

## II. Lesson enactments: maintenance in everyday educational practice

Lessons are educational objects often taken for granted as containers of everyday teaching. In this study, however, I aim to challenge this notion by exploring the lessons at Pine Grove as holding educational order together as enactments of everyday pandemic teaching. The lessons I followed were constantly negotiated, elusive, and liable to change. They

were lively enactments of the everyday at the intersection of routine and breakdown. How are lessons enacted and brought into being in the everyday of teaching and pandemic here?

Empirically and theoretically, the study explores the material care practice in everyday teaching and the care for things in education, here lessons and technology, as *maintenance* (e.g. Denis & Pontille, 2015, 2023). Multiplicity and performativity become vital theoretical concepts for how maintenance bundles multiple orders and take breakdowns and disorder into account. The study works on a methodology of exploring two situations of maintenance in which the ordering of lessons becomes at stake. This means that lessons become caught up in empirical events right at the intersection of routine and breakdown. I trace these relations in, first, an empirical event about connecting to an online class call for a specific lesson even though it is not planned, and then, the scheduling of lessons that teachers do in Microsoft Teams. One of the questions I deploy for tracing is what mechanisms of maintenance can be identified in these events.

With the first event, I trace mechanisms of replication and improvisation in an online call relating to the missing classroom. Whereas replication and replacements have been accused of being non-innovative modes of digital education, maintenance studies make possible the re-inventive character of such practices that re-assemble parts and recognise that improvisations in everyday pandemic teaching open up for what an online class call can be. The second event of scheduling lessons becomes a maintenance situation of ordering what to do and when. Importantly, it also maintains the functioning of the Teams feed and the online call by allowing with each created 'meeting' post a join-meeting button. What becomes performed in the encounter of meeting and lesson is a maintained everyday pandemic teaching in which lessons gain capacity to adapt and change so that the everyday can hold together (cf. Mol, 2010). Improvisations, replication, and adaptability become mechanisms of maintenance that address lessons as precarious achievements and repeated and performative doings. My argument is that maintenance is not confounded by the simultaneous change and sameness of everyday pandemic teaching but instead is rather comfortable with it (Mörtsell, 2023).

Bringing maintenance to education stages an intervention in the erased work overshadowed by the user-instrument logic by adding neglected descriptions (cf. Puig de la Bellacasa, 2017) of the intricate and reciprocal ways that teaching and digital technology engage. Mol et al.

(2010) argue that theorizing and researching the local specificities and often unnoticed details of care practices, such as maintenance, make them stronger in the face of erasure. The study foregrounds that use relations are not singular or unidirectional but multiple. The multiplicity allows for co-existence by, firstly, undoing the user-used binary, and, secondly, by adding maintenance to use relations and as a co-ordinating device in everyday teaching. This kind of enrichment and addition is one of the points of a relational materialist approach (Mol, 2010, 2021).

## III. Caring Cuts: unfolding methodological sensibilities in researching postdigital worlds

The concern of this article is the making of researchable worlds and how worlds become researchable when we concern ourselves with 'the digital'. The study is situated with postdigital educational research, which we understand as sociomaterially addressing the more-than-digital of educational phenomena (Rich & Lupton, 2022). The methodological space for interrogating the more-than-digital overlaps with several feminist post-approaches in educational research; post-qualitative research, posthumanist educational research. Within these approaches, we specifically address feminist methodological sensibilities (Barad, 2007; Mol, 2008; Puig de la Bellacasa, 2017) that have inspired attention to the empirical matters of how research methodologies enact educational realities of what it is to teach, learn, and research in these realities.

The study introduces the configuration of *caring cuts* as a new concept for care-ful research. Feminist ANT scholars like Mol (2008) and Puig de la Bellacasa (2017) have advanced the concept of care as entangled with technology, rather than in a binary relation. The everyday doings of care necessarily involve some kind of technology, for example dressing and cleaning. Technology also relies on care, or the battery will soon run out. We propose in this article that this thinking makes care a way of entering the more-than-digital. With feminist post-approaches, care becomes a gatherer that mobilises ethical and practical engagements with knowledge production that creatively looks for and articulates other possible realities. Informed by Barad (2007), cuts become enacted of the attachments of the larger arrangements of research entanglements, not as an individual act. Within these entanglements, care is vital to how cuts enact what becomes assembled and not. In relation to care-ful research, *caring cuts* conceptualises the idea that what concerns researchers also structures how we notice the world and how we think it

should be and thereby stressing that research practices are co-constituted of epistemology-ontology entanglements (Law & Lin, 2020).

*Caring cuts* is put to work in the article by engaging empirically with digital research practices as methodological sensibilities. The first case involves putting trust in research technologies and how breakdowns foreground the co-construction of researcher, recorder, and participants and who or what becomes valuable when vulnerabilities of actors quickly shift and become uncertain. Putting caring cuts to work with this event of *modest interruptions* shows the fragments and partial way of organizing the world that knowledge production enacts. The second event on which *caring cuts* is put to work is with discarded research data. These are erasures from the knowledge production on basis of being meaningless or otherwise unimportant. By first establishing that 'meaningless' data is enacted of the linear pull of research discovery (Juelskjær, 2013), in which the discarded data becomes explained as too messy to be included, the study explores how the unexciting is replete with care by asking what happens in the uneventful. The uneventful event of taking a screenshot is produced of vital actors across scales and whose work was initially erased as long as the screenshot was rendered meaningless.

## IV. Mutual capabilities: digital platforms in unpredictable pedagogical encounters

Everyday pandemic teaching was in some respects dominated by the digital platform. Specifically at Pine Grove, the platform was Microsoft Teams and its range of functionalities. Yet, there was unpredictability with the digital platform which enacted both friction and relief. So, what work does a digital platform do in everyday teaching and how does it become able to do that work? With the rise of platforms, critical studies of education and technology have stressed *platformisation* as a regulating effect on education (Decuypere et al., 2021; Nichols & Garcia, 2022). Perrotta and Pangrazio (2023) comment on the need to explore new ways to research platforms in education that allow for how platforms also become unpredictable in their governing. To explore the digital platform at Pine Grove, the study builds on the insights from platformisation to craft an approach that allows for practices that are not predetermined and regulated.

The study takes platforms as repertoire for critique and articulates the platform as *methodological*, instead of primarily computational. This move is made with Lury's (2020) material semiotic notion about

platformisation as a compositional methodology. She explains the compositional act as the platform's capability to pull some things together while suppressing others and *becoming platform* in the acts of raising the platform*ed*. It aligns with ANT's principle of *material semiotics* which acknowledges that to become in specific ways is the effect of relations (Bodén et al., 2019; Law, 2007). Thereby, the principle highlights that digital technologies are not ontologically prior to its performative effects *on* teaching and schoolwork.

Taking on the platform as methodological, the study empirically explores how it becomes relationally co-constituted within pandemic teaching practices. The exploration requires, mutually, to ask how pandemic teaching is done with platforms. Drawing on interviews with teachers and students at Pine Grove, the platform appears in the interview for example by screen sharing, being scrolled, and with notifications. Tracing misalignments, tensions, and resistance with the platform stresses that specific platform*ing* capabilities become gained.

One recurring request from students at Pine Grove was to connect online from home to follow lessons from the classroom when they had Covid-19 symptoms. The online platform does not discriminate between bodies at home and bodies in the classroom but pull them together to produce normative expectations of successful pedagogical participation that we might recognise as 'flexible'. The request to join becomes reasonable. Nonetheless, the requests were tense and ambiguous to teaching and the platform imposed inflexibility and were unreasonable to follow, i.e. that a position on granting the request or not must be taken (Gillespie, 2010). The platform becomes enacted of everyday practices as (un)reasonable. Instead of universally replacing every way of participating in teaching, the tensions show how the platform in practice becomes simultaneously shaped *of*, and give shape *to*, specific ways of teaching.

The analysis shows that platforming well-bounded domains for easier, more flexible, louder, smarter, clearer, and more efficient teaching and schoolwork ironically and incoherently make educational practices less so. The incoherence and unpredictability stress critical openings to surprise and curiosity of pedagogical encounters.

# Contributions of everyday pandemic teaching

The four above summarised studies of this thesis are co-produced of empirical events with Pine Grove, the research engagements, theory, and

literature. Here, I elaborate on the summaries in response to the thesis overall aim and research questions. It means suggesting the following empirical and theory-methodological contributions about enactments of everyday pandemic teaching and the knowledge production.

## Enacting everyday teaching in the Covid-19 pandemic

In relation to the first research question, *how is everyday teaching enacted in the Covid-19 pandemic?* the unexpected openings address teaching as enacted *of* various practices across space and time. Situated at the intersection of breakdown and routine, the enactments of space in attendance practices show how everyday pandemic teaching becomes *simultaneously* distributed and contained, in which late arrivals are not always possible. It challenges a starting point in separation and distance that has dominated ideas about teaching in the pandemic. The space of school closures is thereby not taken as a pre-existing starting point but an effect of sociomaterial relations of attendance that practices of everyday pandemic teaching produce.

Furthermore, tracing lesson enactments shows they are not simply transported from classroom to online platform. Instead, lessons become elusive and liable to change in specific school-aligning arrangements. By serving the practices around them, such as the school timetable, elusive lessons produce sameness and change in enactments of everyday pandemic teaching together. I recognise these practices of holding teaching together, with digital technology, lessons, and pandemic control measures, as maintenance practices. Subsequently, everyday pandemic teaching practices show how classrooms are not neutrally replaced by online calls and how the insight can be articulated.

Informed by maintenance, connecting everyday pandemic teaching to repertoires on maintenance practices makes possible new thoughts for teaching-technology relationalities. The implications of maintenance at Pine Grove unsettles three related binaries: user-technology, breakdown-routine, and before-after (Mörtsell, 2023). In addition, oppositional thinking about teaching and technology becomes further troubled with platforming. How digital platforms become enacted in teaching practices is a relational, i.e., two-way, matter of composing each other capable, to resist, to participate, and to negotiate boundaries (Mörtsell, 2024). It suggests a displacement of ‘distance teaching’ as the self-evident role of platforms to teaching in the pandemic. Furthermore, maintenance invites considerations of how technologies constantly present everyday teaching with a wide range of responsibilities in the

becoming of things, including responsibilities in enactments of pandemic control measures (Mörtsell, 2023).

## Implicating relational materialism in knowledge production

The second research question is, *what are the implications for knowledge production when everyday teaching with digital technology is explored with relational materialism?* One vital implication is the relational materialist *sensibility* to imply ANT rather than apply ANT (from a distance). A care-ful methodology becomes a sensitising device to research as world-making practices of partial views and not an innocent discovery of a world, or a field site. What becomes important is to explore everyday teaching and digital technology with sensibilities towards how relations become and acknowledge cuts.

Sensibility to *mundane rituals* opens for how devices in everyday teaching practice are not necessarily machine-like but co-constituted of many actors and relations, including the researcher. Furthermore, the educational reality of closely monitored attendance is not a totality but selective and at times even suspended. Read together with the configuration of *caring cuts*, the mundane ritual of 'click like' as attendance enacts caring cuts. By this I mean that 'click like' detaches monitoring and exposure and at the same time connects and maintains other attendance practices that hold everyday teaching together.

The implication here is in *adding* to reality (Latour, 2004b). Sensibilities acknowledge the becoming of digital platforms as effects of relations and mutual capabilities. In other words, a key notion is that technological mediation of is not an ontological prior to teaching-technology relationality but rather its effect. Within knowledge production of everyday pandemic teaching, mundane rituals and caring cuts become additions and concepts that add stories about teaching and technology. Enriching the repertoire, however, is not the only way to think about addition since they are also produced of methodological experimentations.

Caring cuts stress the sensibilities of making researchable worlds. It implies that research is world-making and thereby amplify specific versions of everyday pandemic teaching. Caring about pandemic teaching cuts into the researcher's distributed responsibility of its becoming (cf. Mörtsell & Gunnarsson, 2023). It means recognising that intervention with teachers and students has been primarily up to the interference of the Covid-19 pandemic rather than the empirical

engagements of the 'safer' research arrangement. The amplified version of everyday pandemic teaching as well as the methodology and researcher become non-neutral effects of such cuts.

The implication of sensibilities is to be adaptive and let go of research methods as getting technical procedures right (Law, 2004; Singleton & Law, 2013). However, it is a challenge to do so without setting up new technical procedures in the process. Another related methodological implication is that representation and language dominate sensibilities from being more attentive to materiality and becoming. Consequently, a significant implication is that some methodological questions remain to be explored. Nevertheless, how the additions I have addressed in response to the overall aim of the thesis serve as critical capacity to intervene in teaching-technology relationalities is something I wish to discuss further in this concluding chapter.

# 5. Discussion: Capacity for different kinds of responses

In this closing chapter, I discuss what becomes of everyday pandemic teaching with a care-ful methodology by turning to its contributions and critical capacity to add stories. I have stressed that a care-ful methodology is not so much about providing better knowledge of the world but about crafting more livable worlds (Mol, 2008, p. 46). First, I address the specifics of the thesis' critical capacity, which sets out that affirmative suggestions can be made to rekindle relations of everyday teaching and digital technology. I then discuss those suggestions in more detail, first as *maintaining teaching* as an intervention in teaching-technology relationality. Following this, I elaborate on the thesis' implications for education practitioners and research and, in conclusion, what the thesis invites as teach-abilities.

## A critical capacity

The starting point for this concluding chapter is a discussion on the critical capacity of the thesis. As pointed out by education researchers who take up ANT, a recurring critique on the limitations of ANT has been that it is merely descriptive and lack explanatory power to answer why-questions (e.g. Decuypere & Simons, 2016; Edwards & Fenwick, 2015; Gorur et al., 2019; Landri, 2024; Landri & Gorur, 2022). It is fair to say that the critical capacity of ANT is not as a 'critical theory' of unveiling from a distance what is held to be true. Furthermore, because the critical capacity of ANT takes a less obvious form, I agree it is important to articulate the particular form that critique does take within the thesis. In doing so, I want to stress the critical creative potential of the described explorations of everyday pandemic teaching.

Gorur et al. (2019) make clear that STS, and here I include ANT, does not automatically begin with 'big concepts' as available priori explanations for education. Concepts such as 'online', 'digital' (and 'remote' and 'distance') hold vast explanatory force that runs through most understandings of contemporary teaching and technology. For exploring (digital) technology and education, it has been important to temporarily bracket some of these concepts. In a sense, this *care-ful* move stresses the need to displace and shift 'the digital' as the object of critique and explore the 'more-than-digital' (Mörtsell & Gunnarsson,

2023). In other words, efforts and sensibilities have been put into exploring, tracing, and describing the everyday practices of teaching without too easily reverting to the pool of 'digital' explanation. Latour (2005) insists that descriptions are not 'mere' but do *add* and that the mark of a good description is that it does not need explanation.

Another vital point to consider is what the critical can do. Latour (2004b, p. 225) has called on researchers to reconsider the forms that the critical spirit can take by asking '[i]s it really our duty to add fresh ruins to fields of ruins?'. Since the Covid-19 pandemic acutely emphasises vulnerable bodies, fragile teaching, and stressful schooling, it has rendered Latour's question even more pressing throughout this thesis research. Thus, the exploration of everyday teaching and digital technology put the critical capacity of ANT in *affirmation*, not in negation (cf. Landri, 2024). In other words, the practice of critique for ANT is about what can become gathered and assembled by offering and opening up spaces for that to happen. 'Critique needs to be worked through practices and simply not about them' from a critical position, as Fenwick and Edwards (2015, p. 1387) put it. This is what the meticulous descriptive accounts of everyday pandemic teaching do, they *add* participants and repertoires.

In education and other scholarships in social science and humanities, relational materialism makes concerns about materiality an engagement with the ontological turn (cf. Mol, 2014; Woolgar & Lezaun, 2013; Zembylas, 2017). A principal assumption is that ontology, 'the real, the conditions of possibility we live with', is not settled (Mol, 1999, p. 75). Other realities are possible and the role of adding stories, concepts, and repertoires is to open for those otherwise realties and alternatives. As posthumanist scholarship insists, creative alternatives and world-making stories can respond and adapt to problems of infused hierarchies and oppositional thinking. It does not suggest forsaking what is problematic for 'the brighter side of things'. For example, it is the escape from the binary capture of critique as clear divisions, e.g. what something is and is not, that necessarily opens up for *what become(s)* (Edwards & Fenwick, 2015; Gunnarsson & Hohti, 2018; Lenz Taguchi, 2016; Staunæs & Brøgger, 2020). Consequently, the teaching-technology problem is about kitting education practice and research for 're-attuning to the materiality of education' (cf. Juelskjær, 2020; Landri, 2024; Snaza et al., 2016). I discuss next what interventions, implications and invitations are offered for teaching and digital technology.

# Interventions in teaching-technology

With the precarity of the Covid-19 pandemic, at Pine Grove and worldwide, digital technologies came to circulate with teaching in new ways (Cone et al., 2021; Grek & Landri, 2021). A frequent wonder at Pine Grove and echoed elsewhere during pandemic restrictions was how seemingly easy it was to take up digital technologies in situations where they had not figured before. Perhaps it was even convenient. What can intervene in this dominant notion of a singularised and smooth event? In line with STS-informed studies of technology in teaching, I have stressed that whether digital technology is successful or not is not an inherent property of technology or teaching (e.g. Gorur & Dey, 2021; Høvsgaard Maguire, 2019; Sørensen, 2009). Instead, this thesis unfolds that if digital technologies present as convenient or working well for teaching it is achieved of the collective and mutual capabilities of specific arrangements. It is not the stable functions of the technology that mediate teaching in ways teachers and students make 'competent use' of. Or rather, that becomes one part of the story that everyday pandemic teaching can add.

At Pine Grove, digital technology was not chosen on its promise to 'improve' education via teaching. No one asked whether the technology lived up to its promises of making better. Instead, digital technologies and teaching became enacted as repairing vulnerabilities and keeping things going but also, crucially, changing them. Change, however, does not, I argue, mould everyday pandemic teaching in a story of progress. Rather, a kind of coping-teaching with 'as well as possible' was on the agenda at Pine Grove. Helpful for putting this into words and also tell us about technology is Le Guin (2004), who articulates technology as the very 'coping with physical reality'. This, I suggest, is what *maintaining teaching* implies. It takes change and multiplicity into account, but primarily offers insights into everyday teaching enactments as shifting and manifold, far from status quo. Maintaining teaching, in which technology and teaching become inseparable, becomes an intervention that leads away from regarding everyday pandemic teaching as 'saved' by digital technologies or viewing platforms as classroom replacements that 'help' teaching.

What, then, becomes of 'the digital' in teaching-technology relationality? The explorations of everyday pandemic teaching can help surface what work 'the digital' does. For example, where is power in 'digitalisation of teaching'? One way to answer this would be to recognise it is in the ability of 'digitalisation (and de-digitalisation)' to become powerful by

erasing mundane chains of everyday practices that are constantly enacted of and as teaching. Such vital practices are highlighted in this thesis by how space for teaching is a relational effect of 'spacing' each other in sociomaterial practice, not an online container for attendance (Mörtsell, 2022a). Digital technology is not ready and one-sidedly used but also maintained with paper and timetables (Mörtsell, 2023). And digital platforms achieve abilities in mutual relations with teachers, students, shame, pandemic control measures, noises, fever (Mörtsell, 2024). In a sense, everyday teaching locally produces 'the digital' but this work becomes regularly erased. *Maintaining teaching* pays attention to such erasures. A critical and creative addition can be recognised.

# Implications of maintaining teaching

Questions that that have appeared during the thesis work include what becomes of everyday pandemic teaching and how can it be made less forgettable. Mol, Moser and Pols (2010) insist that the various acts of paying attention to care practices, such as maintenance, make them stronger in the face of erasures. What the authors suggest becomes a way to wonder about how erasures and values are made with the Covid-19 pandemic, given that there are aspects that we might feel a need to put behind us. To discuss the implications, I propose the following considerations of how everyday pandemic teaching relates to 'just ordinary' everyday teaching.

If everyday pandemic teaching is bracketed as a temporary care practice, does it risk being undervalued by a 'normal' and stronger everyday teaching practice in which technology can be better controlled and planned for? I have suggested that teaching-technology relationality becomes re-generated of the pandemic event rather than bracketed by the pandemic condition as an educational moment best seen as an unfortunate exception to normality. In other words, exploring the everyday rather than the exception yields critical considerations into how intersections of routine and breakdown are ongoingly enacted in the everyday of teaching-technology (Mörtsell, 2023). It recognises that neither everyday teaching nor digital technology can be taken for granted, even when drastic measures like school closures are *not* happening. Everyday pandemic teaching is not a deficient disorder but *another order* of everyday teaching (Law, 2004; Law & Singleton, 2003, 2005). This is why, I argue, it is not a teaching-technology event best forgotten among 'edtech's disremembered pasts' (Chan, 2019).

The thesis has articulated how digital technology is both working and not working in everyday teaching. In other words, it contests a binary question, 'does the technology work or not?' (Denis, 2020; Mörtsell, 2023). Instead, it implies considering who attend, maintain, use, and platform who, and where. Pandemic teaching is an exception, but ordinary teaching and its mundane equipment also insist on being exceptional achievements. Is ordinary everyday teaching more stable and less uncertain? It seems fair to say teaching and schooling is greatly stabilised in constant re-enactments of, for example, classroom walls and vaccines. However, how bodies and classrooms become part of everyday teaching enactments is easily overlooked. As Star (1990) argues, stability is only ever stable for some and '[p]ower is about *whose* metaphor brings worlds together, and holds them there'. Perhaps *maintaining teaching* can help articulate the (in)stabilities and material care that lend unity to digital technology as reasonable tools in contemporary teaching.

This brings me to some implications for teachers' everyday digital work. Throughout schools in Sweden, teachers report concerns with digital platform changes, e.g. brought on by new providers and procurements, and increase of digital workload that crucially involves maintenance (Bergviken Rensfeldt & Hillman, 2023). The explored practices with this thesis emphasise aspects of digital technology in teaching that oftentimes remain in something of a private teaching sphere. Identifying and measuring a 'digital workload' can certainly mobilise a profession and re-cast material care practices as more public work and address unfairness. But what about, as care scholars have argued (Mol et al., 2010, p. 9), along the way of adding value to these professional practices as something more public, 'the *specificities* of care get lost'? I recognise that the approach I have taken with ANT in this thesis is not primarily about strengthening individual teachers. Nevertheless, aligned with arguments made by care scholars, the explored *practices*, and '*whoever is involved in them'*, become strengthened and less neglected and erasable (Mol et al., 2010, p. 11). Mobilisation suggests deploying teaching's manifold of practices and implies that everyday teaching, equipped in the fabric of school life, necessarily relies on some material care (cf. Puig de la Bellacasa, 2017).

# Concluding invitations

Just like the advocates of 'emergency remote teaching' (Hodges et al., 2020), I have wanted to pay attention to important and uncertain

novelties of teaching and technology taking place with the Covid-19 pandemic. My proposal has however been not to fixate on isolation and separation but to add participants to the matters of concern, i.e., how teaching and digital technology relate. By offering an enriched repertoire, new possibilities appear for education practices and the education and technology field to adapt to pressing problems by shifting some dominant hierarchies of the anthropocentric model (Mol, 2021).

One hierarchy from an anthropocentric model of teaching and technology is that *use* is given a dominant position as the main human and teaching activity with technology. I have advanced the study of *maintenance* in teaching and technology to enrich the nuances, vulnerabilities, and multidirections of use-relations that are vastly recognised in everyday practice with almost any technology but conceptually neglected in a one-sided focus on use (Mörtsell, 2023, 2024). With these revived connections, everyday pandemic teaching rather brings to the fore how rejecting hierarchical separations become productive for knowing and doing teaching-technology relationalities. This becomes how a relational-materialist response to everyday pandemic teaching contributes to articulations of teaching. What becomes of everyday pandemic teaching offers a rekindle that does not separate humans from their surroundings. Importantly, such relations of co-existence break with what teaching is otherwise allowed to become.

Thereby, the invitation becomes one about how and why specific actors in teaching and technology are made heroic. This concerns how stories are told and how this thesis has crafted an account of everyday pandemic teaching that adds and includes participants otherwise marginalised. Heros are not necessarily to be located in technological progress nor human excellence. Or for that matter in pitting these in competition or conflict with each other to determine who/what matter(s) most. Doing so tends to be the mainstream storytelling about education in public debate, current policy, and education research. Rather than settling on digital technology as the taken-for-granted mediating enabler of everyday pandemic teaching, this thesis has offered *lesson enactment* as one unlikely hero for serving imposing actors like digital platforms, school schedules, and pandemic control measures (Mörtsell, 2023). Instead of human competence, everyday pandemic teaching has invited *mutual capabilities* (Mörtsell, 2024). Ordinary and *mundane rituals* of human and non-human actors become vital spatial technological devices that enact attendable spaces, with(out) monitoring, for teaching to be taken care of at the intersection of routine and breakdown (Mörtsell, 2022a).

## Teach-ability

The explorations in this thesis have sought to propose a critical-creative and viable story of pandemic teaching that does not repeat dominant cuts but connects and opens up for new ideas and responses to teaching-technology relationalities. In this concluding remark, I wish to do so a final time by allowing for the empirical stories to enliven and give 'flesh' to a new concept – *teach-ability*.

The mutual matters and meanings of everyday pandemic teaching recognise that there is no, by technology, 'uncontaminated' teaching. We are reminded that '[t]echnologies do not subject themselves to what we wish them to do, but interfere with who we are' (Mol, 2008, p. 50). In response to caring for neglected things (Puig de la Bellacasa, 2017), I propose adding teach-ability to and from the bearable fabric of school life. It acknowledges teaching as the ontological achievement of becoming *able to teach*, and the myriad of relations that enact it. Furthermore, my suggestion is that teach-ability is not limited to, or explained by, the pandemic context. It is already around and co-existing although neglected and erased under 'the digital' and perhaps weakened by imperatives to 'use' technology to improve teaching. This is how and where teach-ability can intervene. It has been the ambition with this study to strengthen these everyday teaching practices. Teach-ability resonates with response-ability as the capacity for opening up for different responses with the world (Haraway, 2008).

What can *te(a)ch-ability* offer about teaching and what relations can it foster? Can future research with maintaining teaching say something about how we should care about digital technology in teaching and the responsibilities in the becoming of things? How and where are teach-abilities made and unmade? What can a less anthropocentric care for technology in teaching and education more widely do (cf. Latour, 2012)?

As I consider these concluding questions it becomes important to recognise that teach-ability does not offer a (non-innocent) way out of the teaching-technology binary that has concerned this thesis research on everyday pandemic teaching. The research(er) becomes profoundly implicated, taken into account, accountable and rendered responsible. The multiplied realities of teaching give no single frame for teach-ability but instead stress non-universalising modes of teaching realities.

# Sammanfattning på svenska

## Att ta hand om undervisning – en aktörnätverksstudie av digital teknik i pandemins skolvardag

Föreliggande avhandling undersöker hur undervisningens vardag formades ihop med digital teknik i samband med Covid-19 pandemins olika smittskyddsåtgärder från maj 2020 till juni 2021 i Sverige. Ett halvår in i pandemin drog FN slutsatsen att hela världen befann sig i den dittills mest omfattande störning av sitt skolväsende (UN, 2020). Fokus för den här avhandlingen är hur undervisningen kunde komma till stånd i vardagen trots pandemins omfattande effekter. Hur kan vi förstå vad som fick undervisning och teknik att fungera eller inte fungera på specifika sätt i pandemins vardag? I gymnasieskolorna, så som den skola som ingår i avhandling, skedde en oerhört snabb omställning till en undervisning som i huvudsak för både lärare och elever genomfördes hemifrån.

Denna undervisning har i många studier beskrivits som olika varianter av distansundervisning i vilken digital teknik förstås lösa åtminstone delar av undervisningens mest kännbara problem (e.g. Bond, 2021; Hodges et al., 2020). Andra har i stället beskrivit det som en mer intensivt accelererad digital undervisningsvardag med ovisst förlopp som i sin tur erbjuder nya sätt att studera denna relation på (Cone et al., 2021; Williamson et al., 2020). I denna avhandling är utgångspunkten att denna undervisning är en experimenterande pedagogisk praktik av både fasta och porösa rutiner där hälsa och utbildning står på spel. Att omfatta oberäkneligheten i teknik- och undervisningsrelation, snarare än en som i förväg bestäms som distansundervisning, blir därmed centralt. Det innebär att uppmärksamhet riktas åt händelser i vardagsundervisning där ‘distans’ och vad ’det digitala’ kan göra är i ständig förhandling bland en mängd komponenter. Föreställningen om ’distans’ som en förgivettagen relation och teknisk lösning för hur undervisning ställs om är på så vis något som omprövas genom avhandlingen. Hur digital teknik blir betydelsefull handlar därmed för den här avhandlingen om att utforska och uppmärksamma den mängd av praktiker som uppstår ibland skolstängningar och andra smittskyddsåtgärder och vad som blir till genom dessa praktiker.

## Syfte och frågeställningar

Med pandemins både fasta och porösa vardagsrutiner som empirisk fond är syftet med avhandlingen att utforska relationen i vilken undervisnings- och teknikpraktiken ömsesidigt tar form som samskapat fenomen. Det innebär att utforska på vilka möjliga sätt det går att förstå hur pandemiundervisningens vardag *blir till*. Utifrån det syftet och med hjälp av avhandlingens aktörnätverksteorietiska ansats besvarar avhandlingen följande två forskningsfrågor, (1) hur görs undervisningen med digital teknik i pandemins vardag? Och (2) vilka är implikationerna för kunskapsproduktion när vardagsundervisning med digital teknik undersöks utifrån relationell materialism?

## Problem och bakgrund

Avhandlingens forskningsproblem knyter an till digital teknik som en av skolans centrala förändringsgrunder och samhällstendensen att med optimism digitalisera det som går (e.g. Digitaliseringskommissionen, 2016). Undervisning och teknik har en lång historia, och i och med de digitala framsteg som skedde mot slutet av 1900-talet ökade tilltron till teknikens nytta och användbarhet för undervisning. Att skolan måste hänga med i utvecklingen har betraktats som något naturligt men hur detta bäst bör se ut har inte alltid uttalats. De senaste decennierna har följaktligen präglats av omfattande investeringar och genomgripande satsningar på teknisk utveckling och implementering av skolrelaterad digital teknik av olika slag. Genom utbildningspolitiska insatser och marknadsmässiga tekniklösningar har förväntningarna varit att undervisningens vardag ska förändras, förbättras och effektiviseras. Löftena om att tekniken ska harmonisera med undervisningen har emellertid inte infriats på samma tydliga sätt i praktiken. Trots det har skolverksamheterna starkt påverkats av den plats digital teknik tillåts att ta (Bergviken Rensfeldt & Player-Koro, 2020; Gu & Lindberg, 2021; Riis, 2000).

Det utbildningsvetenskapliga fält som avhandlingen rör sig inom är kritiska teknik-och utbildningsstudier (Selwyn, 2024). Det innebär ett avstamp i viss tveksamhet inför idén om att digital teknik är verktyg som tjänar olika definierbara syften i vardaglig undervisning. Större uppmärksamhet riktas i stället mot hur digital teknik blir betydelsefull i pedagogisk praktik på andra sätt än främst som undervisningsfrämjande. Med kritiska ansatser har politiska reformförslag, utbildningspolitiska föreställningar och teknikindustrins

marknadsorienterade avtryck studerats som drivande för hur skola och utbildning formas (e.g. Ideland et al., 2021; Macgilchrist, 2019; Rahm, 2023). Denna forskning framhäver det digitala som ett kritiskt objekt och pekar på att när fokus har lagts på lärares och elevers behov av att lära sig och utveckla färdigheter för att behärska tekniken har digitalt lärande i sig blivit ett styrande ideal (Pangrazio & Sefton-Green, 2023). I relation till undervisningens vardag har forskare inom kritiska teknik- och utbildningsstudier nyligen börjat uppmärksamma den kritiska kapaciteten som delvis begränsande av hur en livlig och rörlig pedagogisk vardag med digital teknik kan förstås och formuleras. Här påvisas att undervisningens vardag trots allt omfattar vad som kan förstås vara främjande inslag men som kritiken tenderar försumma snarare än förmå bekräfta (Landri, 2024; Selwyn, 2024). Avhandlingen ämnar således bidra empiriskt och metodologiskt till denna diskussion med förslag om hur kritik kan bli kreativ med hur undervisning-och-teknik görs på oväntade sätt.

Jag betraktar också forskningsproblemet som kopplat till dominerande idéer om skola och modernitet, det vill säga om framsteg, utveckling, det nya och det föråldrade. Att utforska teknik-undervisningsrelationen behöver därför ske med idéer som syftar till att utmana förgivettagna föreställningar om människa, materialitet och kunskap (Latour, 1991, 2018). När människan inte eftersträvas som främsta fokus, exempelvis som användare av digital teknik eller som kontrollerad och styrd av dessa, öppnar det för hur både materialitet och användare av digital teknik är oberäkneliga i pedagogisk praktik (Sørensen, 2009). Det innebär att ta fasta på hur digital och etablerad teknik formar och *verklighetsgör* skolvardagen i samskapande med undervisning på specifika så väl som oväntade sätt. Därmed kan inte digital teknik sägas agera neutralt, varken i enlighet med politiska reformförslag eller enligt teknikindustrins mjukvarudesign och inte heller i samklang med lärare och elevers kompetenser. Effekten blir flera och rörliga roller i ansvaret att definiera vad som räknas som undervisning och inte (Gorur & Dey, 2021; Perrotta & Pangrazio, 2023). Att undersöka undervisning och digital teknik som samskapande fenomen gör att oberäkneliga relationer, materialiteter och händelser blir viktiga att försöka förstå.

## Teorier och antaganden

För att undersöka undervisning och teknik som samskapande fenomen utgår avhandlingen som nämnts från aktörnätverksteori (ANT) (Latour, 2005, 2017; Law, 2004, 2007; Mol, 2002, 2010). Närmare bestämt är

det ANTs ontologiska utgångspunkt i *relationell materialism* som blir betydelsefull (Law & Mol, 1995). Inom utbildningsvetenskaplig forskning med inriktning mot posthumanistisk pedagogik har relationell materialism plockats upp som ett centralt vetenskapsteoretisk antagande (Bodén et al., 2019). Därigenom har posthumanistisk pedagogikforskning problematiserat en ofta oreflekterad och särskilt bärande föreställning om människan som väsensskild från materialitet (e.g. Bergstedt, 2017; Juelskjær, 2020; Lenz Taguchi et al., 2020). Det som lyfts fram är att en vanemässigt antropocentrisk föreställning riskerar lämna viktiga empiriska och metodologiska frågor förbisedda. Det gäller exempelvis om hur en föreställning om stum teknik med förutsedda och avgränsade konsekvenser återkommande utmanas i pedagogisk praktik och i pedagogisk vardag. För att utforska undervisning-och teknikrelationer med betoning på det vardagliga är det frågor som är högst relevanta.

De vetenskapsteorier och antaganden som avhandlingen grundar sig på innebär bland annat att jag inte obestritt utgår från läraren som nav för undervisningens händelseförlopp eller att undervisning i det här specifika fallet bäst kan förstås genomföras som distansundervisning. Ansatsen gör också att avhandlingen handlar om att pröva vad det innebär att studera denna specifika undervisningspraktik med relationell materialism. Vilken kunskap blir möjlig att producera med dessa idéer? Den metodologiska ansatsen bygger på att epistemologi och ontologi är tätt sammanvävt. Dessa vetandets och varandets praktiker, menar Gunnarsson och Bodén (2021, p. 10), vävs samman i en metodologisk process ’av att samtidigt göra verklighet och att göra tillsammans med det verkliga’.

För avhandlingen har forskningsproblemet på så sätt aktualiserat vetenskapsteoretiska antaganden om relationen mellan människa och teknik. Hur blir dessa till i undervisningen på särskilda sätt? Det är främst med ANT och posthumanistisk teori som denna fråga utforskas, men den sätts också i relation till det tvärvetenskapliga forskningsfältet teknik- och vetenskapsstudier (STS) varifrån vissa begrepp så som *care* och *maintenace* hämtats och bearbetats. Gemensam nämnare för dessa fält är att de, med något olika betoning, ifrågasätter människan som självständig och oberoende av natur och teknik, som inte antas vara neutrala. Därigenom söker de kritiska och handlingskraftiga öppningar för hur världar kan ta form med hänsyn till sådana ömsesidiga beroenden.

## Metoder och tillvägagångssätt

För att utforska pandemiundervisningens vardag har avhandlingen ett etnografiskt tillvägagångssätt med betoning på praktikers situerade relationer och händelser (Hammersley & Atkinson, 2007). Undervisningens vardag utforskas på en gymnasieskola som jag kallar för Pine Grove i en småstad i Sverige mellan maj 2020 och juni 2021. Deltar gör sex lärare och 63 elever som alla går på högskoleförberedande program. Utöver dessa huvudsakliga deltagare är även övrig skolpersonal och skolledning med i etnografin men i mindre omfattning. Det etnografiska arbetet ses som en rörelse genom skolbesök, skolstängningar, intervjuer och en övervägande del digitala observationer av undervisningens vardag. Tillsammans produceras ett rörligt engagemang snarare än ett väl avgränsat fält som definieras eller upptäcks av forskaren (Gunnarsson & Bodén, 2021). Fältanteckningarna omfattar ungefär 45 000 ord och utöver det består materialitet av transkriberade intervjuer, fotodokumentation, dokument och viss skärminspelning.

Den inledande kontakten med skolan sammanföll med pandemins utbrott. Det innebar omarbetning, anpassning och perioder av osäkerhet om det ens skulle gå att genomföra etnografiska studier. Som en etnografisk förvåning i den här ovissheten framträdde emellertid *pandemiundervisningens vardag* som ett möjligt, om än oväntat, studieobjekt (jfr. Law & Singleton, 2013). Den här vardagen genomsyrades starkt av en svårfångad mångtydighet. Hur bör en sådan rörighet betraktas och bemötas? Utifrån ANTs relationella materialism menar jag att mångtydiga pedagogiska praktiker och fenomen behöver redogöras för snarare än redas ut. Att förklara och förtydliga skulle lägga betoningen på vetandepraktiker men samtidigt riskera reducera och skala av en mångfaldig verklighet och det är inte poängen snarare tvärtom (Latour, 2005; Law, 2004; Mol, 2002). Det har sålunda varit en central metodologisk hållning att försöka studera detta samskapande fenomen som just mångtydigt blivande – här och där, sammanhållen och fragmenterad, rutinfast och upplöst. På så vis möjliggör etnografiska tillvägagångssätt med ANT att utforska detaljer som otydliga och oförutsägbara i de praktiker som spåras. I sin tur genererar etnografin empiriska redogörelser av pandemiundervisningens vardag i såväl skolan som i digitala plattformar.

De här idéerna påvisar hur ANT snarare bör förstås som en vetenskapsteoretisk resurs till att anta en metodologisk hållning än som

teoretiskt ramverk. Senare års idéer kring ANT har utvecklat och aktualiserat den metodologiska hållningens betydelse, något som anammas i avhandlingen genom en *care-ful methodology* (Law, 2022; Law & Lin, 2020; Law & Singleton, 2013). Här betonas det sårbara och tillfälliga som ontologiska villkor och inte som avvikelse från normalitet. Det empiriska arbetet med Pine Grove tillåts på så vis sätta sina avtryck i avhandlingens metodologi och kunskapsproduktion i ömsesidiga och sammanvävda relationer genom vilka både det utforskade och forskande så väl som forskaren blir till.

## Resultat och bidrag

De särskilda förhållanden i vilka pandemiundervisningens vardag tar form innebär att den på en mängd sätt påverkas. Om än på ett förändrat manér gör samtidigt en vardaglig lunk av lektioner och uppgifter skolvardagen välkänd. Dessa praktiker studeras och utforskas i avhandlingens fyra artiklar.

I. *Närvaropraktiker som ritualer*. En skolnärvaro som under lång tid baserats på att elever är på rätt plats i rätt tid blev radikalt omskakad av pandemin. I avhandlingens första artikel adresseras frågor om hur undervisningen gör skolnärvaro möjligt trots att skolan hålls stängd. Strategierna för att föra närvaro är såväl spontana som genomtänkta och tätt sammanvävda med undervisning och en intensivare övervakning med högre uppgiftstempo. Men även tillfällen till andrum förekommer som sätter övervakning och prestationskontroll ur spel. Dessa uppmärksammas genom att spåra förbisedda strategiers betydelse. Jag knyter närvaro till en skolvardagens ritual för att redogöra för de relationer som skapar närvarande i klassrummets frånvaro (Mörtsell, 2022a).
II. *Lektioners underhåll*. Lektionerna som jag följde var svårfångade på så vis att de kunde starta och sluta på otydliga sätt, ställas in, spridas ut genom meddelanden, återsamlingar och delade dokument. Men även om lektionerna var flyktiga var de långt ifrån ignorerade. Stor möda lades exempelvis på att återkommande ’skapa möten’ i den digitala plattformen. Det gick annars inte att samlas för gemensamma lektioner. Praktiken med att ’skapa möten’ aktualiserar hur lektionerna behöver *tas om hand* på nya sätt som inte med självklarhet går att särskilja från varken digital teknik eller undervisning. I avhandlingens andra artikel undersöks därför omsorgspraktiken *maintenance*. Både

digital teknik och lektioner kallar på ständigt underhåll varigenom de också omformas. Jag menar att lektionernas flyktighet blir betydelsefulla för hur pandemiundervisningens vardag hålls samman som samskapande med smittskyddsåtgärder, schema och tekniken (Mörtsell, 2023).

III. *Omsorgsfulla snitt*. Varken digital praktik eller forskningspraktik betraktas med ANT som neutrala instrument. Digital teknik deltar i forskningspraktiken och formar uppmärksamhet, forskaren och material på särskilda samskapande sätt och begränsar andra. Det går att förstås som *snitt* med verklighetsskapande effekter. En för avhandlingen viktig aspekt av vetenskaplig omsorg i relation till materialitet uppmärksammas huvudsakligen i avhandlingens tredje artikel som föreslår begreppet *caring cuts*. Det utforskas i relation till på vilka sätt *postdigitala* fenomen blir forskningsbara med utsnitt i empiriskt material. Begreppet uppmärksammar att det inte går att 'bry sig om' allt på jämbördigt sätt och att dessa *omsorgsfulla snitt* blir centrala för kunskapsproduktion och behöver uppmärksammas (Mörtsell & Gunnarsson, 2023).

IV. *Ömsesidiga förmågor*. Hur den digital plattformen förmår agera genom det vardagliga arbetet med undervisning och skolarbete undersöks i avhandlingens fjärde artikel. I pedagogiska möten med oviss utgång analyseras hur plattformen förhandlas och förändras genom exempelvis stress, motstånd, exponering och viskningar. Teoretiskt betonas plattformens metodologiska potential, det vill säga genom att handla 'förhöjande' samtidigt trycka undan andra praktiker med specifika effekter. Det förstås som samskapande materiell-semiotiska handlingar i vilka plattformen också blir till som rörligt gränsdragande av vad som räknas som undervisning och inte (Mörtsell, 2024).

Det är emellertid genom att läsa dessa studier tillsammans med kappan som avhandlingens två forskningsfrågor går att besvara. Genom att utforska pandemiundervisningens vardag (studie I-II och IV) går det att uppmärksamma hur den vävs samman med materiella ting så som kropp, lektion, digitala plattformar, gilla-knappar och närvaro. Vad som spelar avgörande roll är effekterna i dessa samsakapande porösa relationer snarare än att undervisningen räddades av digital teknik. Som svar på första forskningsfrågan visar avhandlingen således hur undervisningen vardag blir till genom en mängd omställda praktiker. Här menar jag att undervisning, digital teknik, omsorg och smittskyddsåtgärder i vardagen blir till som samskapande fenomen.

Detta diskuteras i avhandlingen som *maintaining teaching* och kan ses som en bekräftande berättelse om pandemiundervisningens vardag.

Avhandlingens andra forskningsfråga besvaras genom kappans redogörelse för vad som krävs för att utforska den oberäkneliga undervisning-teknik relationen. Vilka implikationer det blir för kunskapsproduktion besvaras även av avhandlingens bidrag i form av de metodologiska begreppen *mundane rituals* (I) och *caring cuts* (omsorgsfulla snitt) (III). En ytterligare implikation är det metodologiska greppet om digitala plattformar (IV) som belyser hur de görs föränderliga i undervisning. För att utforska vardagsundervisning och digital teknik med relationell materialism krävs med andra ord en metodologisk hållning som utforskar blivande och uppmärksammar snitt. Där skapas ett utrymme varifrån det går att undersöka människa-teknik-relationen som formande, intim och vidgad snarare än uppdelad, distanserad och statisk. Ett ytterligare sätt att besvara denna fråga är med vilka metodologiska grepp som hade kunnat stärkas. Mer sensibilitet hade kunnat riktats mot exempelvis forskningspraktiken som en intervention i undervisningen utöver smittskyddsåtgärderna. Att spåra blivandet i skiftningar som även innefattar materialitet utan att fastna i språk och ord är en annan kvarstående metodologisk utmaning. Slutligen, i strävan att förskjuta forskningsmetoder som ’säkra’ tekniska procedurer (Law, 2004) kan nya metoder uppstå som just ’säkra ideal’ trots att vad som eftersträvas snarare är prövande av ytterligare tillvägagångssätt än metodologi som teknisk procedur.

## Slutsatser och diskussion

Vad innebär då avhandlingens bidrag slutligen för kunskapen om undervisning och digital teknik? Hur pandemiundervisningens vardag spelar roll i vidare bemärkelse diskuteras i det avslutande kapitel som en kritisk kapacitet att lägga till och bekräfta nya relationssätt för undervisning-och-teknikpraktikerna (cf. Latour, 2004b). En mängd praktiker, snarare än en enskild faktor, möjliggör att undervisning kan genomföras på avstånd mellan sårbara kroppar som riskerar smitta. Det gemsamma klassrummet omförhandlas därigenom och kan inte tas förgivet. Detta aktualiserades i pandemins vardag men fasta och poröst sammansatta rutiner samhandlar undervisningens vardag även utan pågående pandemi. Om denna vardag av närvaro, lektioner, digitala plattformar pågår på ett till synes naturligt sätt uppmärksammar avhandlingens spårningar hur undervisningens materialitet i sin tur kallar på uppmärksamhet, förtroende och ett omhändertagande svar för

att fungera. Digital teknik kan på så sätt inte med enkelhet sägas stötta undervisning eller bemästras genom kompetent användning.

Att uppmärksamma undervisning och teknik som materiell omsorg och samhandlat fenomen visar att ’användning’ inte är det allenarådande relationssättet i skolvardagen. Vidare sätter det fingret på vilka vardagliga pedagogiska praktiker som suddas ut när ’digitalisering’ tas förgivet som dominerande förklaring av teknik och samtida undervisning. Som berättande resurs erbjuder *Maintaining teaching* på så sätt angelägen uppmärksamhet åt dessa osynliggjorda relationssätt. Avhandlingen har som ambition att dessa vardagliga och omsorgsfulla undervisningspraktiker stärks och därmed även de som samhandlar i dessa (jfr. Mol et al., 2010). Genom att belysa hur undervisning *tas om hand* blir den mer svårglömd och förgivettagen. Som slutord föreslår jag att avhandlingens utforskade betydelser och relationssätt när det gäller undervisning-teknik kan bäras upp av begreppet *teach-abilities*.

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# Appendices

## Appendix A

**Interview guide May 2020**

I den här intervjun är jag intresserad av att höra vad du gjorde under din senaste arbetsdag för att kunna undervisa under de omständigheter som skolstängningen har inneburit. Jag har också några frågor som jämför med hur det var innan skolan stängde.

Frågor

Vi kan börja med din senaste arbetsdag.

1. Ungefär vilken tid började du och slutade du din senaste arbetsdag och var befann du dig?
2. Vad av det du gjorde (igår) skulle du säga hör till undervisning, på ett eller annat sätt?
3. Vad använder du för att hålla reda på olika saker, exempelvis ditt arbete och elevers uppgifter eller olika förändringar som du behöver komma ihåg?
4. Var det något av arbetsdagen som skedde mer ”på rutin” än något annat, dvs utan att du behövde tänka efter särskilt mycket?
    a. När hade du mest rutin och när hade du minst rutin under dagen?
    b. Kan du beskriva rutinen för någon som inte har en aning? Vad är proceduren och i vilken typ av situation utförs den? Vilka steg ingår?
    c. På vilket sätt skulle rutinen/erna varit annorlunda om eleverna varit i skolan?

Frågor om undervisningen

1. Vad behövde du för att genomföra undervisningen? Vilka olika hjälpmedel, läromedel, program, instruktioner kan det röra sig om?
    a. Vad tror du resultatet skulle bli om du var utan?
    b. Vad skulle krävas av dig om du inte hade?
2. Finns det något som skulle göra dig mer nöjd?

    a. Hur arrangeras de tillsammans? Exempelvis, vad ser du framför dig på skärmen och vad håller du i handen?
3. Har du märkt någon särskilt problemfylld situation eller risk medan undervisningen sker på distans som du försöker undvika?
    a. Kan du beskriva vad risken handlar om?
    b. Kan du beskriva närmare vad du behöver göra för att undvika eller parera problemet/risken?

Inledningen på skolstängningen

1. När den här perioden med skolstängning inleddes, hur fick du veta vad som gällde för att undervisa ”på distans”?
2. Har du eller ni några nedskrivna råd, riktlinjer/instruktioner för det?
    a. Går de att tillämpa i praktiken tycker du? Varför/varför inte?

Då har jag några framåtblickande frågor som avrundar intervjun

1. Finns det arbetssätt som du ser fram emot att få återuppta när skolan kan öppna för eleverna igen? Eller tvärtom; arbetssätt som du kommer vilja förändra eller sluta med när eleverna väl är tillbaka?
2. Vad tycker du att du går miste om i och med att det inte kunnat göras? (Om sociala kontakter, med vilken regelbundenhet och hur sker de?)
3. Vad skulle du säga om skolstängningen visar sig bli en mer utdragen period?
    a. Vilka åtgärder skulle behöva vidtas i så fall?

# Appendix B

# Research information to participants 1

## Forskningsinformation till lärare

Vi vill fråga dig om du vill delta i en delstudie för ett forskningsprojekt om digitala material i undervisningen. I det här dokumentet får du information om projektet och om vad det innebär att delta in den del som rör lärarintervjuer (delstudie 1) under våren 2020.

### *Vad är det för projekt och varför vill ni att jag ska delta?*

I det här projektet är vi intresserade av att studera hårdvara och mjukvara i olika vardagliga och mindre vardagliga undervisningssituationer inom gymnasieskolans verksamhet. Syftet är att få veta mer om relationen mellan digital teknologi och undervisningens praktik, en kunskap som behövs i takt med skolans digitalisering.

Din arbetsplats är en av gymnasieskolorna med studieförberedande program som ligger i [redacted]. Ni lärare på skolan får en persondator och eleverna får också varsin persondator, vilket gör att skolan passar för det här forskningsprojektet. Vi har tagit kontakt med rektor om att ställa den här frågan till er som är lärare på skolan om att delta i forskningsprojektet.

Forskningshuvudman för projektet är Umeå universitet. Med forskningshuvudman menas den organisation som är ansvarig för studien. Forskningsprojektet sker i samarbete mellan Umeå universitet och Högskolan i Gävle.

### *Hur går intervjustudien till?*

Forskningsprojektet har olika delstudier och den här första studien är intervjuer med lärare om undervisning under Coronaepidemin våren 2020.

Intervjun genomförs av mig, Sara Mörtsell, med en lärare åt gången och beräknas ta ca 1 timme och max 1,5 timme. Under de rådande omständigheterna kommer intervjuerna att genomföras i ett webbaserat konferensprogram som jag skickar lösenordskyddad länk till.

Ljudinspelning kommer användas för att dokumentera intervjun. Det finns också en möjlighet i programmet att dela sin skärm för att enklare visa upp något av det som intervjun berör. Eventuell skärmdelning kan du som intervjuas ta ställning till när intervjun är i gång och det finns inget obligatoriskt moment i intervjun som kräver skärmdelning från din sida.

Intervjufrågorna kommer att ha utgångspunkt i vad du gjorde föregående arbetsdag för att kunna undervisa och genomföra dina uppgifter som lärare under de omständigheter som Coronaepidemin har inneburit. I helhet fokuserar frågorna på praktiska genomföranden.

## *Möjliga följder och risker med att delta i studien*

Att delta i ett forskningsprojekt kan innebära en känsla av att bli granskad. En känslomässig effekt kan på så vis vara att man känner sig hämmad eller ifrågasatt i den egna arbetsinsatsen och yrkesutövandet. Forskningsprojektet har inte som syfte att värdera eller bedöma enskilda eller grupper av lärares prestationer, men det finns ändå en risk att du som medverkar kan få en känsla av det.

## *Vad händer med informationen om mig?*

Projektet kommer att samla in och registrera information om dig på följande sätt:

När intervjuerna spelas in kommer din röst och den information om dig som du uppger att bli del av det material som samlas in. Tjänsten som spelar in intervjun gör också automatiskt en videoinspelning, den kommer däremot att förstöras direkt efter avslutat intervju eftersom den inte är relevant för studien. Ljudupptagningen kommer att sparas och transkriberas till text. Personuppgifter, exempelvis namn, ålder och kön, har inte betydelse för studien och kommer därför att anonymiseras när materialet bearbetas. Anonymiseringen i texten innebär att inga namn publiceras i forskningsresultaten.

Dina svar och din medverkan kommer att behandlas så att obehöriga inte kan ta del av dem.

Ansvarig för dina personuppgifter är Umeå universitet. Enligt EU:s dataskyddsförordning har du rätt att kostnadsfritt få ta del av de uppgifter om dig som hanteras i studien, och vid behov få eventuella fel rättade. Du kan också begära att uppgifter om dig raderas samt att

behandlingen av dina personuppgifter begränsas. Om du vill ta del av uppgifterna ska du kontakta Göran Fransson som ansvarig forskare, se kontaktuppgifter nedan. Dataskyddsombud nås på [redacted] och [redacted]. Om du är missnöjd med hur dina personuppgifter behandlas har du rätt att ge in klagomål till Datainspektionen, som är tillsynsmyndighet.

## *Hur får jag information om resultatet av studien?*

Resultatet från hela forskningsprojektet kommer att presenteras i vetenskapliga artiklar som kommer publiceras någon gång mellan 2021-2024, och offentliggöras när Sara disputerar under 2024.

## *Försäkring och ersättning*

Den ordinarie försäkringen som anställd gäller också för deltagandet i studien. Ingen ersättning ges för den tid som projektet tar i anspråk.

## *Deltagandet är frivilligt*

Ditt deltagande är frivilligt och du kan när som helst välja att avbryta deltagandet. Om du väljer att inte delta eller vill avbryta ditt deltagande behöver du inte uppge varför, och det kommer inte heller att påverka hur din arbetsinsats bedöms.

Om du vill avbryta ditt deltagande ska du kontakta den ansvariga för studien (se nedan).

## *Ansvarig för studien*

Ansvarig för studien är Göran Fransson, professor i didaktik vid Högskolan i Gävle. Han nås på [redacted].

Sara Mörtsell är den som genomför studien och har e-postadressen [redacted] och telefonnummer [redacted]. Sara är forskarstudent på Högskolan i Gävle och Umeå universitet.

*Samtycke till att delta i studien*

Jag har fått muntlig och skriftlig informationen om studien och har haft möjlighet att ställa frågor. Jag får behålla den skriftliga informationen.

☐ Jag samtycker till att delta i delstudie 1 av Digitala material i undervisning.

☐ Jag samtycker till att uppgifter om mig behandlas på det sätt som beskrivs i forskningsinformationen.

| Plats och datum | Underskrift |
|---|---|
| | |

# Appendix C

# Research information to participants 2

**Information till forskningsdeltagare**

Vi vill fråga dig om du vill delta i ett forskningsprojekt om digitala material i undervisningen. I det här dokumentet får du information om projektet och om vad det innebär att delta.

## *Vad är det för projekt och varför vill ni att jag ska delta?*

I det här projektet är vi intresserade av att studera hårdvara och mjukvara i olika vardagliga undervisningssituationer i gymnasieskolan. Syftet är att få veta mer om relationen mellan digital teknologi och undervisning, en kunskap som behövs i takt med skolans digitalisering.

Din arbetsplats och skola är en av gymnasieskolorna med studieförberedande program som ligger i [redacted]. Både lärare och elever på skolan får en varsin persondator, vilket gör att skolan passar för det här forskningsprojektet. Vi har tagit kontakt med rektor om att ställa den här frågan till er som är personal och elever på skolan om att ge eventuellt samtycke till att delta i forskningsprojektet.

Forskningshuvudman för projektet är Umeå universitet. Med forskningshuvudman menas den organisation som är ansvarig för studien. Forskningsprojektet sker i samarbete mellan Umeå universitet och Högskolan i Gävle.

## *Hur går studien till?*

Den här studien går till så att jag som genomför studien, Sara, kommer att vara på skolan och i klassrummen under vanliga lektioner och observera vad som sker, och ibland ställa några frågor. Jag deltar också genom att vara tillagd i kursen på Teams och observerar den del av undervisning som sker där.

Här beskriver jag hur video och ljudinspelning ibland kommer användas som komplement i studien:

1. Jag kommer att anteckna i vad jag observerar i klassrummet och i Teams. Ibland kommer jag använda foto och video för att

dokumentera avgränsade delar. I dessa fall kommer jag säga till att jag tar fram kameran. Min kamerautrustning är inte molnuppkopplad.

2. Ibland kommer jag ställa frågor och anteckna svaren. Om det skulle visa sig att svaren blir mer utförliga kommer jag be om att få använda ljudinspelning för att vara säker på att inte missa något viktigt i svaren. Inspelningsutrustningen är inte molnuppkopplad.

De här klassrumsbesöken/Teams-besöken kommer påbörjas i slutet av 2020 och sedan ske under 2021 efter överenskommelse med de lärare som deltar.

## *Möjliga följder och risker med att delta i studien*

Att delta i ett forskningsprojekt kan innebära en känsla av att vara övervakad och granskad. En känslomässig effekt kan på så vis vara att man känner sig hämmad i den egna arbetsinsatsen. Forskningsprojektet har inte som syfte att värdera eller bedöma någons prestation i klassrummen, men det finns ändå en risk att du som medverkar kan få en känsla av det.

## *Vad händer med informationen om mig?*

Projektet kommer att samla in och registrera information om dig på följande sätt:

När något från en lektion fotograferas eller filmas kan ditt ansikte och information om dig som syns på datorskärmen, exempelvis namn och e-postadress, att bli del av det material som samlas in. Personliga uppgifter som den här typen av information har inte betydelse för studien och kommer därför att avidentifieras när materialet bearbetas av Sara, som genomför studien. Bildmaterialet kommer manipuleras så det inte går att känna igen vem det är. Avidentifieringen innebär att inga namn publiceras i forskningsresultaten.

Dina svar och din medverkan kommer att behandlas så att obehöriga inte kan ta del av dem.

Ansvarig för dina personuppgifter är Umeå universitet. Enligt EU:s dataskyddsförordning har du rätt att kostnadsfritt få ta del av de uppgifter om dig som hanteras i studien, och vid behov få eventuella fel

rättade. Du kan också begära att uppgifter om dig raderas samt att behandlingen av dina personuppgifter begränsas. Om du vill ta del av uppgifterna ska du kontakta Göran Fransson som ansvarig forskare, se kontaktuppgifter nedan. Dataskyddsombud nås på [redacted] och [redacted]. Om du är missnöjd med hur dina personuppgifter behandlas har du rätt att ge in klagomål till Datainspektionen, som är tillsynsmyndighet.

### *Hur får jag information om resultatet av studien?*

Resultatet från hela studien kommer att presenteras i vetenskapliga artiklar som kommer publiceras någon gång mellan 2021-2025, och offentliggöras när Sara disputerar under 2024.

### *Försäkring och ersättning*

Den ordinarie försäkringen som anställd gäller också för deltagandet i studien. Ingen ersättning ges för den tid som projektet tar i anspråk.

### *Deltagandet är frivilligt*

Ditt deltagande är frivilligt och du kan när som helst välja att avbryta deltagandet. Om du väljer att inte delta eller vill avbryta ditt deltagande behöver du inte uppge varför, och det kommer inte heller att påverka dina betyg eller hur din arbetsinsats bedöms.

Om du vill avbryta ditt deltagande ska du kontakta den ansvariga för studien (se nedan).

### *Ansvarig för studien*

Ansvarig för studien är Göran Fransson, professor i didaktik vid Högskolan i Gävle. Han nås på [redacted].

Sara Mörtsell är den som genomför studien och har e-postadressen [redacted]och telefonnummer [redacted]. Sara är doktorand på Högskolan i Gävle och Umeå universitet.

*Samtycke till att delta i studien*

Jag har fått muntlig och skriftlig informationen om studien och har haft möjlighet att ställa frågor. Jag får behålla den skriftliga informationen.

☐ Jag samtycker till att delta i studien Digitala material i undervisning.

☐ Jag samtycker till att uppgifter om mig behandlas på det sätt som beskrivs i forskningspersonsinformationen.

| Plats och datum | Underskrift |
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