The Somatechnics of Emergency Online Education

An Analysis of Synchronous Online Lectures at Dutch Universities during the COVID-19 Pandemic.

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Research master's thesis written by Floor W. Mijland (4602563) under the supervision of prof. dr. Iris van der Tuin and second reader dr. Laura Karreman.





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Floor W. Mijland 4602563

Supervisor: prof. dr. Iris van der Tuin Second reader: dr. Laura Karreman

Cover design: Mijland, Floor W. April 2022. 'BSOD'. Digital image. Private collection. Including: Utrecht University n.d. 'logo'. Accessed on: April 26th, 2022. https://www.uu.nl/organisatie/huisstijl/downloads/logo. Image inspired by the 'Blue Screen of Death' (BSOD) shown when a Windows computer crashes.

How to see? Where to see from? What limits to vision? What to see for? Whom to see with? Who gets to have more than one point of view? Who gets blinkered? Who interprets the visual field? What other sensory powers do we wish to cultivate beside vision?

- Donna Haraway 1991, 194.

I think academia as we have known it will transform radically and become almost unrecognizable by present standards in the decades to come. Universities are faced by challenges so profound that I suspect they will not exist in their present form for much longer.

- N. Katherine Hayles 2014.¹

The old space of concentrations, the space where I speak and you listen, has been diluted and expanded. We are living in a distributed space of immediate neighbourhoods. I can speak to you from my home or anywhere else, and you can listen to me from anywhere - even your home. What, then, are we doing here?

- Michel Serres 2014, 12.

¹ See: Hayles and Pötzsch 2014, 100.

Abstract

This thesis provides an analysis of synchronous online lectures at Dutch universities during the COVID-19 pandemic, using the posthumanist, new-materialist philosophy, and two social scientific models (CoI-framework and TPACK-model). Lectures are a traditional one-to-many approach to education. Unfortunately, this approach has proven to be unconducive and restrictive to learning, both on-site and online education. Using the concept of *somatechnics*, this thesis highlights why this is the case. Moreover, it provides suggestions for a more somatechnically aware pedagogy for online lectures. Firstly, the dispositif of the students partaking in emergency online education will be discussed. Secondly, attention will be paid to the cybernetic processes within and between the participants, technologies, and informatters in online education. Lastly, suggestions will be provided somatechnical analytical sensitivities to consider in educational design in current online and on-site courses in HEI's.

Keywords

COVID-19 pandemic; emergency online education; HEI's; posthumanism; new-materialism; somatechnics; dispositif; cybernetics; bodies; technologies; informatter; pedagogy.

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Floor W. Mijland August 2022.

Abbreviations

Col	Community of Inquiry
DAM	Dispositif Analysis Method
GUI	Graphical User Interface
HEI	Higher Education Institution
ICT	Information and Communication Technology
ТРАСК	Technological Pedagogical Content Knowledge

Introduction

Over the past few years, the use of online learning environments has skyrocketed (Xie et al. 2020), but due to the COVID-19 pandemic all Higher Education Institutions (HEI's) worldwide were forced to fully migrate their educational activities online (Singh and Thurman 2019; Meij et al. 2021). Indeed, "[a]ccording to the United Nations' policy brief of August 2020 on *Education During COVID-19 and Beyond*, this pandemic has created the largest disruption to the educational system in history" (Motwani and Gupta 2022, 19; emphasis in original). Within the timespan of a few months, university teachers and supporting staff had to adapt all course material and teaching strategies to suit the online format, supporting both

synchronous learning in which students and teachers are virtually present at the same time with each other while using an online platform to communicate, and *asynchronous learning* whereby curriculum content is uploaded to an online site and then students complete their studies at their own pace and at the time of their choosing (Smith, Jeffery, and Collins 2020, 75).

At many HEI's, both globally and specifically in the Netherlands, *asynchronous* learning activities were already ubiquitously in use before the COVID-19 pandemic began, with teachers and supporting staff uploading course manuals and content to platforms such as *Blackboard* and *Brightspace* and registering courses and grades in *Osiris* or *ProgRESS*. *Synchronous* online education, however, was not as commonly in use, especially in Dutch research university courses (Meij et al. 2021), but in a matter of days it became the only option for continuing higher education due to the nationwide lockdown restrictions. "In the Netherlands, most teachers and [supporting staff] had about three days to learn and prepare" (Van der Spoel et al. 2020, 624) for this unfamiliar mode of teaching. Whether they liked it or not, all teachers and support staff, and all of their students, received a crash-course in the navigation of the requisite software of platforms such as *MS Teams, Google Meet* and *Zoom* as well as lessons in online meeting netiquettes (Cutri, Mena and Whiting 2020; Allen, Rowan, and Singh 2022).² Luckily, many Dutch HEI's succeeded in transforming their educational activities to suit these previously unfamiliar online learning environments, using them to the best of their abilities in the trying pandemic circumstances.

At first, the online format seemed a solid solution for higher education to continue during the pandemic, but quickly the limitations of a fully online curriculum became apparent (Allen, Rowan, and Singh 2020), especially when analysed from a somatechnical point of view.³ "Somatechnics is a neologism based on the words of *sōma* (body) and *techné* (craft, art)" (Van der Tuin and Verhoeff 2022, 176). As a concept, *somatechnics* is attentive to the inextricability "of 'the body' (as culturally intelligible construct) and the techniques (*dispositifs* and 'hard technologies') in and through which corporealities are formed and transformed" (Sullivan and Murray 2009, 3; emphasis in original).⁴ In online education, Information and Communication Technologies (ICT's) and their Graphical User Interfaces (GUI's) constantly mediate the educational exchange, confining the interaction between

² Netiquette is a neologism of 'network' and 'etiquette', referring to conventions in technology use.

³ Due to this, the online format could be described as a 'pharmakon': "a gift that is also a threat" (Hansen 2010a, 65).

⁴ In chapter 1, the concept of *dispositif* will be explained in more detail. Generally, it "refers to the heterogeneous ensemble of discourses, beliefs, institutions, regulations, knowledges, and other factors through which modes of governing emerge" (Taylor and Gannon 2018, 466).

student, teacher and course material to a small rectangular light-emitting screen. Moreover, the lockdown restrictions ushered by the Dutch government to prevent a further spread of the virus confined especially students to their homes as well. Just as teaching changed dramatically in a matter of days, so did the corporealities of students in higher education: for over 22 months well over 1,3 million students in vocational education and higher education in the Netherlands had to take their classes online (Tielemans 2022). Under conventional circumstances "students are mostly sufficiently skilled to take part in digital lessons" (Van der Spoel et al., 624), but the straining lockdown restrictions did not benefit the students' engagement with the study program and their motivation to participate at all (Adedoyin and Soykan 2020; Bhagat and Kim 2020; Carrillo and Flores 2020; Williamson, Eynon, and Potter 2020; Xie et al. 2020; Akram et al. 2021; Arik 2021). In fact, many developed mental health issues such as severe anxiety, loneliness, and depressive thoughts due to failing technological means, the lack of (physical) social interaction, and an increased uncertainty about their future (Chaudron 2020; Dujardin 2020; Spekkink 2020; Xie et al. 2020; Consultancy.nl 2021; Salimi et al. 2021; Science Guide 2022a; Tielemans 2022).⁵ As this brief somatechnical analysis shows, the online educational situation during COVID-19 pandemic could not have been more different from its pre-pandemic counterpart, both with regard to its increased dependence on 'hard technologies' as well as the added lockdown restrictions. Due to this, the educational practices developed during the COVID-19 pandemic are now being referred to as 'emergency remote teaching' or as 'emergency online education' (Adedoyin and Soykan 2020; Carrillo and Flores 2020; Williamson, Eynon, and Potter 2020), setting it apart from other voluntary, well-designed, pre-planned, and extensively researched educational practices.

As the pandemic continued, more and more student representatives, student unions, as well as teachers and supporting staff started advocating for a wholesale return to the campus. Though this did not happen at first, over the course of 2020 and 2021 universities were allowed to open on a small scale taking physical distancing limitations into account. In March of 2022, after two years of off-andon distance education, Dutch universities were finally allowed to open their doors again full-time and full-scale. They could welcome their students in on-site lectures and seminars, without facemasks and 1,5 meters of distance. Unfortunately, this long-awaited return to campus did not go as expected, and especially the grand lecture halls in research universities remained eerily quiet (Enter 2022; Kloosterman and Van Loosbroek 2022; Radboud 2022; Science Guide 2022a; Schouten 2022; Strijbosch 2022). One explanation for the empty lecture halls can be sought in the hybrid or blended teaching practices Dutch HEI's were engaged in during the periods in-between lockdowns. Well into March, students had been given the option to attend their courses online as many of them still had to self-isolate or stay in guarantine (Radboud 2022), but from April onwards several HEI's decided to stop offering the online option, to both incentivise students to physically attend class and lift the workload for teachers and supporting staff (Strijbosch 2022). Another explanation can be sought in the idea that students simply had to familiarize themselves with offline education again. However, well into June on-site lectures were still only marginally attended, suggesting there is more to empty lecture halls than meets the eye. So, where are the students?

⁵ Research by the Dutch Government showed that 97% of students experienced stress due to their studies and the pandemic. Over 75% of the students felt lonely, and at least 25% of these students felt extremely lonely. For 80% of the students, the COVID-19 pandemic was named as the most important cause for their feelings of loneliness. Also increased levels of fear, sadness, stress, and powerlessness were discerned, which are serious problems that can lead to actual mental illnesses (Tielemans 2022). Many students were already experiencing mental health issues, which increased significantly due the COVID-19 pandemic (Science Guide 2022a).

Where Are the Students?

In order to explain why the lecture halls remain empty, it is insightful to look at the educational experiences of students during the COVID-19 pandemic. Specifically, the students' changed corporealities, their intra-actions with technology, as well as their current post-pandemic dispositif.⁶ Most students agree that on-site education has its benefits, such as meaningful social interaction with fellow students and the possibility to ask in-person questions to the teacher. However, for most, these benefits do not outweigh the conveniences of the synchronous online format (Enter 2022; Radboud 2022). Students have become accustomed to studying at their own pace in their own time, as the technological means have allowed them to do for the past two years, and this has instigated changes in their study behaviour (Kloosterman and Van Loosbroek 2022; Clowes 2018). Many students experience the synchronous online education as more efficient (Smith, Jeffrey, and Collins 2020; Xie et al. 2020), especially the lectures (Strijbosch 2022).⁷ In pre-pandemic Dutch university education, lectures usually consist of a teacher delivering a lecture to a large group of students. Though interaction can occur, lectures are largely understood as a frontal teaching method aimed at knowledge transfer from the sending lecturer (a 'sage on the stage'; King 1993) to the receiving student.⁸ In contrast, during the pandemic, the online curriculum incorporated more knowledge clips and pre-recorded lectures, which allow students to study when it suits their schedule, take a break or pause the recording to correct their notes.⁹ If students did have to attend a synchronous online lecture, they were able to combine it with other activities, such as knitting or doing the dishes (Gherhes, Simon, and Para 2021; Enter 2022).¹⁰ After online classes, they are able to spend more spare time on work, sports, and other activities instead of taking time to commute to the university. Since the lockdown restrictions have been lifted, this has only increased as students are no longer confined to their homes.¹¹ So attending lectures on campus seems a waste of time (Enter 2022).

Additionally, there is now a whole cohort of students who have never experienced on-site education as part of their study program.¹² These students have no idea what on-site university classes are like and have only interacted with their classmates through computer screens. Due to this, students feel little to no social bond with their classmates or the institute (Science Guide 2022a; Verkoeijen and Meijers 2022), which does not benefit their motivation to go to the campus (Strijbosch 2022). As for those students who do attend on-site lectures: many are experiencing increased levels of fatigue, stress, and anxiety, as they are no longer used to this type of education (Kloosterman and

⁶ Intra-action is a concept coined by Karen Barad (1996) and will be contextualised further in chapter 1.

⁷ Here, 'efficiency' has the connotation of a neoliberalist clear-cut goal-oriented understanding of what counts as efficient.

⁸ Seminars usually consist of a teacher and a smaller group of students, aimed at exchanging ideas and discussing the course material in more detail. Here the teacher is a 'guide on the side' (King 1993).

⁹ "Knowledge clips are short video presentations of no more than 10 minutes, focussed on a single topic or concept" (Utrecht n.d.).

¹⁰ 'Because at home I can just knit during a boring lecture', in Dutch: "Omdat ik thuis lekker kan breien tijdens saaie colleges" (Enter 2022).

¹¹ During the pandemic moving to a university city was no top priority, and now the housing crisis in the Netherlands makes finding suitable student living accommodations nearly impossible. Additionally, the increasing risks of taking student loans has made moving out even more unattractive.

¹² In the Netherlands, research university undergraduate or bachelor education takes three years. At least 5 cohorts of undergraduate or bachelor students have been affected by the lockdown restrictions, either finishing or starting their education during the pandemic. Graduate or master education takes one to two years, which means at least 6 cohorts of graduate or master students have been affected by the pandemic, with most of them completing their education fully online (see appendix A for a schematic overview).

Van Loosbroek 2022). So, when left the choice, a high percentage of students prefers to attend lectures online, decreasing stress, travel time, as well as expenses (Radboud 2022; Strijbosch 2022). Going back to campus would also mean giving up a certain level of flexibility and autonomy. It would mean adapting their study behaviour (again) to suit this other format. Besides, if pure knowledge transferal can supposedly be done in online lectures why would they visit campus at all? (Science Guide 2022a).¹³

Understandably, to the Dutch HEI's the empty lecture halls are of great concern (Enter 2022; Kloosterman and Van Loosbroek 2022; Radboud 2022; Schouten 2022; Strijbosch 2022; Verkoeijen and Meijers 2022). On the one hand, university teachers and supporting staff recognize the usefulness of the online format as it allows vulnerable, self-isolating, and quarantining students to participate in education. On the other hand, many teachers stress that on-site and online education do not foster the same kind of teacher-student and student-student interactions (Schouten 2022; Verkoeijen and Meijers 2022). In both online classes and hybrid teaching situations, it is difficult to actively engage, motivate, and interact simultaneously with both the students physically present and their online classmates. Online, students can easily detach themselves from what is going on in class, as they do not have to relate directly to anyone in close contiguity. Moreover, the online format allows for a constant re-doing, re-shaping, and re-building of reactions, repeatedly and near-instantly (Smith, Jeffrey, and Collins 2020). Students can 'sanitize' their reactions or refrain from reacting when this might offend others, ignoring their own biases. This is especially harmful in "moments of teaching [...] that are characterised by tension and unsettlement" (Smith, Jeffrey, and Collins 2020, 89).¹⁴ Instead of working through difficult questions concerning topics such as racism, gender, inequality, climate change, they can be brushed over or ignored.¹⁵ In fact, when students take their classes online, teachers are less able to keep track of their learning process altogether (Versnellingsplan.nl 2021): they cannot immediately correct mistakes, redirect student's focus to key concepts (Chiu 2022; Enter 2022) or check "whether students are absorbing challenging material" (Smith, Jeffrey, and Collins 2020, 90). In any educational setting, students and teachers alike should be cautions of "the dangers of conflating data, information, and knowledge" (Van der Tuin and Zuurmond 2021, 10), but in a fully online curriculum this becomes even more important.

As the emergency online educational practices of the past two years have shown, the loss of direct interaction between students and teachers can and has decreased the quality of the education tremendously (Enter 2022; Kloosterman and Van Loosbroek 2022; Radboud 2022). This loss in quality formed an additional reason for many HEI's in the Netherlands to discontinue online or in hybrid

¹³ "Studenten [hebben] in de afgelopen jaren ervaren dat pure kennisoverdracht ook middels online colleges kan plaatsvinden. [...] Waarom zou een student nog naar de campus komen, als alles wat hij of zij moet doen om een diploma te halen ook gewoon op afstand kan?" (Science Guide 2022a). In English: 'Over the past years, students have learned that pure knowledge transferal can easily be accomplished through online lectures. Why would the student return to campus, if everything they need for a diploma can be done at a distance? The epistemological implications about 'knowledge' of this statement will be addressed later.'

¹⁴ In their article 'Critical Pedagogy in Online Social Work Education: Changing Conceptions of Time in the Neoliberal University' (2020) Smith, Kristin, Donna Jeffrey, and Kim Collins explain that "the absence of bodies in the same room with each other means that [for example] white students can 'hide' their racism, leaving it unaddressed in the critical, digitalised classroom" (Smith, Jeffrey, and Collins 2020, 90).

¹⁵ Working with or through these difficult questions is what multispecies feminist theorist Donna Haraway would call 'staying with the trouble': "The Chthulucene, Haraway explains, requires sym-poiesis, or making-with, rather than auto-poiesis, or self-making. Learning to stay with the trouble of living and dying together on a damaged earth will prove more conducive to the kind of thinking that would provide the means to building more liveable futures" (Duke University Press 2022).

educational formats, restoring their education as much as possible to its pre-pandemic state (Kubica et al. 2020; Kloosterman and Van Loosbroek 2022; Strijbosch 2022). However, a full-fledged return to its pre-pandemic formats completely disregards how emergency online education has changed the students' understanding of higher education and the position it takes within their lives (Blankenberger and Williams 2020; Science Guide 2022a). Undoubtably, not all study behaviour students developed over the past two years might actually be productive, but the empty lecture halls are sending a clear signal which should not be ignored. So, what, then, are we doing here?

What, Then, Are We Doing Here?

What the empty lecture halls signal to is the fundamentally changed corporeality of the current generation of students in higher education. Or rather: the COVID-19 pandemic has only highlighted the different lifeworld of the current generation of students enrolled in higher education, as all-round philosopher Michel Serres already put forward in his book *Thumbelina: The Culture and Technology of Millennials* (2014):

These children inhabit the virtual. The cognitive sciences have shown us that using the Internet, reading or writing messages (with one's thumb), or consulting Wikipedia or Facebook does not stimulate the same neurons or the same cortical zones as does the use of a book, a chalkboard, or a notebook (Serres 2014, 6).

Technologies, like the internet, have certainly changed the possibilities of teaching and learning. Accessing information has never been easier, and the use of online education during the COVID-19 pandemic has only underlined the notion that knowledge can be acquired anywhere. No wonder that the lecture halls remain empty. Students have learned that education is "no longer [...] restricted to attending classes on brick-and-mortar campuses, sitting in a traditional classroom, and listening live to an instructor" (Xie et al. 2020, 178). Even before COVID-19, frontal teaching methods have been questioned in terms of their suitability for the students enrolling in our schools today, students who refuse "the hierarchical setting of the classroom that forces [their bodies] in the passive posture of a passenger who is being driven around with a professor at the steering wheel" (Van der Tuin and Zuurmond 2021, 9). Clearly, the

old space of concentrations, the space where I speak and you listen, has been diluted and expanded. We are living in a distributed space of immediate neighbourhoods. I can speak to you from my home or anywhere else, and you can listen to me from anywhere - even your home. What, then, are we doing here? (Serres 2014, 12).

As Serres rightfully asks: what are we doing in these lecture halls, if this type of education does not support the learning processes of the current generation of students? HEI's might want to reconsider their educational practice altogether, instead of simply discontinuing the online format and reinstating its pre-pandemic ancestor. As has been shown in several educational studies, pre-recorded lectures and knowledge clips can actually be quite beneficial for student's learning process (Arik 2021), and, interestingly, most of these are usually staged quite traditionally: with one expert addressing others so they can watch, listen, and learn (Biesta 2019). Outside of the university, students have innumerable educational resources like these at their disposal and can easily become "as knowledgeable as any teacher, anytime" (Van der Tuin and Zuurmond 2021, 9). These ubiquitous,

informal, and accessible sources of information have instigated a change, supported by modern technologies which, in turn, can

facilitate pedagogical changes regarding the roles of teachers and students, moving away from a one-to-many system of dissemination (for example, the traditional lecture) and toward technologically facilitated teaching practices such as flipped classroom, innovative project work, or new forms of collaborative writing. By these means one can more easily tap into the enormous reservoir of knowledge, creativity, and insights students always already bring to the classroom (Pötzsch and Hayles 2014, 100).

So, when used in a pedagogically informed manner, it is possible to foster the interaction students and teachers are looking for through ICT's (Mishra and Koehler 2006; Colvin Clark and Mayer 2016; Bedenlier et al. 2020; Van der Tuin and Zuurmond 2021), meeting both "the learners' needs and expectations as well as the requirements of the educational context" (Diaz and Iaonnou 2019, 2). Moreover, *when chosen voluntarily*, online education allows students easy access to information and a high level of flexibility in planning their studies (Xie 2020; Science Guide 2022a; Verkoeijen and Meijers 2022).

At the same time, this highly technologically mediated online educational exchange is not without consequences, as the concept of somatechnics already highlighted. As a complex sociocultural phenomenon, technology is never neutral (Hansen and Mitchell 2010; Diaz and Iaonnou 2019; Williamson, Eynon, and Potter 2020; Smith, Jeffrey, and Collins 2020; Kassymova et al. 2021) or "separate from the subject who employs it" (Sullivan 2006): it shapes "the modes of managing knowledge, of thinking, and of being" (Bleeker 2021, 2) and the students' idea that online lectures transfer 'pure knowledge' disregards the "sensitivities through which thinking takes place" (McCormack 2014, ix). 'Information' and 'knowledge' are no quantifiable, objectifiable, self-contained entities which can efficiently be distributed through any channel without compromising on quality (Hayles 1999). Though it holds true that devices such as smartphones and laptops allow students to "manipulate several forms of information at the same time" (Serres 2014, 6), this does not mean students are able to understand it, work with it, and integrate it with the right sensitivity (Heersmink and Knight 2018). As stated before, data, information, and knowledge are easily conflated, especially in this digital age: "the internet is a source of misinformation, extremist agendas, and disturbing business models. It is precisely such online pitfalls that the teacher might help the student to avoid" (Van der Tuin and Zuurmond 2021, 10). So, "higher education is not only a matter of the teaching and learning mind but also, and simultaneously so, a matter of teaching and learning bodies, technologies, built environments, and disciplinary regimes" (Van der Tuin 2020, v).

Considering this loss of quality in information acquisition, knowledge production, and meaning making online, the decision of Dutch universities to revert back to on-site education is understandable, but does it justify the continuation of lectures in their pre-pandemic form? Does it justify a 'sage on a stage' style of teaching which is not conducive to learning for the current generation of students? (Serres 2014; Heersmink and Knight 2018; Van der Tuin and Zuurmond 2021; Science Guide 2022a). The COVID-19 pandemic has caused an unprecedented educational situation: it instigated both a paradigm shift and a quandary concerning the current educational paradigm in Dutch university education. It seems both students and teachers will have to change their behaviour in order to meet these post-pandemic pedagogical and didactical challenges (Blankenberger and Williams 2020; Carrillo and Flores 2020; Kubica et al. 2020; Arik 2021; Criolo et al. 2021; Di Gesú and González

2021b; Gherhes, Simon, and Para 2021) and this requires a somatechnically informed interdisciplinary approach to (online) higher education, as will be argued for in this thesis.

The Somatechnics of Emergency Online Education

Motivated by the empty lecture halls, this thesis presents a somatechnical analysis of the educational situation during the COVID-19 pandemic, focussing specifically on synchronous online lectures taught at Dutch universities. As stated above, somatechnics engenders a "nuanced, ethical, and embodied attentiveness to how humans, [technologies], and materialities are not separate, but actively emerge through entanglements and in co-constitutive relation with one another" (Taylor and Ulmer 2020, 7). Drawing on social-scientific empirical research outcomes and analysing its outcomes through this somatechnical lens, this thesis aims to answer the following research question:

What analytical sensitivities does the concept of somatechnics disclose about emergency online educational practices developed at Dutch universities during the COVID-19 pandemic?

To answer this research question, two subquestions will be considered:

- 1. How can we specify the dispositif of the students partaking in emergency online education in HEI's in the Netherlands during the COVID-19 pandemic?
- 2. Given the specific dispositif, how does the use of emergency online education in higher education impact the information flow within and between students, teachers, and ICT's?

Together, these questions provide insight in the changed dispositif of students in Dutch higher education through their intra-actions with technology, both 'hard technologies' as well as 'techniques' exercised during the COVID-19 pandemic. It is important to gain such insight, as to explains the current lack of attendance at lectures. Moreover, it also calls attention to important pedagogical sensibilities to be considered when designing (online) lectures in present and future times.

Structurally, this thesis has been divided into two parts. Part I consists of two chapters. Chapter 1 introduces the theoretical framework and methodology based in Humanities scholarship and, specifically, media studies. The concepts of somatechnics and dispositif will be further contextualised, as well as the situated, posthuman, new-materialist feminist approach which has been chosen to analyse the emergency online education during the COVID-19 pandemic. To specify and operationalize the approach presented in chapter 1, chapter 2 discusses two social-scientific models, the Community of Inquiry Framework (Garrison, Anderson, and Archer 2000) and Technological Pedagogical Knowledge Model (Mishra and Koehler 2006), which can be considered when designing and purposely including technology in (online) education. Combined with the Humanities-based Dispositif Analysis Method (Kessler 2018), an integrated model for the analysis of the online educational situation in part II will be introduced at the end of chapter 2.

Part II consists of one analytical chapter: chapter 3. This chapter provides an answer to the subquestions presented above, using the integrated model presented in chapter 2. First, the online education situation during the COVID-19 pandemic will be analysed, focussing specifically on synchronous online lectures as a case study. Here, the aim is not to provide an objective description, but to critically analyse what multispecies feminist theorist Donna Haraway refers to as 'the politics and epistemology of location' (Haraway 1988) or its specific 'situatedness'. Using an autoethnographic approach, attention will be paid to the entangled participants, technologies and 'informatters' which

make up the dispositif of the students, answering the first subquestion.¹⁶¹⁷ Based on this, the second half of the chapter will consider the impact of these lectures on the information flow within and between students, teachers, and ICT's, answering the second subquestion. In the conclusion, the insights from the analysis in part II will be critically reflected on, laying out the analytical sensitivities the concept of somatechnics provides for designing (online) lectures, answering the central research question.

If the past two years have made anything clear, it is that the COVID-19 virus is more resilient than expected. Chances are we might experience another lockdown in the Fall of 2022, and that COVID-19 will not be the last virus to cause a pandemic. Therefore, it is likely higher education must resort to the online format again in the future. So, instead of viewing the educational situation during the COVID-19 pandemic only as a disruption of the educational system, emergency online education can also be understood as an opportunity for HEI's to rethink their educational practices altogether (Adedoyin and Soykan 2020; Bhagat and Kim 2020; Darling-Hammond and Hyler 2020; Van der Tuin and Zuurmond 2021; Versnellingsplan.nl 2021). Online education has been "an important and integral component of the [new] normal in education" (Xie et al. 2020, 183), and the current outlook predicts it will remain this way. This 'new normal' requires educators to delve deeper into the use of online education (Bhagat and Kim 2020; Williamson, Eynon, and Potter 2020). Therefore, this thesis aims to shift the focus from 'responding to' a crisis to 'becoming responsible' for current educational endeavours (Taylor 2019) and to do this in a matter that is "driven by critical theory and informed analysis" (Williamson, Eynon, and Potter 2020, 111). Through the close examination the participants, technologies, and informatters involved in (online) education, this thesis aims to support those teachers who strive to create environments suitable for the current generation of students, both onsite and online. In doing so, this thesis also serves as a call to action for a more somatechnically sensitive approach to higher education.

¹⁶ "Autoethnography is a research method that uses personal experience ("auto") to describe and interpret ("graphy") cultural texts, experiences, beliefs, and practices ("ethno"). Autoethnographers believe that personal experience is infused with political/cultural norms and expectations, and they engage in rigorous self-reflection—typically referred to as "reflexivity"—in order to identify and interrogate the intersections between the self and social life. Fundamentally, autoethnographers aim to show "people in the process of figuring out what to do, how to live, and the meaning of their struggles" (Bochner & Ellis, 2006, p. 111)" (Adams, Ellis, and Jones 2017, 1).

¹⁷ The concept of *Informatter*, a neologism of 'information' and 'matter', is coined and discussed in chapter 2.

Part I.

Towards A Somatechnical Approach to Emergency Online Education.

Chapter 1

Introduction

In this chapter, the theoretical framework and methodology will be discussed. As stated in the introduction, this thesis approaches emergency online education using a situated, posthuman, new-material feminist perspective and somatechnics as an analytical concept, a combination of which is mapped out in figure 1 (Mijland 2022a).¹⁸ As a concept, somatechnics is based in the broader context of posthumanism and new-materialist feminist philosophy, "which shift attention away from humans as the central focus, and toward a theoretical and practical engagement with matter" (Taylor 2019, 38), in this case the matter of 'bodies' and 'technology' involved in the emergency online educational practices developed during the COVID-19 pandemic. In the first part of this chapter, posthumanism and new-materialism will be introduced, focusing specifically on the theory of 'agential realism' as introduced by feminist theorist of science Karen Barad. Secondly, this chapter will discuss the concept of somatechnics in more detail. To situate the concept within media studies, the notions of *sōma*, *techné, cybernetics*, and *cyborgs* will be discussed to relate it to current discourse.¹⁹ Together, these



Figure 1. Mapping Chapter 1

¹⁹ "'[M]edia studies' has emerged as a viable research area, under rubrics like Comparative Media Studies (at MIT) and Literature, Communication, and Culture (at Georgia Tech), and as the focus of an ever-expanding range of research initiatives across the globe. Despite this process of institutional consolidation, however, media

¹⁸ Figure 1 could be described as a practice of cartography: "[C]reating representations of territories – whether geographical, synthetic [...], or theoretical" (Van der Tuin and Verhoeff 2022, 44). It is explained as a dual practice, matching criticality with creativity, due to its acknowledgement of "top-down classifixation of thought, practicing situated knowing and doing and following the philosophical material" (45). In this case, figure 1 is an open classifixation of the concepts used to navigate the case study of emergency online education. The singular lines in the diagram show specific concepts flow from broader ones. The one-sided arrows signal how specific concepts rhetorically flow from another, for example how the senses are discussed as part of the body. The double-sided arrows highlight the double bind between concepts, such as how the biological body and embodiment are inextricably linked. The infinity signs (∞) point to a thicker inextricability, from which other broad concepts flow. The curly bracket highlights how the concepts from the theoretical framework are brought together in the concept of dispositif.

parts form the theoretical framework used in this thesis. In the third part of this chapter, the methodology will be discussed. Here, the concepts of *dispositif, situatedness, ethico-onto-epistemology, ethics of care,* and *speculation* will be elaborated on, as this set of concepts, views, and values has shaped the methodological approach to emergency online education within this thesis.

Posthumanism and New-Materialism

As the name suggests, Posthumanism refers to a thinking post humanism, in the sense that it emerged after humanist thinking. Humanism is marked by "a commitment to the search for truth and morality through human means in support of human interest" (Wolfe 2009, xi). Posthumanism, alongside the temporal marker, is marked by a commitment to putting "into doubt the centrality of human egocentric, Enlightenment subject, and the privileging of a rational and cognitive mode of knowing that the subject assumes" (Taylor and Ulmer 2020, 25) as these "Enlightenment ideals of rationality, objectivity and scientific progress have only delivered partial benefits for particular groups of people" (Taylor 2019, 40). Therefore, scholars such as Donna Haraway, Rosi Braidotti, Bruno Latour, Karen Barad, and Michel Foucault (Wolfe 2009) have attempted to generate new understandings of subjectivity, power, relationality, and ethics to subvert harmful hegemonic narratives, for example by theoretically and practically engaging with matter (Taylor 2019). Such engagements with matter purposefully upset harmful hegemonic narratives owing to their existence to reductive dichotomic universalist thinking. Instead, as a movement in thought, or series of movements (Van der Tuin and Dolphijn 2010), new-materialism or new-materialist feminism critically reflects on how non-human and human animals, nature, culture, technologies, environment, etc. are co-constitutive in the formation of the (human) subject (Hayles 2016b).²⁰ In return, (human) subjectivity is not seen as separate from its environment but enmeshed or entangled in it. It is this focus which situates newmaterialist feminism within the broader frame of posthumanist thinking (Taylor 2019).²¹

When discussing matter, the work of feminist theorist Karen Barad will automatically come up as part of the current academic discourse, specifically her new-materialist theory of *agential realism* which is an explicit critique on representational, dualistic worldviews common to scientific progress rationales from the Enlightenment. Agential realism is characterised by a *performative* approach, which calls "into question representationalism's claim that there are representations on the one hand, and ontologically separate entities awaiting representation, on the other hand" (Barad 2007, 49). Representationalism is the idea that "our experience as *Wirklichkeit* equates the world of things as *Realität*. Classical representational theory transforms *Wirklichkeit* into a function of *Realität*" (Timeto 2011, 167). However, knowledge and knowledge-making practices do not stand outside of the world they represent. Rather, they emerge from and are enmeshed in it (Timeto 2015). So, Barad argues, there are no pre-given states which can be observed by self-contained pre-given entities. Instead, the observer, the observed, and the practice of observing are always-already connected. Therefore, conceiving of humans and their surroundings as separate entities is problematic (Weber 2020, 1). Hence, agential realism is concerned with "what/who comes to matter and how that mattering comes

studies remains an amorphous enterprise, more of a loosely associated set of approaches than a unified field" (Mitchell and Hansen 2010, vi). Therefore, the insights from media studies are combined here with posthumanism and new-materialist feminist philosophy.

²⁰ New-materialism was coined in the 1990's by Rosi Braidotti and Manuel DeLanda "independently from one another, and working from different scholarly fields" (Van der Tuin and Dolphijn 2010, 153).

²¹ Visually, the notion of humanism could be portrayed as a human at the top of the food chain pyramid ('ego') as opposed to the notion of post-humanism with humans as part of a round sphere consisting of other non-human entities ('eco').

about" (Taylor 2019, 42). Or, as Barad puts it, understanding "how matter comes to matter" (Barad 2003, 801).

As a philosophy "for understanding the world" (Weber 2020, 3), agential realism ties ontology (what exists), epistemology (what we can know), and ethics (how we should act) together. In fact, "Barad argues these three components in her philosophy are 'mutually implicated'. In other words, they cannot be studied separately – they must be studied as a whole in the form of an 'ethico-ontoepistemology'" (Weber 2020, 3). To understand the world and study it, Barad introduces several key concepts. Here, the concepts of phenomena (1), entanglement (2), intra-action (3), and agential cuts (4) will be focussed on. Phenomena (1), Barad states, are so-called "ontologically primitive relations relations without pre-existing relata" (Barad 2007, 139): it is the world-in-its-becoming in which we are entangled. These entanglements (2) "presuppose a material connectivity between objects, even those separated by large distances, such that an action performed on one affects the other" (Taylor 2019, 41). Based on this principle, it is impossible to speak of interacting entities, as this "presupposes that things already exist as separate and separable entities prior to their coming together. Intra-action, (3) in contrast, speaks of how matter and meaning come into being in the moment of their coming together" (Taylor 2019, 42; added number). So, before the intra-action, the phenomena are indetermined: they are not being measured, counted, or clearly known. They come to be known as consisting of entities through so called 'agential cuts' (4) or "material-discursive intervention[s] in the phenomenon under investigation" (Tamboukou 2014, 626). These material-discursive interventions "make manifest the world in a particular way" (Weber 2020, 3) and in doing so create boundaries (Shutkin 2019; Taylor 2019). In other words, through measurements, counting, or naming phenomena, they become known to us: we have demarcated it as x and thus it is not y.

In this context, Barad discusses the (in)famous 'double slit experiment' from quantum physics, which forms the base of her argument for agential realism.²² In the double slit experiment, particles are shot at a screen with two slits (see figure 2: Mijland 2022b). When this experiment is conducted



Figure 2. Double Slit Experiment

²² For a video on the double slit experiment, see this clip: https://www.youtube.com/watch?v=Q1YqgPAtzho.

on a normal scale, the particles form two lines where they hit the back wall. At this same scale, when waves are sent through the two slits, a so-called 'interference pattern' forms due to the waves bouncing off each other. The highest intensity of the waves is measured in the middle of the back wall. When this experiment was conducted on a quantum scale, however, something different happened. Like the first experiment, particles were shot at the two slits, but physicists were surprised to find an interference pattern instead of two lines. So, when repeating the experiment, another measuring device was directed at the two slits to see how the particles behaved, but this time the experiment resulted in two lines. The only difference between the two quantum experiments was the instalment of a measuring device. Yet, this device changed the outcome of the experiment completely. Based on this, Barad argues that the apparatuses through which the world is met and measured determine *"the material conditions of possibility and impossibility of mattering"* (Barad 2007, 148; emphasis in original). Therefore, Barad concludes, "[w]e are part of the apparatus that enacts the agential cut. How we enact the cut depends on the discursive practice we use" (Weber 2020, 4), which can be both consciously chosen or unconsciously materialized.

What the double slit experiment shows is how ontology, or 'being', is always entangled with epistemology, or 'knowing': the apparatus as a discursive practice materializes the world-in-itsbecoming. Knowing, here, is not about a sentient being acquiring knowledge about the world. Due to our entanglement with apparatuses, "'knowing' manifests in the world when one part of the world responds differently to a new materialization of the world" (Weber 2020, 4). Moreover, "knowing does not come from standing at a distance and representing but rather from a direct material engagement with the world" (Barad 2007, 49). Therefore, knowledge is *performative*, as it comes into being in sense-making practices. Here, agential realism might leave the impression that Barad does not believe in objectivity. However, though Barad does call into question the nature of science and the scientific method, she does believe in a specific type of objectivity. "[W]hen an agential cut occurs, the boundaries and properties of relata within phenomena become determinate, a causal structure between the relata manifests, and the meanings of the components in the phenomena and their relationships become determinate" (Weber 2020, 4). If these relationships materialize in the same way every time after an agential cut, Barad does speak of a certain type of objectivity.

So, according to the theory of agential realism, 'objectivity' does not refer to the objective truths or facts Enlightenment Humanist scholarship sought to find, as the repeated materialization of the world cannot be used to construct pre-existing universal states or laws. Yet, this is exactly what has been done by representationalist, "modernist (positivist), and postmodernist humanist epistemologies" (Van der Tuin and Dolphijn 2010, 15). 'Naturalized' binaries, such as subject/object, mind/body, man/woman, and nature/culture, have shaped common thought about "the nature of a host of fundamental notions such as being, identity, matter, discourse, causality, dynamics, and agency, to name a few" (Barad 2007, 49). Here, the ethical implications of Barad's work become apparent: "different agential cuts materialise the world in different ways" (Weber 2020, 4) and most of these cuts have only benefitted white Western able-bodied males (Taylor 2019). Therefore, the strength of new-materialism in general and agential realism in particular "is precisely to be found in its ability to show that agential, or the non-innocent nature of all matter, [which] seems to have escaped both modernist (positivist) and postmodernist humanist epistemologies" (Van der Tuin and Dolphijn 2010, 159; emphasis in original). Instead, these non-innocent matters "all manner of bodies, objects and things have agency within a confederation of meaning-making" (Taylor 2019, 39). Since 'meaning-making' is a central part of education, Barad's ethico-onto-epistemological philosophy of offers a generous understanding of the matter at hand (Taylor and Ulmer 2020, 12). In this case the

matter at hand is emergency online education, approached through the concept of somatechnics which will be discuss in more detail in the next section.

Somatechnics

In the introduction, the concept of *somatechnics* has already briefly been introduced as 'the inextricability of soma and techné'.²³ Like new-materialist feminism, somatechnical calls attention to *matter*, specifically the intra-active mattering of bodies and technologies, making "critically analysable how human (and animal) bodies are cut through with technologies, and how technologies are supported by different types of bodies" (Van der Tuin and Verhoeff 2022, 176). Central to the somatechnical analysis this thesis are the bodies of those participating in emergency online education and their intra-actions with technologies.

Technologies, here, can be understood both as 'hard technologies', such as laptops, smartphones, ICT's, and other devices, but also as disciplinary and regulatory 'techniques', such as the classical seating arrangements in lecture halls and the habit of raising a hand to ask a question.²⁴ These technologies are not 'applied to' or 'used by' the body as neutral tools (body *and* technology), nor are they opposite of to the body (body *or* technology) (Van der Tuin and Verhoeff 2022, 176).²⁵ Instead, "technés [...] are techniques and/or orientations (ways of seeing, knowing, feeling, moving, being, acting and so on) which are learned within a particular tradition or ontological context (are, in other words, situated), and function (often tacitly) to craft (un)becoming-with in very specific ways" (Sullivan 2012, 302). Therefore, *soma* and *techné* should be considered as immediately interwoven "dynamic means in and through which corporealities are crafted, that is, continuously engendered in relation to others and to the world" (Sullivan and Murray 2009, 3).

Due to this continuous engendering, somatechnics could be considered an ethico-ontoepistemological practice, to speak in Baradian terms, as it pertains "to the operations of power that are the subject of critical practice" (Sullivan and Murray 2009, 3). In this case, the critical practice of the critiquing the naturalizing the body and the neutralizing technologies within "philosophy, science, and society" (Van der Tuin and Verhoeff 2022, 176), and in higher education. As stated in the introduction, part II of this thesis will consist of a dispositif analysis of the online educational situation during COVID-19, specifically to synchronous online lectures taught on *Microsoft Teams*. To conduct this dispositif analysis, a general understanding of both the body and technology as apparatus is necessary. Media scholars have extensively theorized and unpacked notions of the body and technology, calling attention to their construction instead of regarding them as pregiven entities. Therefore, the next section will take a closer look at the concepts *sōma* and *techné* as they are understood within media studies. It is important to note here, that the following section merely begins by contextualizing the concept of 'the body' in order to demonstrate its inextricability with 'technology'.

²³ "The term somatechnics was coined in the period between the international conferences *Body Modification: Changing Bodies, Changing Selves* (Sydney, 2003) and *Body Modification Mark II* (Sydney, 2005) by the organizers and participants collectively" (Van der Tuin and Verhoeff 2022, 176).

²⁴ In the upcoming section on technology, the difference between disciplinary and regulatory techniques will be discussed, based on the work of philosopher Michel Foucault.

²⁵ Which is why 'somatechnics' is written as one word instead of being hyphenated.

Sōma

In her chapter on 'Body' in W.J.T. Mitchell and Mark B.N. Hansen's *Critical Terms for Media Studies* (Wegenstein 2010, 19), Bernadette Wegenstein writes that "[n]o thought, cultural production, or human activity can take place without the body as its source". Yet, the body has long been neglected, forgotten, or 'naturalized' in the studies of cultural production and human activity. However, it is indispensable *as medium*, constituting all experience "including that of its own thematization" (Wegenstein 2010, 19). So, "[t]o assume that the body is a mute substance, a passive blank slate on which history or culture makes [their] mark [...], is to deprive matter of its own historicity, to limit the possibilities for agency" (Barad 2007, 60). Instead, 'the body' can and should be studied as both a biologically given fact as well as an historically situated experience.

To differentiate between the biological body and the historically situated body, media scholars introduced the term embodiment: "In contrast to the body, embodiment is contextual, enmeshed within specifics of place, time, physiology, and culture, which together compose enactment" (Hayles 1999, 196). Thus, embodiment is used to refer

to how particular subjects live and experience being a body dynamically, in specific, concrete ways. If human bodies are in some cases factual objects to be discovered and analysed, they are at the same time the very medium through which such knowledge is attained (Wegenstein 2010, 20).

What "embodiment makes clear [is] that thought is a much broader cognitive function depending for its specificities on the embodied form enacting it" (Hayles 1999, xiv).²⁶

Recognizing this significant role of the human body as the medium in attaining knowledge, however, is quite a recent endeavour. Modern Western thinking has a deeply rooted understanding of the body being "a passive, inert object inhabited and manipulated by the mind" (Wegenstein 2010, 23), as postulated (in)famously in the work of French philosopher René Descartes. In this understanding of the human intellect, the body and its embodiment are rendered "epistemologically unimportant to learning and knowing" (Metlevskiene 2012, 414). Through the phenomenology of Maurice Merleau-Ponty and his successors, the body started to become recognized as "our most fundamental medium of knowledge and experience" (Wegenstein 2010, 34), placing our embodied senses (Jones 2010, 94) of touch, smell, sight, hearing, taste, and proprioception central to our intraaction with the world-in-its-becoming.²⁷

Furthermore, these "senses both constitute our 'sense' of unmediated knowledge and are the first medium with which consciousness must contend" (Jones 2010, 88). As complex cognitive systems, our senses have

no clear separation between, for example, the 'medium' of air, the 'message' of sonic information, and the intricate body system that interprets sound waves as language,

²⁶ Cognition refers to "[t]he mental action or process of acquiring knowledge and understanding through thought, experience, and the senses" (Lexico 2022). Or, as media theorist N. Katherine Hayles formulates it, "[c]ognition is a process that interprets information within contexts that connect it with meaning" (Hayles 2016a, 792).

²⁷ "[T]he synthesizing viscera that produce orientation, balance, sensory location in space and time" (Jones 2010, 89-90).

calculating location on the basis of the skull's own acoustic shadow and the microsecond delays between inputs at either ear (Jones 2010, 91).

Our senses, therefore, have a significant role in our understanding of the world, directly opposing Descartes' rationalist approach.²⁸ In fact, corporealities "emerge from a sequence of context-specific *embodiments* in which mental and affective processes on the one hand and material and physiological conditions on the other shape each other" (Winthrop-Young 2010, 189-190).²⁹ This shaping includes the corporeal dimensions of perceptions and sense making, and how these are "informed by practices of doing, by the affordances of tools and technologies, by the environments with which humans engage, as well as by habits and practices they have incorporated" (Bleeker 2021, 2). The mind, or rather: bodymind (Bleeker 2021), is inherently embodied as well as embedded in the world we encounter, with its senses being "a crucial arena for determining the effects of mediation on understanding" (Jones 2010, 88). Therefore, our embodied embeddedness in the world should be understood as a co-constitutive intra-action with the technologies through which we continually form and transform the world-in-its-becoming. Here, technology can refer to 'hard technologies' as well as disciplinary and regulatory 'techniques', as put forward in the section on somatechnics. In the next sections, these two understandings of technology will be discussed in more detail, starting with so-called hard technologies and then embedding those in the broader context of regulatory techniques.

Techné

In his entry on 'Technology' in Mitchell and Hansen's *Critical Terms for Media Studies*, John Johnson explains that

[h]istorians of technology typically distinguish between the simple machines known in antiquity (wheel, axle, lever, pulley, wedge, screw) and the power-driven machines that characterized modernity (windmill, turbine, steam and combustion engines). However, with the invention of the computer, a fundamentally new type of machine appeared. Whereas the two earlier types transmit force or energy, this third type processes information (Johnson 2010, 199).

This understanding of technology refers to what could be termed 'hard technologies', with the third type colloquially being referred to as 'new media'. These new media "are distinct [... from any other technology due to their...] *stronger evolutionary potential*" (Hayles 2016a, 802; emphasis in original). According to media theorist N. Katherine Hayles, they are quintessentially a cognitive technology, as we use them to access, share, and store information with across other bodies dispersed globally. Devices such as computers, therefore, shape the modes of managing knowledge (Clowes 2018; Bleeker 2021). Take the genealogy of a computer for example:

²⁸ Rationalism is the philosophical tradition which assumes the human 'ratio' or reason is the main source of knowledge, as opposed to the empiricist tradition which assumes human experience of the world should be seen as the main source of knowledge. Separating the experience of the world and reasoning about the world is common in epistemological traditions but has also been the main source of critique as put forward in (ethico)onto-epistemology.

²⁹ Affect can be understood as a "distributed field of intensities, circulating within but also moving beyond and around bodies" (McCormack 2014, 3). It "points at both the capacity to affect as well as the capacity to be affected" (Van der Tuin and Verhoeff 2022, 17) by bodies. In this context, 'bodies' can refer to "organic and nonorganic [bodies], regardless of size, materiality, and life" (Van der Tuin and Verhoeff 2022, 17).

Having started off as a calculator, the computer first became a general symbol manipulator, and then – through rapid improvements in processing chips, circuit design, digital data storage, programming languages, and networking – a universal media machine in which 'information' was any content expressible in a language of discrete elements that could be 'processed' algorithmically, that is, in coded instructions that could be written, read, and carried out automatically by a machine (Johnson 2010, 199-200).

Especially the internet has become increasingly important in memory strategies: "If you were taught a fact in 1990, you memorized it; if you need a fact now, you google it" (Allenby and Sarewitz 2011, 16)³⁰. Nowadays, "regular users of such systems count the information they access [... as] part of their own knowledge" (Clowes 2018, 263).³¹ However, understanding how to *source* content does not equal an *understanding* of the content (Serres 2014; Heersmink and Knight 2018). The act of 'googling' can be understood as an act of 'cognitive distribution', so-called "environmental scaffolding" (Krueger 2011 in Ferreira 2021, 8) or an "exteriorization of know-how and memory into media" (Hansen 2010b, 177). Due to our ever-increasing intra-actions with hard technologies, it is impossible to "draw a clear ontological distinction between human beings and their technological surroundings" (Pötzsch and Hayles 2014, 96). In media studies, this process is referred to as 'technogenesis' (Pötzsch and Hayles 2014; Bleeker 2021), calling attention to how "computational media and humans mutually modify, influence, and help to constitute one another" (Hayles 2010a, 154) and this "forms the very basis of human existence" (Hansen 2010b, 177). ³²

An important part of this interaction with technology is shaped by the materiality of the medium. As a universal 'information' machine, computers may leave the impression that information is a stable and independent entity, "delaminated from any specific material substrate, [... circulating] – dematerialize and rematerialize – unchanged. [...] [However] information (and our access to it) relies on the physical support of communication technologies" (Brown 2010, 55),³³ e.g. manually operating a keyboard makes numbers and letters appear digitally in a search bar, by pressing the 'Enter' key we open a world of search results, and by moving the mouse we can clink on a hyperlink the internet browser's data base has provided us with. Vice versa, the materiality of ICT's shape regimes of meaning-making, making bodily movement the navigation tool for

³⁰ "Turning a corporate brand into a verb is one flag of a socially interesting phenomenon, and in this case "to google" is a profound statement about important, and very new, changes in cognitive systems" (Allenby and Sarewitz 2011, 16).

³¹ In a meeting on the online educational situation held by the employee participation body (in Dutch: medezeggenschapsorgaan), one student expressed how she felt that a large extent of her memory was now located 'in her computer' (Pers. comm. April 6th, 2022). In *Thumbelina*, Serres expresses a similar sentiment about Thumbelina's head: "It is a full head, because of its enormous stock of information, but it is also a well-made head, since its search engines bring up texts and images at a moment's notice, and its programs process huge amounts of data faster than she could ever do herself. She is holding, outside of herself, a cognition that used to be inside head" (Serres 2014, 18).

³² Like technogenesis, the Material Engagement Theory (MET) "suggests a way of looking at, and sets out a possible pathway to approach [the] middle space where brain, body, and culture conflate" (Malafouris 2018, 4). Though the MET theory offers useful insights in human cognition, within the scope of this thesis the concept of technogenesis is chosen as a 'possible pathway' to approach brain, body, and culture.

³³ The first part of this quote is what mathematicians Claude Shannon and Warren Weaver argue for in their Shannon-Weaver model of communication.

scrolling through lists of data, communicating with friends and strangers, and organizing and making connections between diverse materials. As a result, the skills involved in performing these movements become part of how bodies make connections, how they relate to what they encounter, and how they make sense of it (Bleeker 2021, 4-5).

Therefore, meaning-making is based in materiality (Kirschenbaum 2016; Mills and Unsworth 2017), even in technologies which are colloquially understood as immaterial (Drucker 2013b). Such interactions can be termed as 'recursive feedback loops', which occur between materiality of bodies and computational media.³⁴ These "sensorimotor interactions [... are] crucial for gaining knowledge and developing cognitive capabilities" (Ferreira 2021, 8). In the context of (online) education, teachings can be understood as the conscious act in directing sensorimotor interactions for constructive learning to occur. Considering their impact on cognition, the use of hard technologies calls for a responsible theorizing (Hayles 2010a; Diaz and Iaonnou 2019), to become more aware of the intra-actions of informational patterns and material instantiation in which embodiment is explicitly included.

In addition to the informational patterns instantiated by the materiality of 'hard technologies', other technologies also determine the sensorimotor interactions of bodies. More specifically, these are the *techniques* named in the definition of somatechnics, referring to the "mode in which power is applied to [bodies]" (Wegenstein 2010, 24). Or rather, how bodies co-evolve through exercised power, and how the exercised power shapes the apparatuses through which we intra-act with the world. When discussing bodies and power, the work of philosopher Michel Foucault is one of the first to be mentioned, especially his notions of biopower and biopolitics.³⁵ In his famous lecture series Society Must Be Defended (1975-1976), he discusses the relationship between bodies and power, and the bodily regimes and regulatory practices which institutions exercise over a population. Here, Foucault links technology not only to the individual body but also to the so-called the 'social body' or "body politic" (Van der Tuin and Verhoeff 2022, 176). In his Lecture 17 March 1976, Foucault provides a genealogy of the relationship between bodies and power, discerning three types of power: sovereign power, disciplinary power, and lastly biopower. Sovereign power refers to the power executed by sovereigns in pre-eighteenth century Europe. In a sovereign society, the population was seen as one single body with the sovereign as and at its head. The royal subjects were expected to live according to the rules instated by this reigning sovereign to keep the state-body functioning, therefore disobedience was punishable by death. They were literally *subjected-to* the sovereign. Foucault describes this as the right of sovereignty "to take life or let live" (Foucault 1976, 241).

Due to changing (political) ideas at the advent of Modernity, such as an understanding of 'the body' as individual capital, Foucault notices a shift in power dynamics: in "the seventeenth and eighteenth centuries, we saw the emergence of techniques of power that were essentially centred [...] on the individual body" (Foucault 1976, 241-242) to (self-)discipline it. Through separation, organization, serialization, and surveillance techniques, disciplinary power was executed by governments and institutions, categorizing individual bodies based on their economic value: only individuals who were fit to follow the order were allowed to live. Those who could not work were left to die (Foucault 1976, 241). This shifted the power from being exercised by a sovereign, to power being exercised by the individual as an act of internalized *self*-discipline, "controlled from within"

³⁴ 'Feedback loop' is a term borrowed from cybernetics (Timeto 2015), which will be introduced later.

³⁵ Foucault's work has also extensively influenced Karen Barad's theory of agential realism.

(Wegenstein 2010, 24). Here, individuals are *subjects-of*. The exercised self-control forms the breeding ground for the third type of power Foucault discerned: 'biopower'.

Biopower marks a shift from a society of discipline to one of control. Instead of addressing individual bodies, biopower "is applied to [...] man-as-species, [...] [the] global mass that is affected by overall processes characteristic of birth, death, production, illness, and so on" (Foucault 1976, 242-243). Especially governments want to exercise control over these processes that impact 'man-as-species', thus exercising what Foucault calls 'biopolitics'. Through biopolitics governments install security mechanisms in society which "optimise the state of living [...] [This is] a matter of taking control of life and the biological processes of man-as-species [...] ensuring that they are not disciplined but regularized" (Foucault 1976, 246).³⁶ To give an example, Foucault discusses the preoccupation of governments with morbidity rates, explicitly in the context of viruses causing pandemics. As our current intra-action with the COVID-19 virus has shown is that such viruses are "difficult to eradicate, [...] [yet permanently] sapped the population's strength, shortened the working week, wasting energy, and costing money both because they led to a fall in production and because treating them was expensive" (Foucault 1976, 244).

Another example of security mechanism can be found in the current neoliberal preoccupation with credentials, efficiency, competitiveness, and corporate profit-making found in many HEI's (Taylor 2019; Smith, Jeffrey, and Collins 2020).³⁷ In this model, "students and teachers alike [are] rendered commodifiable, valued for their resource use, which increasingly is measured by performance metrics and surveillance apparatuses that quantify their work - and them - as outputs and deliverables" (Gray and Taylor 2020, 1). According to neoliberalism, if students produce the desired outcome their education was successful (Shutkin 2019; Taylor 2019) and the process of education can be optimised to secure (more) production. Forcing the 'modern individual' to conform to the norm exercised by the biopolitical regime may sound oppressive. At the same time, this same individual "managed to exert a great deal of individual will in the creation of their persons [... with their bodies becoming a medium for self-expression, a technique to communicate] gender, age, class, religion, and so on" (Wegenstein 2010, 24). Moreover, as private property the body has become something to invest in and to improve upon, which counts as "examples of [the] modern culture of bodily expression, in the spirit of Foucauldian care of self" (Wegenstein 2010, 24). In principle, enrolling in higher education is meant as one such act of self-improvement.

Considering the body as a medium is what Hayles would term "a thoroughly cybernetic impulse" (Hayles 2010a, 153). As a concept, cybernetics refers to the process of information flow "between humans and intelligent machines" (Hayles 2010a, 145). Like somatechnics, Hayles' notion of cybernetics takes a significant role in the analysis of emergency online education, as it pays attention to the social context, technology, materiality, and semiotics of information/matter constellations in which this phenomenon is entangled (Hayles 2010a). Therefore, the next section will contextualise *cybernetics*, relating it also to discussions on cyborgs (as a reality) and transhumanism (as utopia or dystopia).

³⁶ Mirroring the biopolitical act of protecting those who are worth living, Achille Mbembe's *Necropolitics* (2003) calls attention to the act of choosing which groups within society are left to die. According to Mbembe, these choices are mostly informed by acts of racism. In context of the pandemic, the distribution of vaccines can be seen as a prime example of how the distribution of wealth determines who had access to it first and which groups had to wait extensively to be vaccinated.

³⁷ "The educative project of Western schooling and post-compulsory education is founded on an individualized, cognitivist, developmentalist narrative; it privileges ends over means; and seems ever more tied into the production of competitive forms of neoliberal credentialism" (Taylor 2019, 40).

Cybernetics

As an academic discipline, cybernetics flourished between 1940 and 1970, "and then all but vanished from the academy as an identifiable discipline" (Hayles 2010a, 145).³⁸ Or rather, it was integrated in many others, since the study of information flows between humans and technology can be interpreted from many different approaches. Cybernetics only came about after World War II when the modern conception of 'information' came about. "[C]ybernetics signalled that three powerful actors – information, control, and communication – [...] [operate] jointly to bring about an unprecedented synthesis of the organic and the mechanical" (Hayles 1999, 8). Most notably in this context is the so-called Shannon-Weaver model of communication, which theorizes how, in communication, information can be transmitted through a channel in a controlled way. Here, information is defined as a function of message possibilities, allowing "for a fast and easy translation across divergent systems" (Wegenstein 2010, 17). What this also implies, however, is a detachment or a 'disembodiment' of the information from its material substrate,

leading eventually to Hans Moravec's claim that the human brain is nothing but an informational pattern that can be represented in any medium. Hence, Moravec argues, it will be possible within the next decades to upload the human brain into a computer without losing anything essential (Hayles 2010a, 146)³⁹.

Moravec's claim, and cybernetics in general, is quick to equate complex biological processes to relatively simple mechanistic ones, with human bodies being understood as "information-processing entities who are *essentially* similar to intelligent machines" (Hayles 1999, 7; emphasis in original). In this view, the body has become "wetware, flesh and blood, [...] an obstacle to overcome through such techniques as cryonics [...] or computational re-embodiment" (Wegenstein 2010, 27).⁴⁰ However, as Hayles argues in her influential book *How We Became Posthuman* (1999),

[information] must *always* be instantiated in a medium [...] [A]bstracting information from a material base is an imaginary act [... as is conceiving] information as a thing separate from the medium instantiating [... it portrays] a holistic phenomenon as an information/matter duality (Hayles 1999, 13).

Here, Hayles' call for an integrated approach to information and matter is not meant to lead to a conflation of bodies and technology, as their feedback loops and constellations are what determine the co-evolutionary dynamics of technogenesis (Hayles 2010a, 154). Rather, Hayles' work advocates for a similar material-meaning entanglement as put forward by Karen Barad in her agential realism, inextricably linking information and matter in general and specifically humans and intelligent machines.

³⁸ "[T]he term *cybernetics* [is] adapted from the Greek word for 'steersman'" (Hayles 2010(a), 145) and gained wide currency following Norbert Wiener's eponymous book with the same title from 1948.

³⁹ Moravec is a roboticist, AI expert, and known for his futuristic, transhumanist writings on the impact of technology (Pötzsch and Hayles 2014).

⁴⁰ Cryonics is a method which aims to preserve life by maintaining the body at low temperatures (Wegenstein 2010).

In popular culture, as well as in Moravec's scientific imaginary, the link between humans and intelligent machines has been imagined in diverse ways, creating the human-machine hybrid we have come to know as a 'cyborg'. Through cybernetic enhancements the illusion of an optimized human being is created. In the Humanities, this type of thinking is termed 'transhumanism'. The next section will discuss both cyborgs and transhumanism in more detail.

Cyborgs

Noticing the notion of 'cyborg in popular culture, Donna Haraway's *Cyborg Manifesto* (1991; originally published in 1985) discusses the *cyborg* imaginary as an analytical tool to rethink ingrained dualisms in Western thinking. Cyborgs are cybernetic organisms, hybrids of machines and organisms, and are both "a creature of social reality as well as a creature of fiction" (Haraway 1991, 65). In science fiction, we imagine cyborgs as creatures half animal and half machine, both nature and culture. Such a connection between 'meat' and 'machine', however, is not pure science fiction. If we apply the implications of the cyborg-logic to our current social reality, we can see that "[m]odern medicine is also full of cyborgs, of couplings between organism and machine, each conceived as coded devices" (Haraway 1991, 66). Haraway's notion of the cyborg has proven to be a fruitful notion for analysis. It "asks us to pay attention to where, precisely, a prothesis stops and a body starts" (Pugliese and Stryker 2009, 1),⁴¹ or "the division of human and machine" (Bolldén 2014, 4). Take online education, for example, where "[t]he body in online environments could be understood as a cyborg, pixels on a screen and, in some cases, accompanied by voice relayed through a headset" (Bolldén 2014, 4). In cyborgian logic, this construction of the human body sitting in front of their computer represented by its verbal and semiotic markers "necessarily makes the subject into a cyborg" (Hayles 1999, xiii).

As a creature of fiction, the cyborg is often associated with a use of technology to enhance human existence, a thought common to transhumanism.⁴² Contrary to posthumanist thinkers, "[t]ranshumanists explicitly embrace the pursuit of immortality, of human perfectibility, of dominion over nature, and of transcendence over the limits that time and space impose on the individual" (Allenby and Sarewitz 2011, 17). For transhumanists, this transcendence of the biological human body is possible to achieve through altercations and enhancements "through robotic devices, implants, protheses, and a variety of other technical exteriorizations of the body" (Wegenstein 2010, 21). Not only does this transform the biological human body: it changes human embodiment as transhumanism seeks the enhancement of "human intellectual, physical, and emotional capabilities, the elimination of disease and unnecessary suffering, and the dramatic extension of life span" (Wolfe 2009, xiii). Moreover, the belief of progress through technology is central, specifically 'hard' technologies (Hayles 2012, 920), to not only gain 'material betterment of human life', but also an 'improved humanness' (Allenby and Sarewitz 2011, 18):

[T]his utopian view of technology as a neutral tool separate from the self, which, if deployed correctly, will enable us to fully realise our true potential, is everywhere apparent in contemporary Western culture, and in fact works hand in hand with the logic of consumer capitalism (Sullivan and Murray 2009, 1).

⁴¹ This is central to critical disabilities studies, "a field that departs from the recognition that every human being is as cyborg and as we are all cybernetic organisms, there is no difference in kind between wearing carefully crafted fashionable, sports, or orthopaedic shoes, using a walking stick or not, or walking up straight or moving around while sitting in a wheelchair" (Van der Tuin and Verhoeff 2022, 176).

⁴² The prefix 'trans' in transhumanism refers to something *across, over* or *beyond*.

Considering the concerns raised by posthumanism, transhumanist ideas are obvious reasons for debate "about what is technically plausible and what is not; about what is morally acceptable and what is not; about who will benefit and who will be left behind" (Allenby and Sarewitz 2011, 19). To use Baradian terms: using technology calls for an ethico-onto-epistemological approach or methodology, as will be presented in the next section.

Methodology

As shown in figure 1, the theoretical framework presented above feeds into the methodological approach to emergency online education chosen in this thesis. Posthumanism and new-materialist feminism call for a critical engagement with matter, shifting the focus from a human actionability to human accountability. This focus on "[h]uman accountability begins with the recognition that our educational institutions, our pedagogies, our research practices are entwined with the material-discursive rhythms of everyday life" (Taylor and Ulmer 2020, 12-13): our bodies, our technologies, and their intra-actions. To analyse these 'material-discursive rhythms', the following section will introduce the concept of dispositif as a method for analysis, alongside the notions of situatedness, ethico-onto-epistemology, ethics of care, and speculation. Together, these concepts form the set of views and values which have shaped the methodological approach and method of analysis for the case study of synchronous online lectures at Dutch universities during the COVID-19 pandemic.

Dispositif

As a concept, dispositif has been introduced above firstly as part of the definition of somatechnics, referring to "the heterogenous ensemble of discourses, beliefs, institutions, regulations, knowledges, and other factors through which modes of governing emerge" (Taylor and Gannon 2018, 466). As a concept, dispositif closely resembles the disciplinary and regulatory techniques discerned by Foucault in his analysis of (bio)power, though it has a different modus operandi. In his later work, Foucault defines dispositif as the "thoroughly heterogenous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral, and philanthropic propositions – in short, the said as much as the unsaid" (Foucault 1980 cited by Barad 2007, 63).⁴³ In addition to being part of the definition of somatechnics, the concept of dispositif has also been mobilized in media studies for a distinct and substantive analysis method of zooming into the elements of, relations between, and senselines in concrete media situations, for example by film historian and media theorist Frank Kessler.⁴⁴ Instead of using dispositif as a normative category, Kessler proposes to use the notion for an analytical perspective, describing the specific constellations through which subjectivity and meaning are produced, considering the spatial, temporal, material, physical, and technological elements within a specific mediated situation.

In his article 'The Multiple *Dispositifs* of (Early) Cinema' (2018), Kessler explains how media configuration comprises of three poles: (1) the techno-pragmatic pole, (2) the textual pole, and (3) the user-spectator pole, which relate to each other in a triadic formation (see figure 3; Kessler 2018, 56). Firstly, the techno-pragmatic pole is constituted by "technologies and (other) materials and their affordances" (Van der Tuin and Verhoeff 2022, 81), as well as the pragmatic dimension of the

⁴³ In her agential realism, this conception of 'the said and the unsaid' is picked up by Barad as part of the apparatus through which agential cuts are made.

⁴⁴ Instead of speaking of 'sightlines', the term 'senselines' has been used in this sentence to avoid the implication of a hierarchy of senses.

communicational situation. Or, in Kessler's words, "the media technology intervening in the communication process and the ends to which it is used (to entertain, to persuade, to inform, to instruct, etc.)" (Kessler 2018, 55). Secondly, the textual pole is constituted such as "text, images, sounds, or other forms of communicated content" (Van der Tuin and Verhoeff 2022, 81). In education, text, images, videos, and other modalities are employed to support and shape the learning process:

Ranging from drawings on a blackboard to interactive multimedia simulations to etchings on clay tablets or Web-based hypertexts to the pump metaphor or the heart or the computer metaphor of the brain, technologies have constrained and afforded a range of representations, analogies, examples, explanations, and demonstrations that can help make subject matter more accessible to the learner (Mishra and Koehler 2006, 1023).

In a carefully crafted educational setting, these modalities are presented as part of the performative act of teaching so as to help students engage with the presented content-matter. Therefore, in many cases, the textual pole should be "considered in a much broader sense than simply the features of text itself [... as] there is also a performance element involved" (Kessler 2018, 55). Moreover, "[e]very material is characterised by its specific expressivity and – to a large extent – by the specific procedures or techniques by which it is, or might be, processed" (Kattenbelt 2010, 32). Therefore, modalities function as socially and culturally shaped semiotic resources or sign systems which, in turn, shape making meaning as well (Mills and Unsworth 2017).⁴⁵ Thirdly, Kessler distinguishes the user-spectator pole, which encompasses the "subject whose positioning, perception, and agency within this situation impacts the way that she makes sense of what happens and what is communicated" (Van der Tuin and Verhoeff 2022, 81). Here, a subject can be understood as both user and/or spectator, depending



Figure 3. Dispositif Analysis Model

⁴⁵ "Semiotic resources are the systems of meaning available to the user. [...] The meaning potential of these resources is connected to their past uses and the norms or power relations that define their appropriation in social context or use" (Mills and Unsworth 2017, 7).

on the media figuration and the form of engagement this fosters. Depending on the pedagogical starting point, for example, students in (emergency) online education could both be considered the user of the platform as well as the spectator of a lecture.

In Kessler's model, it becomes apparent how "each of the poles is positioned in relation to the two others" (Kessler 2018, 56) in the constitution of a specific dispositif. Describing and analysing this dispositif allows for more insight in mediated communication processes and their consequences. "Moreover, understood in this way, the concept of *dispositif* makes it possible to focus the analysis on any one of the poles, while still taking into account the two others, depending on the issues one aims to explore" (57). So, as an analytical tool, dispositif highlights how media specificity, communication, meaning-making, and subjects/subjectivities/corporealities become situationally and relationally constructed matters. It allows for critical reflection on the "form, structure, and content of messages and artifacts" (Van der Tuin and Verhoeff 2022, 81) as they are encountered. Moreover, performing a dispositif analysis in combination with the concept of somatechnics, allows for a "situated, relational, and dynamic [approach] and move beyond critiques of common sense and scholarly notions of embodiment and technology by being creative with alternative forms of relating" (Van der Tuin and Verhoeff 2022, 177). By analysing the specific situatedness of the students in synchronous online education during the COVID-19 pandemic, or their 'screening situation' in Kessler's words, it becomes possible to rethink, or 'speculate on', the situation to better support student learning. Therefore, the concept of situatedness is explained further in the next section.

Situatedness

As a concept, *situatedness* calls attention to "the dependence of meaning (and/or identity) on the specifics of particular sociohistorical, geographical, and cultural contexts, social and power relations, and philosophical and ideological frameworks, within which the multiple perspectives of social actors are dynamically constructed, negotiated, and contested" (Chandler and Munday 2011). In their book *Critical Concepts for the Creative Humanities* (2022), cultural theorists Iris van der Tuin and Nanna Verhoeff recognize two perspectives to the "situatedness of people, things, events, or processes" (174). The first perspective focusses on the specificity of the situation itself, and the second perspective is oriented at the future implications of the situation:

In case of the first, we can recognize a dramaturgical perspective on how dynamic relationships, stories, and meanings take shape within specific spatiotemporal, material, and technological constellations of elements, agents, or forces. Here the situation is both historical and local, as it is inscribed in a logic of time and place specificity. Moreover, the situation is political as the specific affordances and structures of power embedded in its constellation or dispositif produce subjectivity. The second perspective focuses on how such situatedness has epistemological implications, taking into account how knowledge is always produced in situ, and therefore relative, framed, and biased (Van der Tuin and Verhoeff 2022, 174).

Therefore, the particular time and space of the emergency online educational situation during the COVID-19 pandemic in Dutch universities will be considered, making the case study both historically and culturally specific. Furthermore, the somatechnics and cybernetics of emergency online education will be discussed as these instate power structures which produce the subjectivity of those participating in emergency online education, especially with regards to the corporeality of the students. The aim of this situated methodology is not to give an objective description, but to execute

a critical analysis which pays attention to "politics and epistemolog[y] of location, [...] where partiality and not universality is the condition of being heard" (Haraway 1988, 589). This allows for knowledge claims to be made based in the situation. As "[t]hese claims are claims on people's lives" (Haraway 1988, 589), they should be made with great consideration and care. Therefore, this situated methodological base complements or, in social-science terms, operationalises the earlier introduced *ethico-onto-epistemological* context of Barad's agential realism, as well as a so-called *ethics of care* as theorized by feminist philosopher María Puig de la Bellacasa.

Ethico-Onto-Epistemology and Ethics of Care

In her book *Matters of Care: Speculative Ethics in More Than Human Worlds* (2017), Puig de la Bellacasa calls attention to 'matters of care'. Unlike matters of fact, matters of care cannot be generalized, due to their entanglement in thick "intersectional relations of power both within and between communities and across social, natural, and technological environments" (Van der Tuin and Verhoeff 2022, 41), entanglements such as in emergency online education during a pandemic. Furthermore, as Puig de la Bellacasa states,

[w]ays of knowing/caring reaffect objectified worlds, restage things in ways that generate possibility for other ways of relating and living, connect things that were not supposed to be connecting across the bifurcation of consciousness, and ultimately transform the ethicopolitical and affective perception of things by involvement in the mattering of worlds (Puig de la Bellacasa 2017, 65).

Combined with Barad's understanding of ethico-onto-epistemology introduced above, this understanding of an ethics of care allows for a shift from 'responding to' to 'becoming responsible', moving from *emergency* online education to a thought-through (online) educational practice. As stated above, this can be reached through a thorough analysis of the dispositif of the students in emergency online education, as well as through a *speculation* on the possible changes needed for this educational situation to comply with future emergency situations. In the next section, this speculative aspect of the thesis will be introduced.

Speculation

As concepts, situatedness, ethico-onto-epistemology, and ethics of care allow for a critical reflection based in current practices and for their implications for future (online) educational practices. These approaches, however, all focus on the analysis of the current apparatuses that shape our intra-actions with the world. A speculative addition to the methodology, therefore, presents the opportunity to rethink current approaches to (online) education:

[S]peculation is a creative method. It is an approach to respond to a question or problem in the here and now, a means to develop new insights and instruments for pointing out ways to think and act differently. [...] [Furthermore, speculation can] be instrumental to actively unlearn or mobilize habits and skills that have become too fixated to be responsive to and adaptive in the face of the unexpected and unknown (Van der Tuin and Verhoeff 2022, 178).

Such, speculation is never an ungrounded wild guessing game, as it is always based on a situated "framework that is before or outside the speculation that it produces" (Van der Tuin and Verhoeff

2022, 178).⁴⁶ This 'before' or 'outside' is not understood as a pre-given state which can be observed, but rather a phenomenon under investigation based on which we can enact an agential cut. In this thesis, the emergency online educational practices developed during the COVID-19 pandemic in Dutch universities analysed in part II is the phenomenon under investigation, and this will be speculated on using the material presented in part I. This framework will give "explicit direction to actions and decisions and coordination for future navigation" (Van der Tuin and Verhoeff 2022, 178) in online educational endeavours as well as the current on-site practices. As an endeavour, this is certainly urgent, given the university's ambition to fill the empty lecture halls as well as the looming expectation of a new upcoming lockdown. Moreover, on a personal level this has relevance since I will be teaching at the university myself next year.

Conclusion

In this chapter, the theoretical framework and methodology of this thesis have been presented. Based in the Humanities and media studies, the notions of posthumanism and new-materialism were discussed first. Posthumanism is focussed on the decentralisation of the human subject, as it has been theorized in the Enlightenment. Instead, posthumanism calls attention to the more-than-human world which is as important in the co-constitution of humans as the human subject itself. The movement of thought termed 'new-materialism' or 'new-materialist feminism', is one such efforts to decentralize the human subject. New-materialism critically engages itself with matter, both theoretically and practically. In this thesis, matter refers to the bodies and technologies involved in online education. Here, somatechnics and new-materialism overlap, as both call attention to the (techno)materiality of bodies and technologies, and their entanglement in (mediated) meaning-making.

In this context, Barad's agential realism was introduced, to highlight and make analysable the material-discursive practices that shape our entanglement with the world-in-its-becoming. Her ethicoonto-epistemology was introduced to emphasize that what we can *know* about the world (epistemology) is highly dependent on how we *engage* with the world (ontology), and thus determines in part how we should act in the world (ethics). Or, in Baradian terms, how the materialization of the world depends on the apparatus with which we enact agential cuts and thus determine boundaries. In this context, apparatus is understood as the *tools* we use for measurement as well as the *language* we use to speak of phenomena. Therefore, Barad speaks of material-discursive practices, as the discourse determines the material and vice versa. These material-discursive practices are never innocent as the enact agential cuts which "reflect our training and education, the influence of other [bodies], our culture, and so on" (Weber 2020, 4). Both consciously and unconsciously, these material-discursive practices are cultivated and perpetuated, but can also carefully be unpacked, denaturalized, and deneutralized as is the aim of somatechnics.

In the second section of this chapter, the concept of somatechnics was discussed in more detail, followed by an elaboration on the body, technology, cybernetics, and cyborgs. Somatechnics calls attention to the entanglement of bodies and technology, with technology being understood as

⁴⁶ Another approach speculative approach can be found in so-called educational *design experiments:* "Design experiments, as a research methodology, emphasize the detailed implementation and study of interventions with evolving pedagogical goals in rich authentic settings. It acknowledges the complexities of classroom teaching and enlightens both practitioners and researchers by leading to development of theoretical ideas grounded in contexts of practice; design experiments narrow the gap between research and practice, between theory and application" (Mishra and Koehler 2006, 1018-1019). Due to the similar definition, the speculation performed in chapter 3 can also be regarded as a design experiment, though it will semantically be classifixed as a speculation and presented as a Humanities endeavour.

both hard technology as well as disciplinary and regulatory techniques. Interactions between bodies, hard technologies, and techniques are not seen as additive or oppositive. Rather, they are coconstitutive in a process called technogenesis. Inextricably linked, information flows between these human bodies, intelligent machines, and the conventions surrounding them. Hayles' terms this process cybernetics. The inextricability of bodies and intelligent machines make it is impossible to draw a clear ontological distinction between humans and machines, as Haraway's notion of the cyborg shows. Due to our technogenic co-evolution with technology, all humans can be considered humanmachine hybrids or cyborgs according to Haraway. As an analytical tool, this cyborgian logic allows us to see how in online education especially our eyes and ears were extended through webcams, microphones and the internet. However, using such ICT's in online education is not just a matter extending our senses, but of emulating the physical classroom digitally. Emulating a classroom in such different material assemblages creates a completely different 'viewing situation' those participating in higher education, as the concept of 'dispositif' makes clear. As a theoretical concept, dispositif has been incorporated in the definition of somatechnics. However, operationalized through Kessler's Dispositif Analysis Method, it also makes up a central part of the proposed methodological framework in the third part of this chapter.

In the third part of this chapter, the methodological approach to emergency online education was presented. The proposed dispositif analysis is aimed at the critical analysis of synchronous online lectures developed during the COVID-19 pandemic. In addition to describing what this dispositif amounts to, the proposed approach aims to accounts for what this dispositif engenders, and how it can responsible theorized. To this end, the ethico-onto-epistemological, care ethical, and speculative approach has been proposed. This approach allows for a rethinking of (emergency) online education for the near or far future, so as to create a learning environment suitable for the current generation of students in Dutch universities. To specify and apply the ideas introduced in this chapter, the next chapter will contextualize (emergency) online education further as well as introduce two design methodologies for technologically mediated (online) learning environments.

Chapter 2

Introduction

In this chapter, an integrated model for the analysis of (emergency) online education will be introduced, specifying the theoretical framework and methodological approach presented in the first chapter. Due to the rapid changes in ICT's, online education as a practice has evolved and expanded over the past decades. It has been extensively researched from a social-scientific perspective. Building on an existing body of work, this chapter will first introduce (the current debate on) the definition of online education. Secondly, the Community of Inquiry framework (Col-framework) will be discussed, as it was specifically designed to critically analyse and consciously design educational experiences online and as it is frequently used in research on online education in higher education (Meij et al. 2021). Though thorough in its design, the Col-framework could benefit from an additional focus on how the use of technology impacts the content and pedagogical knowledge required to shape the educational experience. To this end, the so-called Technological Pedagogical Content Knowledge model (TPACK-model) will be introduced. The TPACK-model is not specifically designed for the analysis of online education, but it will prove to be complementary to the Col-framework due to its specific focus on the knowledge required to successfully integrate technologies into a new educational situation. In this thesis, the new educational situation refers to the online educational practices developed during the COVID-19 pandemic. In the last section of this chapter, the CoI-framework and the TPACK-model will be combined with Kessler's Dispositif Analysis Method (DAM) into an integrated model, combining relevant social-scientific research outcomes with the theoretical framework presented in chapter 1. The integrated model provides the necessary somatechnical analytical sensitivities needed to consider the dispositif of the students partaking in emergency online education and what cybernetic processes it fosters.

Online Education

In the literature on online education, a wide array of definitions of the phenomenon can be found (Carrillo and Flores 2020). As a practice, it can be referred to as distance education, online teaching, remote teaching, e-learning, online courses, etc.⁴⁷ In their article 'How Many Ways Can We Define Online Learning?', information scientists Vandana Singh and Alexander Thurman present a systematic literature review of the definitions of online learning between 1988 and 2018. Based on their review, Singh and Thurman state there is much confusion surrounding the definition of online learning. However, they observe that, depending on the scholar and year of publication, the definitions differ with regard to three key factors: the element of *time*, level of *interactivity*, and involvement of *technology*. In this case, the element of time refers to the synchronicity and asynchronicity of an online educational practice. As explained earlier, asynchronous online education makes use of ICT's to share material with students so they can work at their own pace and in their own time. Contrary to this format, synchronous online education is dependent on a set study schedule and consists of lectures

⁴⁷ In this context, Massive Open Online Courses (MOOCs) and blended or hybrid learning are also mentioned. MOOCs can be offered both by universities and independent educational institutions. As a format, MOOCs provide large-scale one-to-many education through the internet. In blended or hybrid formats of synchronous education, "students have the opportunity to take courses either with the instructor(s) on-site at the university or participate online from a remote location in real time" (Hagemeijer and Dolfing 2022, 3). Though interesting, MOOCs and blended or hybrid learning encompasses an additional field of research which cannot be accommodated within the scope of this thesis. Therefore, these forms of synchronous (online) education will not be discussed further.
with live discussion, either through a chat window or through video-conferencing software (Smith, Jeffrey, and Collings 2020). Usually, a synchronous online lecture includes a teacher or guest lecturer streaming a presentation to which students can react, either by opening their microphone or typing a message. "For more classroom engagement, teachers [...] can divide students into smaller groups with breakout rooms" (Wintemute 2022). These synchronous online lectures allow teachers to demonstrate specific problems or processes, and use chatrooms, polls, surveys, and shared documents to support interaction between students. So, the element of time determines to the level of interactivity between participants, e.g. synchronous lectures allow students to ask questions concerning unclarities as they come up in real-time. Asynchronous formats enable this type of interaction through discussion boards, but this type of interaction is characterized by a certain degree of delay. Live chats and break-out rooms in synchronous online education engage teachers and students more directly, and in that sense provide higher level of interactivity also depend on the use of technologies in online education.

In the article by Singh and Thurman, technology is defined as "an effective medium for delivering education or to enhance interaction" (295), specifically making use of 'hard technologies' such as laptops, tablets, the internet, and other ICT's (Mishra and Koehler 2006; Adedoyin and Soykan 2020). Here, "technology is used to define online learning by describing how technology delivers content, enhances the existing learning environment, and enhances the interaction among the students or teacher" (Singh and Thurman 2019, 295). Though whether technology 'enhances' learning environments and enhances interaction is up for discussion, as "the mere use of technology as such does not make learning better but is rather only one factor in the design of a course or module" (Bedenlier et al. 2020, 140). For example, access to and changes in technologies should also be factored in, as the synchronous lectures in *MS Teams* or *Zoom* Dutch higher-education students became accustomed to throughout the pandemic were only possible due to a widespread availability of broadband internet, communication software, and webcam hardware.

In the earliest definitions of online education, Singh and Thurman observe a focus on the translation of 'traditional' course material to suit the online format. Later definitions progressively include a focus on the creation of a 'learning environment', within which a community is created between learners (Singh and Thurman 2019, 300-301), as will be shown in the section on the Community of Inquiry framework. These observations lead Singh and Thurman to conclude that a solid definition of online learning should include an explicit focus on the use of technology, with a clear articulation of its inclusion of synchronous and/or asynchronous elements, level of interactivity, and an acknowledgement of the role of physical distance. Based on their own advice, Singh and Thurman provide the following definition:

Online learning is defined as learning experienced through the internet/online computers in a synchronous classroom where students interact with instructors and other students and are not dependent on their physical location for participating in this online learning experience (Singh and Thurman 2019, 302).

In this definition, attention is drawn to the bridging of "space between the teacher and the student through the use of web-based technologies" (Singh and Thurman 2019, 293), connecting the teacher and students via different platforms (Akram et al. 2021). Moreover, it draws attention to the "electronically mediated [...] synchronous communication for the purpose of thinking and learning

collaboratively" (Garrison 2017, 2), in which technology mediates the access to learning materials, the learning process, and the assistance and interaction between teacher and student and between students through different digital communication channels (Akram et al. 2021). In order for this educational experience to be successful, i.e., for the student to develop in their learning and/or reach the satisfactory results, the online learning experience needs to be carefully designed and planned, considering the ICT's operating particularities, possibilities, and limitations for teaching and learning in these environments (Mishra and Koehler 2006; Garrison 2017; Adedoyin and Soykan 2020; Akram et al. 2021), 1025). To this end, the Community of Inquiry framework (Col-framework) was established between 2000 and 2009. Since then, the framework has been developed further to the current extensive instrument for online learning and teaching (Castellanos-Reyes 2020). In the next section, the Col-framework will be discussed to show what an "efficient online learning experience" (Castellanos-Reyes 2020, 559) should include.

Community of Inquiry Framework

Rooted in the work of pedagogue John Dewey's educational philosophy and in social constructivism, the "Community of Inquiry framework is a collaborative-constructivist process model that describes the essential elements of a successful online higher education learning experience" (Castellanos-Reyes 2020, 557).⁴⁸ As a model, the Col-framework was specifically designed to analyse and consciously design online educational experiences for a community of learners. Here, 'community' refers to the students and teachers participating in the educational activity (Garrison, Anderson, and Archer 2000). The Col-framework assumes that learning occurs in an interaction between the three core elements of the model: social presence (SP), cognitive presence (CP), and teaching presence (TP) (see figure 4: The Community of Inquiry n.d.). Below, each of these presences will be discussed.

Social Presence

Social presence (SP) describes how participants interact in digital environments and their level of connectedness to other participants online. As stated above, many current definitions of online learning include the building of a community. Social presence describes the potential for learners to feel connected to one another and to the educational program, which contributes to the overall success of the educational experience (Garrison, Anderson, and Archer 2000, 89; Verkoeijen and Meijers 2022). Moreover, it is social presence which "set[s] asynchronous computer-mediated learning apart from just consuming content" (Castellanos-Reyes 2020, 557). In the literature on social presence, three essential elements are named: *affect, interaction,* and *cohesion* (see figure 5): Garrison 2017, 28). Firstly, the *affective dimension* refers to the ability of participants to show and share feelings regarding the learning activity through open communication in a safe and respectful environment. Though difficult to show body language and facial expressions, it is possible to communicate affects through other means (Meij et al. 2021, 7). In *MS Teams*, for example, it is possible

⁴⁸ As a sociological theory of knowledge, social constructivism describes how human development and knowledge construction is co-constituted through interaction with the environment and other humans: "Through this interaction, ideas are generated that illuminate the external world. That is, meaning is constructed through repeated sharing of thoughts and ideas. Through purposeful collaboration, ideas are communicated and knowledge constructed and confirmed" (Garrison 2017, 10). Moreover, such "learning experience allows students to construct new knowledge with fellow students and a skilful partner like a lecture" (Cecchini et al. 2021, 2).

to share emotions through emoji⁴⁹ (on screen and as reactions to chat messages) and in written form in (private) messages. Here, it is the GUI-specific design which facilitates the expression of social cues (Wei, Chen, and Kinshuk 2012). Secondly, the interactive dimension refers to the recognition of each other's presence by paying attention to the additions others make to the learning environment. This can be done by the same reactions that confirm affection, as well as through explicit complements and additional questions in reaction to certain remarks. Lastly, the cohesion dimension determines a sense of belonging, which can be enhanced through small talk, addressing to participants by name, and referring to the group using inclusive plurals (such as 'we' and 'us' and 'ours') (Meij et al. 2021, 7). Creating a sense of community creates a positive learning experience, a lower dropout rate, and high student satisfaction. This makes didactics online especially important when compared to traditional forms of education (Versnellingsplan.nl 2021), as the community of learners does not implicitly take shape through physical contiguity in on-site classrooms. Moreover, a strong social presence increases "co-construction of knowledge among participants [...] and the impact of online teaching and learning practices" (Carrillo and Flores 2020, 471). Generally though, the identity of a learning community is mostly based in the shared goal of deep and meaningful learning and "not simply social interactions" (Garrison 2017, 47). Therefore, setting the right academic climate is an important condition for participants "to feel sufficiently at ease to engage in meaningful discourse" (Garrison 2017, 38). As can



Figure 4: Community of Inquiry Framework

⁴⁹ The term 'emoji' is a Japanese term for ideograms used in digital communication, such as hearts, expressive human faces, or clapping hands. These can also be referred to as *emoticons*.

be seen in figure 4, this is where the social presence overlaps with the cognitive presence, which will be addressed in the next section.

Cognitive Presence

Cognitive presence (CP) concerns meaning-making processes and critical-thinking practices, and the extent to which students are able to participate in both (Garrison, Anderson, and Archer 2000, 89). "More specifically, [...] cognitive presence means facilitating the analysis, construction, and confirmation of meaning and understanding within a community of learners through sustained reflection and discourse" (Garrison 2017, 51). Garrison et al. operationalise cognitive presence according to a cycle of practical inquiry consisting of four phases: triggering event, exploration, integration, and resolution (Garrison 2017, 66). To make meaning and think critically, students need to be triggered by a problem or question (1), in order to start exploring the problem and selecting relevant information about the matter at hand (2). After exploring, students are asked to integrate the information with prior knowledge (3) so as to solve or answer the aforementioned problem or question (4) (Meij et al. 2021, 8).⁵⁰ It is important to note here that not all educational activities are aimed at solving a problem or answering a question. Lectures, for example, are usually aimed at triggering the student and exploring a problem. Seminars tend to foster integration and problem solving activities. To be successful in both, students need to develop a certain level of higher order skills allowing them to apply their gained knowledge outside of its given context (Meij et al. 2021). Developing these skills takes time, as what is learned needs to be transferred from working memory

Elements	Categories	Indicators (examples only)		
Social presence	Personal/affective	Self projection/expressing emotions		
	Open communcation	Learning climate/risk-free expression		
	Group cohesion	Group identity/collaboration		
Cognitive presence	Triggering event	Sense of puzzlement		
	Exploration	Information exchange		
	Integration	Connecting ideas		
	Resolution	Appling new ideas		
Teaching presence	Design and organization	Setting curriculum and methods		
	Facilitating discourse	Shaping constructive exchange		
	Direct instruction	Focusing and resolving issues		

Figure 5: Community of Inquiry Categories and Indicators

⁵⁰ Here, the operationalisation presented by Garrison, Anderson, and Archer seems to closely resemble Bloom's taxonomy, which describes the "hierarchical classification of the different levels of thinking, and should be applied when creating course objectives" (Bloomstaxonomy n.d.). Bloom's taxonomy dictates that in order for students to start creatively applying their knowledge, they need to go through several stages: remembering, understanding, applying, analysing, and evaluating all precede creative application.

into long-term memory. This requires students to select and organise the acquired information into coherent structures, and integrating it with previously acquired knowledge (Bos, Terlouw, and Pilot, 2009). Working memory only has a limited capacity for processing information, and it takes time for student to store the information in their long-term memory with unlimited capacity (kbhsblog 2021).

Moreover, if a student's working memory is overloaded with information, a so-called cognitive overload may occur: "[c]ognitive overload happens when students receive a large amount of information that is [too] complicated or difficult in terms of time to be adopted" (Tzafilkou, Perifanou, and Economides 2021, 7504). To prevent a cognitive overload, modalities such as carefully timed text, images, videos, diagrams, and schematic drawings can be used, as explained earlier. Often, modalities are "used in concert. For example, speech is one of multiple modes that humans use to communicate, typically complemented by gestures, meaningful spatial arrangements [...] and references to [matters] that maybe within the visual field" (Mills and Unsworth 2017, 5). Such modalities support and shape the learning process. They are meant to help students connect the course material to prior knowledge, handing the students structures to remember it by (Unsworth 2008; Valcke 2010; Colvin Clark and Mayer 2016; Mills and Unsworth 2017). If modalities have a reoccurring, regular pattern, this is called "modal grammar, and these grammars have shared meanings within communities [and] cultures" (Mills and Unsworth 2017, 5).

Generally, the advice is not complicate the educational material by including too many modalities at once (Schnotz 2014; Koptelov and Turner 2021). At the same time, including several complementary modes of address can actually decrease cognitive load (Colvin Clark and Mayer 2016; Sullivan 2018; Zafilkou, Perifanou, and Economides 2021). In educational theory, this is referred to as 'multimodality', which assumes that the use of modalities enhances learning and retention (Chiu 2020; kbhsblog 2021). One of these multimodality principles is dual-coding theory, which describes how learners process sound/image- and language-based modalities. Verbal matters or 'logogens' (spoken or written words) and nonverbal matters or 'imagens' (images or sound not related to speech) can be processed simultaneously, as a dual code. However, learners have a limited capacity to process modalities of the same kind simultaneously: spoken and written text presented at the same time causes learners to either listen or read the presented matter. Speech and writing two cannot be processed simultaneously, unless the same text is read aloud. In that case, the text becomes a visual support accompanying the spoken words. Dual-coding theory also poses that logogens and imagens can be connected in two ways: referentially and associatively. Referential connections put e.g. words to images (and vice versa), and associative connections are used to sketch a more associative connection between e.g. words and images (and vice versa) (Learning Theories 2012). Multimodal learning "occurs when an individual understands what is presented" (Schnotz 2014, 75).

The cognitive presence so far does not differ from the activities any learning activity should foster. Online, however, students are expected to work more self-sufficiently than is expected of students in traditional higher education settings. In fact, "online learning methods can be highly effective and efficient for students who are matured, self-disciplined, motivated, and have a high degree of [(meta)cognitive and] time-management skills" (Koptelov and Turner 2021, 2). This requires the online educational activity to be designed in such a way that students can regulate their own learning, albeit with support of their teacher, justifying their thinking to themselves as well as to other learners. "The acquisition of such (meta)cognitive skills and learning strategies is the task of any

educator" (Carrillo and Flores 2021, 472-473), and thus an integral part of teaching presence (TP).⁵¹ As can be seen in figure 4, the cognitive presence overlaps with the teaching presence in regard to the regulation of learning, which will be addressed in the next section.

Teaching Presence

Teaching Presence (TP) describes the two general tasks of a teacher, which concern the design (1) and facilitation (2) of meaningful educational experiences. As part of the teaching presence, the course content, organisation, educational activities, as well as assessment should be considered. Especially online it is important for teachers to be explicit about these elements, since the informal communication and social signals common to on-site education are not (as) present online (Meij et al. 2021, 5). For teachers to accurately perform their role, they need to have an appropriate understanding of the tools and technology used in online education as well as the "pedagogical possibilities [which] suit their own teaching purposes" (Carrillo and Flores 2020, 475). In a group discussion, for example, teachers need to be aware of the online interaction possibilities when facilitating discourse. Some participants might be discussing verbally through video-conferencing software, whilst others might be reacting to the discussion in the live chat function. These several simultaneous forms of communication require teachers to actively monitor and manage the interaction between students so as to involve all participants, bring "attention to well-reasoned responses, and making linkages to previous [remarks]" (Garrison 2017, 74). Teachers can do this by summarizing threads, but also by giving the students specific assignments and inviting students to participate in peer-to-peer learning. Moreover, allowing students to share what they need and what they find difficult also allows teachers to actively help, give feedback, or redirect students to helpful material and institutions (e.g. study advisors, writing courses, support groups). Additionally, when a teacher is present, timely, and caring, they contribute to a positive learning climate and enhances motivation, which is where the teaching presence overlaps the social presence.

Criticism on the Col-Framework

Since the first iteration of the Col-framework, twenty years have passed. Between 2000 and 2009, the framework was established, becoming "a robust guideline for researchers to use content analyses to explore transcripts of online courses [...] as well as for instructors to make informed decisions" (Castellanos-Reyes 2020, 558). An important addition to the model are the four surrounding factors around the three presences (see figure 4), embedding the educational experience within the educational context, discipline standards, applications, and communication media. By including these four surrounding factors, the Col-framework recognizes the "inseparable relationship between the social environment and personal meaning-making" (Garrison 2017, 9). However, the Col-framework has also been criticized, due to its focus on the instructional method instead of fostering learning outcomes. "Another critique is that the Col-framework needs additional components to be more meaningful as a framework. Researchers suggest the existence of an extra presence but have not achieved consensus on which. Suggested additional components are *learner* presence [...], *emotional* presence" (Castellanos-Reyes 2020, 559; emphasis in original). The

⁵¹ Metacognition refers to the "knowledge and cognition about cognitive phenomena" (Flavell 1979, 906) and is "subdivided in two components: metacognitive knowledge and metacognitive skills" (Keestra 2017, 135-136). Metacognitive knowledge includes knowledge of persons, tasks, and strategies. Metacognitive skills includes planning, monitoring, evaluating, and self-regulation (Keestra 2017, 136).

learning presence, for example, refers to the skills students need in order to regulate their learning (Van der Meij et al. 2021).

Based on Hayles' holistic approach to information/matter, another criticism can be expressed concerning the Col-framework's lack of focus on the interaction between the content of the education and the technology used to teach it. In his book *E-Learning in the 21st Century: A Community of Inquiry* Framework for Research and Practice, leading scholar in the field of online education D. Randy Garrison expresses conflicting statements in regard to technology and medial use. On the one hand, he explains that a "major advantage of grounding research in a comprehensive theoretical framework [such as the Col-framework] is to ensure that the learning experience is not defined by the technology" (Garrison 2017, 28). Yet learning experiences clearly are defined by technologies. Or rather: learning experiences cannot be described as pre-given before their intra-action with technology. On the other hand, Garrison states that "the medium of communication can significantly affect specific learning activities" (Garrison 2017, 98). So, according to Garrison learning activities are not defined by technology but media can significantly affect them. This seems an incongruent understanding of both technology and media, and the Col-framework is not unique in this respect. Only a few studies so far have "explored the technology component as a 'medium' to enhance the effectiveness of learning practices and provided limited attention to the underlying features that lead to impact" (Carrillo and Flores 2020, 470) in online education. This view renders the method of transmission or communication an "important contextual influence that can be strengthened with good design [... and] limitations mitigated with appropriate teaching presence" (98; added emphasis). However, simply applying the 'appropriate teaching presence' still marginalizes the significant role technologies take in (online) educational experiences and their impact should, indeed, not be marginalized. In other frameworks, such as the Technological Pedagogical Content Knowledge (TPACK) Model, technology is placed centrally in the design of educational experiences. In the next section, the TPACK-model is discussed, as it provides a generous insight in the relationship between content, technology, and pedagogy, which is complementary to the Col-framework.

Technological Pedagogical Content Knowledge Model

The TPACK-model was developed to identify "the nature of knowledge required by teachers for technology integration in their teaching, while addressing the complex, multifaceted and situated nature of teacher knowledge" (Koehler 2012). As a model, TPACK was developed by educational scientists Punya Mishra and Matthew J. Koehler in 2006, in a reaction to the increased use technology in educational practices of but lack in vision on *how* it should be used (Mishra and Koehler 2006). Based on their work as "theoreticians and researchers, as well as practitioners and educators" (Mishra and Koehler 2006, 1019), Mishra and Koehler developed the contextual framework that became the TPACK-model. As a framework, the TPACK-model "offers new ways of looking at and perceiving phenomena and offers information on which to base sound, pragmatic decision making" (1019). Moreover, it "emphasizes the connections, interactions, affordances, and constraints between and among content, pedagogy, and technology" (1025), allowing for novel approaches to (online) education which seems especially worthwhile in times of crisis where "knowledge and experience in face-to-face education may not be fully applicable to distance education practices" (Arik 2021, 104).

Like the Col-framework, the TPACK-model can be represented in a Venn-diagram (see figure 6; Koehler 2012). The three base elements are "*content* (the actual subject matter that is to be learned and taught), *pedagogy* (the process and practice or method of teaching and learning), and *technology* (both commonplace, like chalkboards, and advanced, such as digital computers)" (Mishra and Koehler

2006, 1025; added emphasis). In the overlapping areas, these three types of knowledge create three intersecting fields (Pedagogical Content, Technological Content, Pedagogical Knowledge) and one joined model in the middle (TPACK). Below, each of these will be discussed.

CK, PK, and TK

The first primary form of knowledge is Content Knowledge (CK), which represents the knowledge the teacher has about the subject-matter at hand as well as the teaching context, including "knowledge of concepts, theories, ideas, organizational frameworks, knowledge of evidence and proof, as well as established practices and approaches toward developing such knowledge" (Koehler and Mishra 2009, cited by Koehler 2012). Teaching first-year university students, for example, requires a different approach then teaching master students. Here, deep Pedagogical Knowledge (PK) is required about practices and processes within teaching and learning. PK encompasses an overall insight in educational purposes, values, and aims, as well as knowledge of how to plan a course, manage a classroom, and of how students learn (Koehler 2012). Lastly, Technological Knowledge (TK) is concerned with ways of thinking about with technology, tools, and resources (Koehler 2012), as well as using with them:

[This] includes understanding information technology broadly enough to apply it productively at work and in everyday life, being able to recognize when information technology can assist or impede the achievement of a goal, and being able continually adapt to changes in information technology (Koehler and Mishra 2009, cited by Koehler 2012).



Figure 6: Technological Pedagogical Content Knowledge Model

When it comes to technological knowledge, the teacher's "ability to learn and adapt to new technologies (irrespective of what the specific technologies are) [is] important" (Mishra and Koehler 2006, 1028). Like the Col-framework, the TPACK-model discerns three overlapping fields between the three individual forms of knowledge: pedagogical content knowledge, technological content knowledge, and technological pedagogical knowledge. The next section will discuss each of these overlapping areas.

PCK, TCK, and TPK

In the first overlapping field of Pedagogical Content Knowledge (PCK) attention is drawn to the intersection of pedagogy and content, drawing attention to "the representation and formulation of concepts, pedagogical techniques, knowledge of what makes concepts, pedagogical techniques, knowledge of what makes concepts, pedagogical techniques, and theories of epistemology" (Mishra and Koehler 2006, 1027). When preparing their educational activities, teachers interprets the material in such a way that they can present it to the students, making agential cuts in their choices in material (Taylor 2019). PCK, therefore, also applies to the knowledge a teacher needs to transform a subject-matter to suit the specific educational situation, design a curriculum, develop course content, and assess of students (Koehler and Mishra 2009, cited by Koehler 2012). To do this properly, teachers need to understand the technologies they use and how this impacts the content, to prevent misconceptions, correct misapplications, address learning difficulties and foster meaningful understanding (Mishra and Koehler 2006, 1027). This is covered by the Technological Content Knowledge (TCK) domain of the TPACK-model, which concerns the "knowledge about the manner in which technology and content are reciprocally related" (1028).

The TCK-domain also concerns the knowledge teachers need to master in addition to the subject-matter they teach:

they must also have a deep understanding of the manner in which the subject matter (or the kinds of representations that can be constructed) can be changed by the application of particular technologies. Teachers need to understand which specific technologies are best suited for addressing subject-matter learning in their domains and how the content dictates or perhaps even changes the technology—or vice versa (Koehler and Mishra 2009, cited by Koehler 2012).

As an example, Mishra and Koehler discuss the use of *Geometer's Sketchpad*, which allows students to digitally construct shapes and forms based on their mathematical assignments. They explain that "[b]y allowing students to 'play' with geometrical construction, [the nature of learning geometry itself changes, as] proofs by constructions are not available prior to this technology" (Mishra and Koehler 2006, 1028). This reciprocal relationship between technology and content closely resembles Hayles' co-constitutive understanding of information and materiality as described in chapter 1. Moreover, like Barad, Mishra and Koehler explicitly state that knowledge is only available after the encounter with technology: there is no pre-given understanding or state, as this is only created through the student's entanglement with technologies. Unlike the Col-framework, therefore, the TPACK-model places the intra-actions with technology central to learning instead of making it a contextual influence.

Lastly, the Technological Pedagogical Knowledge (TPK) domain describes "the existence, components, and capabilities of various technologies as they are used in teaching and learning settings, and conversely, knowing how teaching might change as the result of using particular

technologies" (Mishra and Koehler 2006, 1028). For example, a synchronous online lecture allows students to immediately ask question when something is unclear, but the lecture cannot be paused to take notes. Pre-recorded lectures do afford pausing, rewinding, and rewatching, but unclarities cannot be remedied in real-time. So, the affordances and constraints of these technologies are necessary to consider in "pedagogical designs and strategies" (Koehler and Mishra 2009, cited by Koehler 2012). This applies both to the affordances of hard technologies as well as consequences for the students' dispositif.

ТРАСК

Combined, these insights created the central domain of the TPACK-model, which states that deep and meaningful learning can only occur when understanding the technologies used. Thoughtfully interweaving technology, content, and pedagogy, however, is not a matter of applying a set of guidelines to a pregiven situation. Mishra and Koehler state that "[q]uality teaching requires developing a nuanced understanding of the complex relationship between technology, content, and pedagogy, using this understanding to develop appropriate, context-specific strategies" (Mishra and Koehler 2006, 1029). Therefore, the TPACK-model "provides an analytic framework and categorization schemes for the analysis of teacher knowledge and its evolution" (Mishra and Koehler 2006, 1045). This is especially useful for regarding the incorporation and use of new technologies and media, as these "reconstruct[...] the dynamic equilibrium among [content, knowledge, and technology]" (Mishra and Koehler 2006, 1030). In this regard, the underlying (onto)-epistemological ideas of the TPACKmodel connect to the Baradian philosophy presented in chapter 1: the entanglement with additional matters changes meaning(-making) and discursive processes. Moreover, as Mishra and Koehler also argue, such an addition should be considered with great care, advocating for the confrontation of educational issues in teaching with the goal of "becoming intelligent users of technology for pedagogy" (1032). In this sense, the TPACK-model also encompasses a certain ethics towards education, expecting educators to consciously consider how their teaching is impacted by technology use.

Confronting educational issues, however, is easier said than done. Especially in emergencies, such as the online educational situation many have experienced during the COVID-19 pandemic. Developing well-designed education, be it for on-site or online teaching formats, requires a certain level of professional expertise as well as time. Contrary to the well-designed, pre-planned, and extensively researched models for online education, the curriculum developed during the pandemic can only be referred to as an 'emergency' situation that was brought together in no time. In the next section, I will discuss the challenges emergency education presented and the additional considerations this situation has brought about for HEI's.

Emergency Online Education

As stated above, the sudden shift from on-site to online education due to the COVID-19 pandemic brought several difficulties for students, teachers, and supporting staff. A lack of readiness was felt amongst all parties involved as most were unfamiliar with the used technologies. Using ICT's to provide synchronous classes online increased the workload for teachers tremendously, as the course material and pedagogical/didactic approach had to be developed whilst the course was being taught. Moreover, student motivation and engagement proved to be difficult to foster: many students experienced a lack of mentoring and support, and issues arose in learning due to teachers' (understandable) lack of competencies in providing sufficient online education (Adedoyin and Soykan 2020; Bhagat and Kim 2020; Carrillo and Flores 2020; Bedenlier et al. 2020; Van der Spoel et al. 2020; Arik 2021; Cecchini et al. 2021; Di Gesú and González 2021; Chiu 2022; Verkoeijen and Meijers 2022). Like their teachers, students were as unfamiliar with the online format, creating a mismatch between needs, expectations, and mode of delivery of both parties.

Unfortunately, throughout the pandemic students increasingly reported concentration and motivational problems, isolation, anxiety, loneliness, and increased levels of stress, due to the increased use of digital technology, failing technological means, lack of belonging and connectedness, and the loss of physical social interaction (Chaudron 2020; Dujardin 2020; Spekkink 2020; Xie et al. 2020; Consultancy.nl 2021; Salimi et al. 2021; Turnbull, Chugh, and Luck 2021). Only through the ICT's were students allowed to interact with the outside world and their personal spaces had to welcome the arrival of university spaces (Di Gesú and González 2021a). The students' (and teachers') homes were "invaded by devices and screens [... which] melted into the foreground [...] under terms and conditions no one thought would ever apply" (Williamson, Eynon, and Potter 2020, 111). The pandemic left higher education unable to fulfil students' basic psychological needs for autonomy, competency, and relatedness which are necessary for students to feel engaged and motivated (Chiu 2022; Verkoeijen and Meijers 2022). ⁵² At the same time, and just like their teachers, the students understood the necessity of the adoption of the online format to deal with the global crisis caused by the COVID-19 virus (Chaudhry et al. 2021).

Reiterating the definition of somatechnics presented previously, the hard technologies in combination with regulatory techniques ushered to curb the pandemic evidently greatly determined the students' learning experience. However, even before the pandemic, educators have increasingly been calling attention to the students' social and emotional experiences in higher education, as these influence the learning (Darling Hammond and Hyler 2020; Versnellingsplan 2021). "In such context, issues of agency, responsibility, flexibility, and choice are key elements, as are careful planning, designing, and determination of aims to create an effective learning ecology" (Carrillo and Flores 2020, 467). The pandemic underlined the importance of student wellbeing and social inclusion in the design and execution of (online) education even more: it demands for a broader understanding of technology and how learning is situated through it. To this end, the integrated model presented in the next section was developed, combining the Col-framework, TPACK-model, and DAM to account for a somatechnically aware approach to (online) education.

An Integrated Model⁵³

To move toward an analytical framework which can account for a somatechnically aware approach to (online) education, this section presents an integrated model (see figure 7; Mijland 2022c). As stated above, this model is based on Kessler's DAM, the Col-framework, and the TPACK-model. Though, each of these presented theories could have been used to analyse the online education, their combination

⁵² Autonomy, competency, and relatedness are based in self-determination theory. "Self-determination theory (SDT), proposed by Deci and Ryan (1985), is a macro-level theory of human motivation that aims to explain the dynamics of human need, motivation, and well-being within a social context" (Chiu 2022, 15). Autonomy refers to the balance between mandatory learning activities and the opportunity for students to plan their own study activities. Competence refers to the knowledge, skills, and attitude students develop in their learning process. Relatedness refers to the connection students feel to the learning community and institution they study at. Explaining why students are asked to participate in certain learning activities is key in enabling students to learn and improve individually and together (Chiu 2022, 15).

⁵³ The integrated model presented here was created making use of integration techniques presented by Allen F. Repko and Rick Szostak in their book *Interdisciplinary Research: Process and Theory* (2021).

has resulted in a model which allows for a heightened awareness of the specific technomediated situatedness of the online educational practices developed during the COVID-19 pandemic. Visually, the integrated model closely resembles its source material, copying the triangular shape from the DAM and the Venn-diagram format from the CoI-framework and TPACK-model. Initially, the DAM was used to build the basic triadic structure, highlighting the intra-active relationship between each pole. On this, the CoI-framework was mapped. In the next sections, each pole will be discussed separately, explaining the design choices and theoretical implications.

Participants

In the right-hand corner, the 'participants pole' can be found. This pole is a combination of the userspectator pole from the DAM and the social presence in the CoI-framework. In the CoI-framework, the social presence refers to all participants that make up the learning community: teachers and students. In the DAM, the user-spectator pole represents all bodies participating in a specific situation. By using the term 'participants', the integrated model positions the embodied presence and mode of engagement of both students and teachers as an integral part of the educational situation. As put forward by Jacques Rancière in *The Emancipated Spectator*, spectators are always active participants: "We [always] learn and teach, act and know, as spectators who all the time link what we see to what we have seen and said, done and dreamed" (Rancière 2009, 17). Therefore, the term 'participants' is used to describe the people involved in online education (students and teachers, as put forward by the CoI-framework) as well as the type of involvement (specifically 'user', put forward in the DAM). In the TPACK-model, the participants are implied as the pedagogical approach, technology use, and content are designed by the teachers to suit the students.

Technology

In the top corner, the 'technology pole' is located, combining teaching presence with the technopragmatic pole and technological knowledge. Technological knowledge, according to the TPACKmodel, refers to certain ways of thinking about and working with technology, tools, and resources. Understanding technology in this way closely resembles Kessler's description of the techno-pragmatic pole, which looks closely at technologies and their affordances. Therefore, the DAM's technopragmatic pole can logically be combined with the technological knowledge circle of TPACK. However, incorporating teaching presence in this pole may seem inconsequential as the description provided by the Col-framework focusses more on the tasks of the teacher instead of the use of 'hard technologies'. At the same time, the teaching presence does call attention to the supporting role teachers have in the *purposeful use* of the online format. Moreover, teaching presence makes explicit how much the teacher is in charge of setting the climate and regulating learning. As explained in the first chapter, technology can both refer to 'hard technologies' as well as 'regulatory techniques'. In this regard, teaching itself can be regarded as a technique to regulate bodies, of oneself and others, and bodily processes. Therefore, the technology pole in the integrated model combines both types of technologies. Together with the participation pole, the technology pole allows for a closer examination of the somatechnicalities of the educational experience.

Informatter

In the lower left corner, the 'informatter pole' can be found. This pole combines the textual pole from the DAM with the content knowledge described in the TPACK-model. The informatter pole inextricably links text, images, sound ('matter'), and other modalities to the content of the education, as described

through concepts, theories, and ideas (here: 'information'). To name this pole, the combinations of 'information-matter' or 'informationmatter' could have also been used. However, like somatechnics, the combined concept of 'informatter' calls explicit attention to the inextricability of information and matter, or 'information and its material substrate' in Hayles' words. This combination nullifies the notion of "technology as an effective medium for delivering education" (Singh and Thurman 2019, 295) as presented in the section on the definitions of online education. Instead, it focusses the attention on the material properties of modalities themselves entangled with the course content.

Additional Considerations

Thus far, the integrated model has accounted for all poles, presences, and knowledges presented in the source material, except for the cognitive presence from the Col-framework and the pedagogical knowledge from the TPACK-model. In the Col-framework, the cognitive presence encompasses meaning-making processes and critical-thinking practices, and the extent to which students are able to participate in both. In the context of this thesis, however, cognition is understood as *distributed*: sensorimotor experiences and thinking processes are embodied and embedded in somatechnical intra-actions with the world in its ongoing becoming. Distributed cognition has been taken up by several scholars and is expressed through different but overlapping frameworks. Currently, the socalled '4E-model' is used to refer to the four most well-established theories considering cognition as embodied, embedded, enactive, and/or extended. Each of "these models emphasize inter-relations between human and non-human agents, and between conscious awareness and a variety of other cognitive faculties" (Hayles 2010a, 269). So, "[w]hat often is at stake in debates under the umbrella of 4E cognition is the extent or degree to which cognitive processes are extended beyond the body (into the environment) and hence whether it is more appropriate to think of cognition as extending into the external environment, or somewhat less dramatically scaffolded by it" (Maecham and Casanova 2018, 272). In the context of embodied cognition, Hayles also discusses what she terms 'nonconscious cognition':



Figure 7: An Integrated Model

As recent work in the neurosciences and cognitive sciences has confirmed, most of our mental life is nonconscious, not unconscious as Freud thought – not hidden from consciousness through mechanisms of suppression and repression – but consistent of cognitive nonconscious processes that are simply inaccessible to consciousness [...] These nonconscious processes filter the enormous amount of information coming from the body and from the environment through sensory perceptions, recognising patterns, drawing inferences, and adjusting between conflicting and ambiguous information (Pötzsch and Hayles 2014, 105-106).

Consciousness only has a limited capacity for processing information, i.e., a limited cognitive load, compared to its unconscious or nonconscious counterparts. "Nonconscious cognition supports consciousness by filtering out irrelevant information, feeding forward only that which is contextually relevant at the moment" (Pötzsch and Hayles 2014, 106) so as to prevent cognitive overload. Though impossible to fathom nonconscious cognition, an estimated guess can be made by assessing the environment within which the cognition takes place. Within the described somatechnical approach, this accessing is done by analysing the sensorimotor experience (Sullivan 2018; Ferreira 2021) of students in online education, focussing specifically on the participants, technologies and informatter. We need to consider "the circumstances of the interpretive process, the capabilities and embodiments of the interpreters, and the environments in which interpretations take place" (Hayles 2018, 1231). Therefore, in the integrated model, cognition is be understood as distributed between all three poles.

Like cognitive presence, the pedagogical knowledge from the TPACK-model is also understood as distributed between all three poles. Pedagogical knowledge refers to the insight in educational purposes, values, and aims, as well as the knowledge on how to plan a course, manage a classroom and of how students learn. If anything, pedagogical knowledge should be understood as the knowledge of all three poles that make up the integrated model: of participants, technology, and informatter. Here, the knowledge links to the applications, communication medium, discipline standard and educational context outlining the Col-framework (see image 4), and the rather vague 'contexts' included in the visualisation of the TPACK-model (see image 5). Like Kessler's DAM, the integrated model includes the context of the technology, participants, and informatter visually implicit, so as not to create the impression of a pre-given contextual situation.⁵⁴ Instead, the educational context is understood as *emerging* from these poles. In this sense, like the Col-framework and TPACK-model also suggests, learning always comes about collaboratively, a material-discursive practice, and so should the pedagogical approach. Combined with DAM, the presented integrated model provides an analytical approach to emergency online education.⁵⁵

Conclusion

As stated in the introduction, this chapter was aimed at contextualising (emergency) online education as well as developing an integrated model for analysis of the specific educational practices developed during the COVID-19 pandemic. First, the definition of online education was presented. According to Singh and Thurman, any definition should include three key factors: the element of time (synchronicity/asynchronicity), the level of interactivity, and the involvement of technology. In the

⁵⁴ It is for this reason that Kessler's work has been labelled as 'posthumanist' and 'new-materialist'.

⁵⁵ I am aware that the integrated model's 'actionability' currently falls outside this thesis, but I have the hope that in my roles of both student and (soon-to-be) teacher I will be able to put it to practice.

earliest forms of online education through web-based ICT's, the focus lied on the translation of 'traditional' course material to suit the online format. However, as time passed and technology evolved, the focus shifted from the material to the learning community, as can be seen in the approach to online education provided by the Community of Inquiry framework.

As a research methodology and design approach, the Col-framework is based on the collaborative-constructivist process model. As a framework, it focusses on the interaction between the social presence, cognitive presence, and teaching presence which together shape the educational experience. The social presence focusses on the participants in the learning community, including both students and teachers. The cognitive presence describes the meaning-making processes and critical thinking practices the educational experience should foster. The teaching presence focusses on the task of the teacher to help guide cognition and create a cohesive learning community. To complement to the presences presented in the Col-framework, the Technological Pedagogical Content Knowledge Model was introduced. As a model, TPACK was developed to help teachers become more aware of their technology use. Like the Col-framework, the TPACK-model focusses on three key factors in educational design: the subject-matter to be studied (content), the method for studying this content (pedagogy), and the medium used to do so (technology). When combined successfully, deep, and meaningful learning should occur.

Looking at the COVID-19 pandemic through both social scientific models, it becomes clear that the sudden shift from a 'traditional' on-site curriculum to a fully online format brought along several difficulties. In a matter of days or perhaps weeks, teachers had to improve their technological knowledge and pedagogical skills to suit the online format. Moreover, they had to learn how to foster an online learning community and foster cognitive processes based in a medium unfamiliar to them. In return, students also had to adapt to a new form of education they did not actively choose to participate in. Due to this complex situation, the educational situation during the COVID-19 pandemic is referred to as an 'emergency' teaching situation, setting it apart from voluntarily chosen, welldesigned, and extensively researched forms of online education. To research this emergency online educational situation, as is the central aim of this thesis, the last part of this chapter presented an integrated model.

In this model, Kessler's method for DAM, the Col-framework, and the TPACK-model have been combined based on their complementary qualities. Dispositif analysis situates the specific educational experience clearly within the COVID-19 emergency, whilst the Col-framework draws attention to the success factors common in non-emergency forms of online education. Furthermore, the TPACK-model adds an awareness to the importance of pedagogy in the development in relation to course content and technology use. Combined, the integrated model presented in this chapter provides an analytical approach to emergency online education which will be used in the next chapter to answer the subquestions of this thesis: how can we specify the dispositif of the students partaking in emergency online education in HEI's in the Netherlands during the COVID-19 pandemic? And, consequentially, given this specific dispositif, how does the use of emergency online education in higher education impact the information flow within and between students, teachers and ICT's?

Part II.

The Great Involuntary Social and Educational Experiment that is Emergency Online Education during the COVID-19 Pandemic.⁵⁶

⁵⁶ In an article on the website of *The Chronicle of Higher Education,* educational scientist Joseph P. Zimmerman called that the online educational situation during the pandemic the 'great online learning experiment' (Williamson, Eynon, and Potter 2020, 112). He explains that the COVID-19 pandemic "has created a set of unprecedented natural experiments [as, for] the first time, entire student bodies have been compelled to take all their classes online" (Zimmerman 2020). In addition to being an educational experiment, the online educational situation can be seen as a social experiment, albeit one for which none of the respondents applied voluntarily. Hence, the title of part II.

Chapter 3

In this chapter, the online educational situation during the COVID-19 pandemic will be analysed using the integrated model presented in chapter 2. Firstly, each separate pole will be discussed, comparing the pre-pandemic lecture experience of students at Dutch universities to its emergency synchronous online counterpart. Under each pole, relevant literature will be brought together complemented by autoethnographic descriptions.⁵⁷ As a case study, the interface of *MS Teams* will be used to visually illustrate the use of ICT's in synchronous online lectures. Secondly, the educational experience will be described, describing how the online format regulated learning, set the climate, and supported discourse. Throughout the first and second part of this chapter, the dispositif of students partaking in emergency online education in HEI's in the Netherlands during the COVID-19 pandemic will be made clear, answering the first subquestion. In the third part, the second subquestion will be answered, describing how does the use of emergency online education in higher education to this chapter will provide an answer to the main question by explaining what analytical sensitivities the concept of somatechnics discloses about emergency online educational practices developed in Dutch universities during the COVID-19 pandemic.

Participants Pole

In this section, the participants partaking in synchronous online lectures will be discussed, focussing on their *expectations* and *attitude* (see figure 8: Mijland 2022d). Like the Col-framework, theses participants include both the students and teachers directly interacting with one another in the



Figure 8: Participants Pole

⁵⁷ As put forward in the acknowledgements, I experienced the emergency online educational situation first hand as of my research master's program took place online due to the COVID-19 pandemic. In accordance with the chosen autoethnographic approach, the dispositif described in this chapter is in part based on this experience. I am aware there are individual differences my experiences cannot account for. However, my aim is not to share my individual experiences. Rather, I aim to use my experiences to investigate what we can learn from participating in this large involuntary social and educational experiment.

educational experience, though specific attention will be paid to the students. As explained in chapter 2, teachers provide the general structure of a course, its learning goals, materials, and classes. When preparing a course, they make certain agential cuts determined in part by the institutions and countries within which they teach (Taylor 2019), in this case HEI's in the Netherlands. In these HEI's, teacher encounter students. So, who are these students "enrolling in our schools, colleges, and universities?" (Serres 2014, 1). What schools, colleges, and universities are they enrolling in? How are they being taught? How does this determine the students' *attitude* and *expectations* towards their role as participants in education? And how was the education impacted by the COVID-19 pandemic? First, this section will discuss Dutch higher education, followed by a description of the lockdown restrictions in the Netherlands. Lastly, the role and attitude of the students within Dutch university education will be discussed as situated in within this context.

In general, the Dutch educational system is characterised by a division between universities (WO) and universities of applied sciences or of the arts (HBO).⁵⁸ Both types of education offer bachelor and master's degrees in accordance with the European Bologna declaration of 1999 and the Dublin descriptors from 2004. In most HEI's, the academic year consists of two semesters divided into two blocks.⁵⁹ Nearly all programs start in September and end in June, but some programs offer the option of starting in February. To enter a Dutch HEI, students must have successfully completed their secondary education at upper levels "in one of the signatory countries of the Lisbon Convention [... or must be] in possession of a valid school leaving certificate and qualify for higher education in [their] home country" (Study in Europe n.d.), provided they pass any additional requirement.⁶⁰ In the Netherlands, this means that students as young as 17 or 18 can enter university bachelor programs. After passing the entry requirements, students are officially registered after paying the set tuition fee. The height of the tuition fee depends on the students' country of origin.⁶¹ Additional costs of living in the Netherlands are estimated between €800,- and €1.100,- per month for students (Study in Holland n.d.(b), Nibud 2022).⁶² To get by, Dutch students are depended on government loans and, in some instances, scholarships.⁶³ A full-time degree in the Netherlands has a course load of 60 ECTS in both undergraduate and graduate education. This is the equivalent of a full-time, 1.0fte working week.⁶⁴ In addition, many students hold a side job to compensate a portion of their monthly expenses (ING n.d.;

⁵⁸ In Dutch, WO stands for 'Wetenschappelijk Onderwijs' or Scientific Education and HBO stands for 'Hoger Beroepsonderwijs' or professional higher education. HBO bachelor's degrees take 4 years (240 ECTS) and university education takes 3 years (180 ECTS). HBO master's degrees take 2 years (120 ECTS) and university master's degrees can take either 1, 1,5, 2, or 3 years (60, 90, 120, or 180 ECTS).

⁵⁹ From September till January and from February till June.

⁶⁰ Additional requirements may entail a language requirement for sufficient proficiency in (academic) English or a specific educational background which matches the chosen degree program.

⁶¹ The tuition fee for the academic year of 2022-2023 has been set at €2.209,- (Duo n.d.). Non-European students pay between €5.000,- and €28.000,- euro's per year for their studies at a Dutch higher education institution.

⁶² The estimated living expenses in 2021 were around €1.030,- a month (Nibud 2022). This estimate, however, was made before the housing crisis and increased costs of living due to the heightened inflation in 2022.

⁶³ All students can loan a maximum set sum per month (€1.001,49-) for up to 10 years. Students from low income families can claim an additional scholarship per month (max. €387,78-) (Duo n.d.).

⁶⁴ Abbreviation of: European Credit Transfer Systems. One EC represents 28 hours of work (Government n.d., Atack 2022, The Student Guide n.d.). This means that one year at the university translates to 1680 hours of studying. These hours are spread out over roughly forty work weeks, which means students are expected to spend at least 42 hours per week on their studies. This includes the time spend in class as well as other study activities. Study in Holland n.d. (c)).

Study in Holland n.d.(c)).⁶⁵ Therefore, studying requires students to have quite a serious *attitude* towards studying, considering how much time and money they are expected to invest in it. In return, this creates certain *expectations* towards the education in which these students are partaking: it is expected to make their investments worthwhile.

As a teaching format, Dutch higher education usually combines lectures with seminars and tutorials, but also includes internships or laboratory work in their programs (The Student Guide n.d.). Depending on the program, the examination can be open-book, take-home, practical, or multiplechoice exams, papers, essays, individual or group presentations, (academic) reflections, internship or research report, or research proposals. At the end of the study programs, the final examination is usually a thesis or (participation in) a (personal) research project. Compared to higher education in other countries, the Dutch style of teaching is (supposedly) characterized by an interactive, studentcentred approach.⁶⁶ In class, specifically during seminars, this means that interaction is highly appreciated, and students are expected to share their thoughts, formulate opinions, and ask questions based on the studied material. A necessary condition for this type of interaction is a safe learning *climate* which *supports discourse* between participants. Moreover, students are expected to have a high level of self-sufficiency in learning, especially in research universities. In some programs, especially in the Humanities faculty, students only have twelve contact hours with their classmates and teachers. The rest of their time is spent on reading course materials themselves and working on (group) assignments, either at home or at the university facilities. So, in return, the students' expectation of the course material is that it can easily be studied individually. To support this type of education, all universities in the Netherlands depend heavily on the use of asynchronous online education platforms such as *Blackboard* and *Brightspace*.⁶⁷ Therefore, 'sage-on-a-stage' on-site lectures normally only make up a small portion of the educational activities current students participate in.68

Until the pandemic, the university's educational structure with lectures, seminars, and selfstudy activities was the normal set up. Students were expected to prepare classes, attend lectures, speak up in class, hand in their individual or group work on time, and pass their courses. Outside of the lecture hall, students were relatively free in determining their study planning, interacting socially with other students, as well as working to support themselves financially. So, even if a one-to-many lecture is seen as an ineffective educational format for the current generation of students (Serres

⁶⁵ At the start of 2020, 63% of the students in HBO and 60% of students in WO worked a side job, spending on average at least 13 hours a week working in addition to their studies. Most earned around €400,- per month. Due to the pandemic, most students lost their side job. In the Netherlands, at least 45% of the adolescents in higher education plan on working, but in the second half of 2020 only 35% found a suitable side job (ING n.d.). Many international students have even more difficulty finding a job, as not all visa's legally allow them to earn money during their residency in the Netherlands.

⁶⁶ According to the website *Studyinholland.nl*, which is an initiative from the Dutch Institution for Internationalisation in Education, or the 'De Nederlandse Organisatie voor Internationalisering in Onderwijs' (Nuffic). Nuffic is an organisation working for the Foreign Affairs office of the Dutch government (Nuffic n.d.), and the *Studyinholland.nl* website was founded to explain (and promote) Dutch higher education to international students.

⁶⁷ According to the website of the Dutch government, 92% of people in the Netherlands use internet due to the 'excellent' digital infrastructure (Rijksoverheid 2017). The use of internet, however, does not disclose anything about who has access to internet and the type of access they have (public Wi-Fi, internet at home, etc.).

⁶⁸ Usually a student takes 2 (7,5 ECTS) to 3 (5 ECTS) courses per block with each having 1 lecture of 2 hours. Depending on the program, this means students have 4 to 6 hours of *lectures* each week, which makes up less than 15% of their study activities ($100/42*6\approx14,28$).

2014; Hayles and Pötzsch 2014; Van der Tuin and Zuurmond 2021), on-site lectures would only have been a minor 'inconvenience' for them. However, during the pandemic as a whole an especially in full lockdown, this 'minor inconvenience' of full-frontal teaching ended up being one of the few collectively shared educational activities the university offered.⁶⁹ Like other countries, the Dutch government decided to close of all public and commercial buildings, except for grocery stores, restricting those living in the Netherlands to their homes and when needed health-care institutions (Rijksoverheid n.d.). In Dutch higher education, these measures meant that the rest of the second semester in 2020 had to be taught fully online without any preparation. In doing so, the Dutch government tried to achieve "an overall equilibrium that protects the security of the whole [nation] from internal danger" (Foucault 1976, 249) and keep the spread of the COVID-19 virus under control, explicitly instating what, in Foucauldian terms, should be called a 'biopolitical regime'.

Like students in other countries, students in the Netherlands were asked to make themselves useful and docile by staying home and continuing their studies online. The rationale behind separating out higher-education students from participating in on-site education was that they are self-sufficient in taking care of their own studies (Zhang, Wang, and Li 2020; Meij et al. 2021), more so than students in elementary schools and high schools.⁷⁰ After all, the educational format already highly depended on the *expectation* of self-sufficiency and the students' investment-incentivised attitude towards their education. In addition to this, HEI-students usually travel considerable distances by public transport to reach campus. So, by closing higher education, the risk of spreading the virus over a large geographical area diminished tremendously. The rationales behind these lockdown measures sound logical. However, in effect, it restricted all students in higher education from fully participating in the daily activity they are putting themselves in debt for. In fact, it is exactly their studying which lends them the title of *student*. Luckily, after the first lockdown period ended in April, the Dutch government slowly allowed for university buildings to be opened for a select group of students, teachers, and supporting staff. It was made mandatory to wear facemasks when moving around on-site, but at least students could attend campus again. Still, all lectures for over fifty students were scheduled online and most seminar groups had to be accommodated in large classrooms as to be able to maintain the 1,5 meter distance restriction. Yet, even with these precautionary measures, many of the educational activities still had to be rescheduled online, as many students and teachers had to be quarantined, chose to self-isolate, or were stuck in another country. Continuing well into the academic year of 2021-2022, the on-site educational activities were interrupted due to nationwide lockdowns to reduce the number of COVID-19 infections and patients in IC units.⁷¹

The biopolitical regime set up by the Dutch government prevented students from maintaining a balance in their study activities. Against these ever-changing measures, students had to keep up their education to the best of their abilities but losing their connection to student life for many meant the loss of a generally helpful educational regime (Di Gesú and González 2021a). Many students rely on attending "different classrooms and meeting different classmates [...] as part of their developmental process" (Xie et al. 2020, 182). Those students who were able to adapt to the situation

⁶⁹ At least in the beginning of the pandemic, when teachers were still familiarizing themselves with the medium. Other teaching strategies were developed later, but in my experience the full-frontal lecture never disappeared. ⁷⁰ Crudely, the same Dutch government that ushered the lockdown restrictions expects students to take full advantage of financial means they offer, but is also currently threatening to cut down funding even further and tax current student loans (LSVb n.d.; Trajectum 2022).

⁷¹ The full lockdown periods took place between November 2020 and March 2021, as well as between December 2021 and January 2022 (Rijksoverheid n.d.).

could still "benefit from these unfamiliar learning environments, [...] [but others were] simply struggling to keep up with their education and stay motivated and engaged" (Chiu 2022, 14). Additionally, "[i]nternational students also had to deal with the uncertainty of not knowing if or when they could return to their countries due to travel restrictions" (Salimi et al. 2021, 2). Moreover, many students lost their side jobs (ING n.d.), creating financial difficulties especially for those with a lower socioeconomic status. This made it difficult to keep up with the material demands for their studies, e.g. a laptop that could support to the necessary software for programs such as MS Teams, Google Meet, or Zoom (Blankenberger and Williams 2020, 414). Maintaining a healthy work-life balance and financial situation was already challenging for students before, but the biopolitical regime of the pandemic made it even more difficult (Pereira 2015; Smith, Jeffrey, and Collins 2020; Górska 2021). As stated earlier, this situation caused many students to (further) develop mental-health complaints. So, by preventing one virus from spreading, the Dutch government unintentionally increased the accumulation of other ailments (Tielemans 2022).⁷² Though students might be expected to be selfsufficient, putting them in the margins and separating them out of society at large does not benefit them or their education at all. Under normal circumstances, higher education is already challenging (Salimi et al. 2021), balancing studies, social life, work, and other activities. A fully online study program emphasizes even more the importance of setting a healthy and conducive learning climate, both in class and out. Specifically, a learning climate with reliable financial support, a healthy worklife balance, and a reasonable level of self-sufficiency.

Considering the above, the *attitude* of the student towards studying and their *expectation* of the synchronous online lectures can be understood as conflicted and multi-layered. In general, students want to partake in synchronous online lectures, as they signed up for their degree and are paying a large sum of money to attend. Moreover, during the pandemic, the online format was the only social and educational interaction the lockdown restrictions allowed for. So, not attending the lectures would have meant no interaction with classmates and teachers at all. At the same time, the lockdown restrictions made fully participating in this type of shared educational activities quite difficult. As stated above with reference to Serres, on-site lectures already force students into a passive posture, "[shackled to their seats], immobile and silent, mouth closed, firmly in [their] place" (Serres 2014, 34), setting an unconducive learning *climate*. Online this passive posture is perpetuated but made even more restrictive, both due to the biopolitical regime instated by the Dutch government as well as the use of the online platform, as the upcoming section on the technology pole will explain further. Due to this, as stated above, keeping an open and attentive *attitude* towards a 'traditional' lecture on a non-traditional platform proved considerably more difficult for students, and the decreased educational quality lowered their *expectations* in the process.

Of course, not only students were affected by this. The sudden shift from on-site to online granted teachers little to no time to acquaint themselves with the medium, let alone predict how it would affect the educational experience for students. Since at the beginning of the pandemic almost no teacher had experience teaching lectures online, basing the online educational practice on its on-site counterpart was a logical approach. As experience has proven, however, this approach turned out to be insufficient for setting a constructive learning *climate* (Garrison 2017; Singh and Thurman 2019; Meij et al. 2021). For learning to occur at all, an elaborate understanding of technology and the way it

⁷² In Dutch: "Serieuze problemen die richting een psychische stoornis gaan" (Tielemans 2022). Most of the reported issues were *worsened* by the pandemic, i.e. they had been prevalent before but apparently were not as impairing.

situates participants is of the utmost importance (Adedoyin and Soykan 2020; Carrillo and Flores 2020). Therefore, in addition to the biopolitical regulatory techniques described above, the next section will focus more specifically on the regimes instated through technology.

Technology Pole

In this section, the technology involved in online education will be introduced. Specific attention will be paid to the *communication space* and assigned *roles* of those participating in the educational activity, comparing the synchronous online classroom to the pre-pandemic lecture hall (see figure 9: Mijland 2022e). In pre-pandemic higher education, lectures would have taken place in physical, on-site lecture halls at the university campus. When searching for images of lecture halls online, the most common search result shows rows of chairs with tables in a semi-circle focussed on a central area in the middle (see image 1: Ecosia 2022, screen shot). In this setting, a teacher can address a large body of students, using the architecture, whiteboards, a microphone, slides, gestures, and other technologies to support their presentation of course materials (Serres 2014; Sullivan 2018; Chiu et al. 2020). These different educational technologies are central part of the educational experience. Most of them have been rendered commonplace to the communication space (Mishra and Koehler 2006, 1023) demarcating boundaries "between what is permitted and what is not" (Di Gesú and González 2021b, 205), or, in Foucauldian/Baradian terms: the said and the unsaid.

The classical amphitheatre architecture cues the participants to focus their attention on one central point, a raised hand tells the teacher there is a question, a closed door means participants should not leave or enter the space without reason. Such cultivated 'rules of physical place' (Timeto 2015) determine behaviour, set the *climate*, and are, in principle, instated to *regulate learning*. Consequentially, they assign the participants their respective *roles*. In case of a lecture, students receive the role of "a passenger [with a passive posture] who is being driven around in a vehicle with a professor at the steering wheel" (Van der Tuin and Zuurmond 2021, 9). The vehicle, in this case, refers to the on-site lecture hall or *communication space*. Following Barad's agential realism, we should not understand this communication space a pre-fixed physical container functioning as a



Figure 9: Technology Pole

backdrop for the participants (Hayles and Pulizzi 2010; Taylor 2013; McCormack 2014; Taylor 2019; Van der Tuin and Zuurmond 2021), but as "one (active) element in a complex materialist assemblage [...] in continual emergence, transformation and temporary stabilization" (Taylor 2019, 47). These assemblages unfold over time and have a certain duration and can therefore be understood as a so-called educational 'spacetime' (McCormack 2014).⁷³ In this spacetime, the bodies and technologies together, unfolding over time, create the educational experience.

During a lecture, the teacher directs the attention of their students, expecting them to follow (Serres 2014; Sullivan 2018). In an interplay of gazes, the teacher draws attention to themselves and the others present, acknowledging and reaffirming the (self-) position of each participant (Di Gesú and González 2021b). In this way, the teacher creates a sense of community, or at least a shared presence, and relatedness which will remain during the lecture. At the same time, the lecture hall grants the student a certain level of anonymity as part of the collective body of students. At the end of a lecture, the lecture hall allows students to linger, chat with classmates, and ask some (in)formal questions before continuing the rest of their day studying, working, or spending their spare time alone or with others elsewhere.

In March of 2020, however, the lecture hall with its rules and *roles* had to be adapted overnight to suit the online format.⁷⁴ When searching for images of online education, the most common search result shows a single person in front of a digital device, looking at the screen or their notes, or even butting their head on the table (see image 2: Ecosia 2020, screen shot). In this setting, a teacher can still address a student body, but the online architecture does not grand them immediate interaction. Based at home, mediated by the internet, microphone, and webcam, the teacher must rely on the online platform to confirm the presence of an audience, and vice versa (Di Gesú and Gonzaléz 2021b). Relying on a stable connection, the course material can be presented, but not as fluently as in the physical lecture hall. When slides are shared, for example, the interface is taken over by the presentation, allowing the speaker to see only a few other participant at the time (see image



Image 1. 'Lecture hall' image search results

⁷³ In his book *Refrains for Moving Bodies: Experience and Experiment in Affective Spaces* (2014), Derek P. McCormack terms these emerging spaces 'spacetimes', a term which seems to closely resemble what Brian Massumi refers to as 'non-Euclidian' space: a space "that cannot be separated from its duration due to a transitional excess of movement. (...) Time and space are dependent variables (...), which cannot be separated from each other without stopping the process and changing its nature" (Massumi 2002, 185).

⁷⁴ In the Netherlands, this first lockdown was (infamously) titled the 'intelligent' lockdown (*Trouw* 2020).

3: Microsoft n.d.(a); and image 4: Microsoft n.d.(b)).⁷⁵ When nothing is shared, the digital architecture places every participant in the same visual field, depending on which setting is selected (e.g., gallery, grand gallery, or 'lecture hall', see image 5: Microsoft n.d.(c); and image 6: Microsoft n.d.(d)). Through the interface of platforms such as *MS Teams* students can raise their hands or make remarks, but these visual cues cannot emulate the spontaneous, (almost) unconscious 'reading of the room' which happens on-site (Smith, Jeffrey, and Collins 2020). In fact, more often than not the teacher is speaking into 'a void' during synchronous online lectures, as many students turn off their webcams.⁷⁶

If participants turn their webcam on, they makes themselves visible to others and themselves. What such 'emerging media' (Thurman and Singh 2019) like webcams, microphones and the Internet, do is 'augment' or 'mix' realities, dynamically connecting the physical with the virtual through continuous feedback loops (Timeto 2015; Clowes 2018). Here, virtuality refers to the "various ways in which our interaction with technology expands our reality and affects human behaviour" (Bleeker 2021, 8), e.g. in addition to making themselves visible, another feedback loops is created between the individual in front of the computer and their own live-video in the right-hand corner (see image 5). Through these feedback loops, the teacher, their fellow students, and the student themselves constantly monitor (and correct) their (own) behaviour: if the student is not paying attention, this is immediately visible to the others. If the student leaves their place, an empty seat shows. If the student accidentally opens their microphone, the lecture is audibly interrupted and the student is immediately made visible due to the programming of the platform. Above a certain number of participants, not everyone is visible in MS Teams, but participants have no way of knowing if their live-webcam footage is being broadcast to the others, or not. Due to this, students feel monitored, shy, anxious, selfconscious, and uncomfortable, so they prefer to leave their webcams off, especially in larger groups (Gherhes, Simon, and Para 2021; Lemelin 2021). Some students also keep their webcams turned off to keep their privacy or when their internet connection cannot support video-conferencing (Gherhes, Simon, and Para 2021). In some contexts, turning the webcam off has become one of the newly instated netiquettes in online teaching (Lemelin 2021).



Image 2. 'Online education' image search results

⁷⁵ Here, 'interface' is understood as a "dynamic space of relations, rather than [a] 'thing'" (Drucker 2011, 3). It is "a zone of affordances organized to support and provoke activities and behaviour" (Drucker 2011, 7).

⁷⁶ Some students do choose to keep their webcam on out of respect for their teachers, to allow discussion to occur more easily, or to better interact with their teacher (Gherhes, Simon, and Para 2021). Others mention privacy (see below).

Such netiquettes can be considered 'rules of digital space'. On-site, students would relate to physical thresholds which shape their interactions, e.g. the arrangements of chairs, talks in hallways, and interactions in public bathrooms (Di Gesú and Gonzaléz 2021b). Online, the thresholds participants cross are those of the digital interface, alternated with some bathroom visits and an occasional peek in the refrigerator, and only with their webcams off can students enjoy some anonymity. Wanting to evade the scrutiny of the teacher and their fellow students is understandable, but this can also cause students to detach themselves more easily from the communication space and, thereby, the educational experience (Smith, Jeffrey, and Collins 2020). In fact, the online format caused many students to lose any feeling of connection to their educational institute and classmates (Chui 2022; Verkoeijen and Meijers 2022). Especially when "students keep their webcams off during synchronous online classes, [others] no longer receive nor have the opportunity to respond to [...] body language, facial expressions, and general tone" (Lemelin 2021). Consequentially, the teacher has to almost blindly rely on the digital technology to regulate learning and set the climate. When the lecture is finished, students leave the lecture with the click of a button. Within seconds the communication space disappears, leaving the student to continue the rest of their day in their rooms due to the lockdown restrictions. Like the on-site setting, participants in synchronous online lectures are again placed in the *role* of the passenger, but this time with a webcam capturing their every move.

When compared to the pre-pandemic situation, it becomes obvious how much the online educational situation changed the "movement patterns, habitual behaviours, and organizational technologies" (McCormack 2014, 2) for both students and teachers. In pre-pandemic on-site spacetimes, the so-called 'old space of concentration' (Serres 2014), with their rules of physical place instate a regime of concentration reinforced by the teacher's presence (Hayles 2007). Engaging new in emergency online education meant "students and teachers [had to go] through a semiotic process [... revaluing the technologies as well as] other features embedded in online learning" (Di Gesú and González 2021b, 208), instating new rules for the *communication spaces* within which they interacted.



Image 3. Sharing Slides in MS Teams



Image 4. Presenting Slides in MS Teams



Image 5. MS Teams Meeting Interface



Image 6. MS Teams Meeting Lecture Hall Interface

The semiotic process of creating new rules not only occurred in relation to educational spacetimes. During the pandemic, homes had to accommodate for all kinds of activities which would normally take place in other spaces (Di Gesú and Gonzaléz 2021a). In addition to being a private space, homes stood in for, e.g. workplaces, gyms, cinema's, and thus universities. In their student housing, students had to create educational spacetimes themselves, without the support of the physical lecture hall, its rules, and its roles.⁷⁷ Generally, students were able to arrange a designated "place in their house, used only by them, to participate in online classes which ensure[d] personal privacy of the home and the people with whom they live" (Gherhes, Simon, and Para 2021, 10-11). To some extent, this helped students focus on their education. However, some students still had difficulty completing "their school work because of a lack of motivation or the absence of a teacher to encourage or remind them to get their work done" (Xie et al. 2020, 182). Yet, due to self-sufficiency being the norm, students became and had to become their own judge, jury, and executioner. In biopolitical terms, this communication space can be seen as a digitally mediated panopticon in which students had to internalize a regime of productivity to continue their education whilst simultaneously remaining docile and complacent to adhere to the lockdown restrictions.⁷⁸ Considering this, it comes as no surprise many students prefer to attend lectures with their camera's turned off. It also highlights why especially online lectures failed as a means to teach during the pandemic: students were literally muted and restrained through technological means.

What becomes apparent in the analysis presented above is how technologies assign students certain *roles* and create *communication spaces*. Moreover, the analysis highlights the importance of critically reflection on newly instated 'rules of digital space' and how they *regulate learning*. More often than not, the rules seem to alienate students from their teacher and classmates instead of creating a sense of community. At least: in synchronous online lectures, not conversational seminars or other activities such as collective mind-mapping. However, it is also important to consider that teachers simply had to make do with the online communication spaces the ICT's provided. These digital communication spaces were not designed to support constructive learning behaviour and foster underlying pedagogical goals of lectures (Tissenbaum and Slotta 2019).⁷⁹ In actuality, these online *communication spaces* were initially not even designed for education or by educators (nor was the passenger *role* designed with the student in mind, as pointed out by Serres). Instead, they were designed by big-tech companies such as *Microsoft, Google*, or *Zoom Video Communications* for video-

⁷⁷ In *Thumbelina*, Serres regards the old concentration space 'where I speak and you listen' as restrictive, placing Thumbelina and her peers in the passengers' seat. I agree that demanding concentration in such a way is not conducive to learning. However, I do think a certain level of concentration is necessary for learning to occur. In my opinion, a central part of teaching and pedagogy is in fact creating spaces where student can concentrate. However, unlike the ones Serres observed, these spaces should *evoke* concentration based on eagerness to learn and mutual respect, rather than *demand* it based on tradition and authority.

⁷⁸ A panopticon is a type of correction facility designed in the 18th century by English philosopher Jeremy Bentham. Architecturally, the panopticon is shaped like a rotunda with the cells facing the centre, where a watch post is placed. This watch post is blinded, so the prisoners have no idea whether or not a guard is present. Therefore, the prisoners never know whether they are being watched, incentivizing them to behave well at all times. In his famous work *Discipline and Punish: The Birth of the Prison* (1975), Michel Foucault used Bentham's panopticon to analyse changes in the Western penal system in the modern age. Through this analysis, Foucault eventually arrived at his notions of sovereign power, disciplinary power, and biopower, as explained in the section on *Techné*.

⁷⁹ Though it remains to be seen to what these pedagogical goals of the lectures are in the first place, as brought forward by Michel Serres, N. Kathrine Hayles, D. Randy Garrison, Iris van der Tuin, Anouk Zuurmond and others.

conferencing by companies.⁸⁰ The design processes is of software developers working for these companies is not (necessarily) informed by extensive educational research (Allenby and Sarewitz 2011; Drucker 2011; Tenen 2017; Clowes 2018; Shutkin 2019; Kassymova et al. 2021).⁸¹ Most often, their "interfaces are designed to disappear" (Monea 2020, 1), maximizing performance and minimizing frustration (Drucker 2011), (almost) obscuring their innerworkings.⁸² Moreover, the incorporated functionalities of platforms such as *MS Teams, Google Meet* and *Zoom* are by no means commonplace in higher education (Mishra and Koehler 2006; Mills and Unsworth 2017; Constantino and Raffaghelli 2021). Therefore, incorporating them in educational design is not a common practice either. Yet, understanding interfaces and platforms situate informatter, what the medial limitations, affordances, and possibilities are for directing attention, *supporting discourse,* critical thinking, and meaning-making practices is and should be at the heart of educational design (Mishra and Koehler 2006; Unsworth 2008; Pötzsch and Hayles 2014; Garrison 2017; Mills and Unsworth 2017). So, how is informatter situated through the interface? And how does it determine the *rhetoric strategy* and *mode of address* of an online lecture? In the next section, this will be discussed in more detail.

Informatter Pole

In this section, the informatter entangled in synchronous online lectures will be discussed, focussing on the mode of address and rhetoric strategy (see figure 11: Mijland 2022f). As stated above, the common mode of address for an on-site lecture is as a 'sage on a stage' frontal teaching method. Here, the teacher brings the course material to the student through a predominantly one-sided form of communication. Situated as such, "[i]t was their academic standing that made us listen to their voice, and they demanded silence whenever they delivered their oral lectures" (Serres 2014, 28). Using several modalities, i.e., words, gestures, slides, images, written formulas, videos, etc. and the corresponding senses to which they appeal, teachers attempt to get their point across whilst students take notes on paper or digital devices. Modalities like these situate the course content, they are the informatter with which teachers work and students entangle themselves by attending the lecture. This "method of presentation directly and substantially influences students' accumulation and retention of knowledge" (Sullivan 2018, 129), both on-site and online. In emergency online education, however, the material assemblages in the communication space are made up of different modalities when compared to on-site lecture halls. Platforms such as MS Teams, Google Meet, and Zoom are highly engaging environments containing multiple communication channels, which incorporate texts, images, animations, audio, etc. (Colvin Clark and Mayer 2016). As a *rhetoric strategy*, teachers must relate to the material logic of the ICT's and their GUI's. This reshapes the mode of address common to traditional lecture, as interaction between participant and informatter is now constantly mediated by the interface. Or rather; it should reshape the mode of address to effectively support discourse between participants.

⁸⁰ Zoom, for example, was founded in 2011 to support "large enterprises, small businesses, and individuals alike" (Zoom 2021).

⁸¹ Due to its extensive use in education during the COVID-19 pandemic, Microsoft updated *MS Teams* based on the feedback they received from educators. According to Barbara Holzapfel, Education GM at Microsoft, the added 'together mode' and 'grand gallery' (as seen in images 5 and 6) added "creative ways to engage students" (Holzapfel 2020).

⁸² Here the 'performance paradigms' from the tech-industry start overlapping with media studies, as described by Jon McKenzie's *Perform or Else: From Discipline to Performance*.

Considering its materiality, the ever-present mediating interface chunks, isolates, and distinguishes one activity or application from another (Drucker 2011; Drucker 2013ab), for example by separating sound and vision in independently operational channels (Arik 2021).⁸³ In a way, the online format allows the teacher to transfer their knowledge 'more purely' to the student, at least according to 'sage-on-a-stage' logic, i.e. when presenting their course material the interface of the digital lecture hall is fully filled by the slides and all students are muted. If a teacher wants to support any type of *discourse*, they have to rely on the chat function and the (few) students who are willing to open their microphones. In fact: connecting the to-be-learned to the learner at all, teachers can only use the functionalities of the platform to shape the intended educational flow of informatter. Where on-site, small sounds, posture changes, or facial expressions can immediately be picked up (Sullivan 2018; Smith, Jeffrey, and Collins 2020), online the teacher must trust the students to either put a message in the chat window or open their microphones at a convenient moment. Moreover, when not sharing slides, the teacher is one of the faces amidst the students, instead of the central point in the lecture hall. So, the teacher must find other ways to capture their attention. On-site, a simple hand movement can draw a student's attention toward the lecture due to a visual reflex towards movements (Sullivan 2018). Watching such movements allows students to engage with the informatter more deeply (Rotman 2002; Sullivan 2018). Teachers can achieve such engagement by, for example, spotlighting themselves or including Mentimeters or Kahoot! quizzes, and other interactive activities in their lectures.⁸⁴ This helped teachers see whether the students were actively participating in class (Kubica et al. 2020; Arik 2021). At the same time, these options only proved to have a small reach (Kubica et al 2020). Moreover, though active participation in a quiz might be an indication of engagement, it does not state anything about attention or retention of the presented



Figure 11: Informatter Pole

⁸³ In *MS Teams*, for example, the webcam can be turned off whilst the microphone stays unmuted, and vice versa.

⁸⁴ Kahoot! is a free game-based learning platform which allows educators to create topical quizzes. On their devices, students can enter a pin code to participate in a live online quiz. The teacher usually centrally shares the scores, either through a smart-board or by sharing a screen.

course material. So, both the *mode of address* and *rhetoric strategy* online are heavily impacted by the materiality of the interface. Moreover, unlike the on-site lecture hall, the online format requires several additional steps for teachers to be able to sufficiently *regulate learning* and *support discourse*.

Vice versa, students also have to work with the materiality of the interface to support their own *learning process* and engage in meaningful *discourse*. On-site, the students would have had a teacher, the slides, and their classmates to look at dispersed over a physical space. As stated before, they can raise their hands and simply speak up if they have a question. Moreover, just as the teacher (non)consciously reacts to such sounds, posture changes, or facial expressions, so does the student. Online, however, they can only engage with informatters through their screens, fitted within a maximum of 17,3 inches. At the same time, the interfaces of platforms such as *MS Teams, Zoom*, and *Google Meet* allow students to 'customize' the *mode of address* to suit their personal preference, at least within the constraints of the platform (Clowes 2018). By using the buttons in the top bar of the meeting interface (see image 7), students can change the view from gallery to together mode, open the chat window to the right, apply a background effect, and even record the lecture for later use. Some of these activities can be seen by others, whereas most only change the interface for the individual participant.⁸⁵

These technological affordances allow for new ways of "performing with and through"

(Bleeker 2018, 10) interfaces, e.g. allowing participants to share links, capture images, cut and paste text, send emoji, enter a search query, find literature, visuals, and other relevant material, and share it in the chat with relative ease. However, once a student opens a different tab in their browser or an app on their phone, they "move away from the initial menu of options and into specific applications or digital environments, [and are] plunged into the complex world of interlocking frames [...] whose distinction within the screen space and interface depend on other conventions" (Drucker 2011, 7). Jumping from window to window and interacting with different informatters simultaneously, however, changes а student's cognitive process tremendously (Hayles 2010; Drucker 2011; Drucker 2013ab; Serres 2014; Clowes 2018; Chan 2020; Bleeker 2021). Or rather: it distributes

Meeting conversation ↓ 은 트 ↓	Raise hand ↓	More options	Camera on/off	Mute/ unmute ↓ ↓	Share screen ↓ ↓	Leave meeting ↓ ► Leave	
 Show participants		evice setti eeting no eeting de	ngs tes tails				
		 ☐ Gallery ✓ ☐ Large gallery (Preview) ▲ Together mode (Preview) 					
		€ Ca 湾 Ap	ill me oply back <u>o</u>	pround ef	fects		
		© Start recording					
		iji Di ⊠⁄i Tu	al pad rn off ince	oming vie	deo		

Image 7. Buttons in MS Teams

⁸⁵ In her article *Performative Mediality and Theoretical Approaches to Interface* (2013), Johanna Drucker uses the work of Matt Kirschenbaum to distinguish between formal and forensic materialities of ICT's. Formal materiality relates to all the features a medium has, such as "the layout, design, or the style of literary composition, relations between image and text and so on" (Drucker 2013a, 3). The forensic materiality relates to 'physical' traces of interaction with the formal aspects of a medium. Applying a background effect, for example, is a formal material feature but applying it is a forensic material choice, especially when a personal picture is being used.

students' attention over several channels at once, a process feeding into what is called a 'hyper' form of attention.

In general, humans are equipped with two types of attention. Evolutionary speaking, hyper attention came first, as this type of attention allowed humans to keep track of several environmental factors to ensure their safety (Hayles 2007). "[H]yper attention requires constant gratification yet enables one quickly to scan significant amounts of data to gain an overview or identify certain patterns" (Pötzsch and Hayles 2014, 98). In relative safety, however, humans further developed their ability to focus more deeply on "one specific task or problem over an extended period of time to develop expert knowledge" (Pötzsch and Hayles 2014, 98). This 'deep attention' has a high threshold for boredom and takes time to train, yet it is this type of attention which education generally wants to foster. Or rather: it is an important type of attention required for students to engage with informatters thoroughly and constructively, allowing students to transfer information from their working memory to their long-term memory. So, deep attention is needed for constructive learning to occur (Hayles 2007); yet "with the development of ubiquitously networked digital devices, [...] we have created a socio-technical environment that systematically privileges hyper attention" (Pötzsch and Hayles 2014, 98). Especially younger generations are highly affected by this, as they are emerged in media from early childhood on (Hayles 2007; Pötzsch and Hayles 2014; Mills and Unsworth 2017).⁸⁶

According to Serres, they are "formatted by the media, which is broadcast by adults who have meticulously destroyed their faculty of attention by reducing the duration of images to seven seconds, and the response time to questions to fifteen seconds" (Serres 2014, 5). In principle, viewers can indeed discern the 'gist' of a scene within 30-50 Ms (Henderson and Ferreira, 2004), especially when an image is presented from a well-known perspective (Schnotz, 2014).⁸⁷ Understanding the general gist, however, is not the same as critically scrutinizing the information the scene provides (Henderson and Ferreira, 2004), which is important for proper comprehension (Roth, Pozzer-Ardhenghi, and Han, 2005, McTigue and Flowers, 2011).⁸⁸ Moroever, rapidly switching between channels, windows, media, devices, and other sources of information feeds students with stimuli. The high level of stimuli students encounter, easily causes cognitive overload to occur, preventing students from taking in any relevant information at all. The mental fatigue many students experienced after participating in online meetings for too long has been associated with this type of cognitive overload (Tzafilkou, Perifanou, and Economides 2021, 7504). What these rapid switches also do is feed into the students' ever increasing need for more and "more intense information stimuli" (Pötzsch and Hayles 2014, 103). So, our contemporary technologies cash in on our "cognitive ability to take in different information streams, [... increasing] the pleasurable effect of doing so" (Pötzsch and Hayles 2014, 103), highly affecting our nonconscious cognitive process at the expense of our conscious cognitive processes (Hayles 2014): as soon as their phone buzzes or an email notification pops up, their attention is

⁸⁶ The current generation of students are sometimes referred to as 'digital natives', i.e. they are training their digital literacy from early childhood on. However, being able to operate a device is different from understanding how the device operates. Therefore, the term 'digital native' will not be used in the context of this thesis.

⁸⁷ Here, the gist is understood as "the general semantic interpretation" (Henderson and Ferreira, 2004, p.10). A well-known perspective refers to the most common way we encounter certain matters, such as an orange in a fruit basket.

⁸⁸ A person is visually literate when they are able to successfully decode and interpret visual communication, as well as encode and compose meaningful images themselves (Beatty, 2013). Unfortunately, students rarely "receive instruction in critical analysis" (Roth, Pozzer-Ardhenghi, and Han, 2005).

dispersed, and they shift their focus, are "flip into autopilot, are abducted from the present, are carried off by an array of prehensions" (Hayles 2014, 212).⁸⁹

Considering how the 'new media' used in emergency online education impact cognitive processes, it is of utmost importance teachers become aware these effects. However, for teachers, however, this is not necessarily easy to achieve due to limited training and time (Carrillo and Flores 2020; Constantino and Raffaghelli 2021; Di Gesú and González 2021b). Though university teachers are obviously professionals in their field of research, this does not necessarily make them skilled educational designers (Mishra and Koehler 2006; Science Guide 2022b).⁹⁰ Therefore, many teachers heavily rely on spoken and written language as their main modality in teaching, even if it does not benefit their students (Sullivan 2018; Constantino and Raffaghelli 2021; Di Gesú and González 2021b). Yet, teachers "must learn to speak digital" (Hayles 2002a, 371) if they want to be able to connect their education to their students. They should "critically discern the interests that are served through the use of images, written words, gestures, sounds, and other [modalities used in their teaching]" (Mills and Unsworth 2017, 6). Moreover, they should "inspire and alert [...] students to forms of attention that may not come to them automatically from their environment" (Pötzsch and Hayles 2014, 99). So, conscious educational design should consider what type of attention the medium fosters and whether or not this benefits the learning activity (Carrillo and Flores 2020). "[I]f structured appropriately, [...] synergistic combination of hyper and deep attention" (Hayles 2007, 193) can be achieved in both onsite and, more importantly, online education.

What the analysis makes clear is that the 'urban myth' that online education allows for 'pure knowledge transferal' is just that: a myth. Instead, the interface of the online platforms shapes interaction patterns between participants and informatter during a synchronous online lecture, situating both the *mode of address* and *rhetoric strategy* differently. Online, *discourse* can only take place through the material substrate of the used platforms. Though it holds true that platforms such as *MS Teams, Google Meet*, and *Zoom* enabled education to continue during the COVID-19 pandemic, but it caused education to unintentionally incorporate the internal logic and identity of digital media in the *rhetoric strategy* (Kattenbelt 2008; Mills and Unsworth 2008; Drucker 2011; Drucker 2013ab; Hayles 2014; Serres 2014; Lavender 2016). Participants in online education could easily switch between platforms, which enabled them to make fast connections but at the risk of getting lost in other virtual realities. As has become clear, participants in online education can easily be distracted by social chats, news, games, and other emerging realities (Xie et al. 2020). Though unintentional and unavoidable, the effect of ICT's on cognitive processes only added to the tremendous self-control and commitment required from students to *regulate* their *learning*, set a conducive *climate*, and remain focussed on the *discourse* in the synchronous online lecture.

⁸⁹ Prehension refers to act of taking hold, seizing, or grasping, and relates to the mental act of understanding (*com*prehension) as well as the act of understanding through the senses (*ap*prehension) (Meriam-Webster 2022).

⁹⁰ Traditionally, in Dutch research universities, the professors were mainly focussed on research. Teaching lectures allowed them to share their body of knowledge, which is where the traditional lecture format originates form. Many current lectures still consider themselves to be researchers with teaching tasks, instead of teachers with research tasks or teacher-researchers. Only recently has it become standard practice in the Netherlands to offer these researchers in research universities teacher training (Science Guide 2022b).

Subquestion 1: The Educational Experience

In this section, the first subquestion will be answered by giving a concise description of the educational experience of students partaking in synchronous online lectures in Dutch universities during the COVID-19 pandemic. In the analyses presented in the sections above, the participants, technologies, and informatter entangled in synchronous online lectures already provide an initial understanding of the educational situation. First, these insights will briefly be summarized, working counter clockwise through the concepts in the integrated model (revisit figure 7: Mijland 2022c). Attention will be paid specifically to the climate, learning, and discourses in synchronous online lectures emulated after onsite 'sage on a stage' type lectures (see figure 12: Mijland 2022g).

Firstly, the *participants* which should be considered as part of the synchronous online lectures are both students and teachers. Teachers are *expected* to present the course content in such a way that students can study it self-sufficiently. In return, students *expect* this to be the case and assume a serious *attitude* towards the material: lectures must be part of the curriculum for a reason and so they attend.⁹¹ By choosing to teach the lecture online as a frontal teaching set-up, the teacher determines the *role* of the student: the *role* of active listener with a passive posture. In front of their computers, students sit through a live lecture whilst being muted and physically constrained to their rooms. Here, distraction looms, as students can easily combine tasks and, consequentially, disperse their attention too far away from the initial lecture. At least when their webcams are turned off. Otherwise, the feedback loop between webcam and live-view creates a panopticon type situation. Considering this, it comes to no surprise the *attitude* of the students partaking in synchronous online lectures can quickly switch from attentive and interested to distracted and detached. This learning *climate* set by the synchronous online format can, therefore, be described as unconducive for critical thinking and meaning-making to occur.

Secondly, both hard technologies and techniques further determine the educational experience during a synchronous online lecture. Devices, their software and hardware, the



Figure 12: Educational Experience

⁹¹ Though this might be a slightly naïve assumption, I do think it is important to always assume a student is motivated to learn and well-willing to participate as a sign of respect.

architecture of used ICT's as well as the internet all form necessary conditions for the lecture to take place. Together with the educational context, teaching tradition, and home environments, this makes up the material substrate for the *communication space* within which the participants intra-act during the synchronous online lecture. In this *communication space*, the teachers *rhetoric strategy* has to adhere to the material logic of the interface. To some extent, the materiality of platforms such as *MS Teams* allows the teacher to continue their on-site teaching habits online: they can easily share slides, though this does obscure most of the participants, and ask a few questions, albeit in the chat. However, especially with their webcams turned off, the teachers are presenting their lecture to, what informally has been termed, a 'void'.⁹² In this void, the presence of the students is assumed, but not directly felt. The void prevents teachers from 'reading the room' to see how matters are picked up. Teachers cannot redirect the attention and intervene if the situation is going 'side ways' (Smith, Jeffrey, and Collins 2020) and there is no way of knowing how their lecture is being received, which makes it difficult to *regulate learning*.

Thirdly, due to the identity of digital media, in their *rhetoric strategy* teachers have to compete with the other technological affordances of ICT's and their GUI's. Due to the possibility of accessing multiple informatters at once, students can access several channels at once, which favour hyper over deep attention, and cashing in on nonconscious cognitive signals which easily disperse attention elsewhere. Due to this, the task of regulating learning, i.e. consciously entangling oneself in the educational activity, becomes increasingly difficult for both students and teachers. Especially if the activity is a synchronous online lecture, as the mode of address online offers limited opportunities for discourse between participants. Yet, meaning-making and critical thinking requires sharing viewpoints, sitting with discomfort, an awareness of and attentiveness to others, and their reactions to the presented matter. So, when compared to its on-site counterpart, it becomes clear synchronous online lectures require a different approach and skill set to teaching and learning, from both teachers and students (Smith, Jeffrey, and Collins 2020; Carrillo and Flores 2020). Teachers nor students knew such approaches or possessed such skills at the start of the pandemic, but the educational situation forced them to develop strategies quickly. Though the student's expectations might have been positive at first, i.e. at least their education could continue in some form, partaking in synchronous online lectures for well over 22 months under the biopolitical regime set by both the Dutch government and their HEI caused many students to lose their connection to the university and each other, see a decrease in educational quality, and experience a lack of autonomy both in and outside of their studies (Verkoeijen and Meijers 2022).

Based on the analysis above, the dispositif of the student partaking in emergency online education in higher education in the Netherlands during the COVID-19 pandemic, specifically a synchronous online lecture, can be described as *restrictive* and *unconducive* for learning. As a large social and educational experiment, emergency online education created conditions for learning which closely resembled a dualistic Cartesian worldview or a Platonic cave allegory. Physically, students were placed in a world operating according to the mechanics instated by the government and the HEI. The students' digital devices provided them with imagery from the outside world, to be viewed from inside their homes. Though stuck in front of their computers, their minds were left free to wonder and take in knowledge about this world they are not able to physically encounter. This Cartesian ideal of disembodied knowledge production (Wang and Zheng 2018; Shutkin 2019) almost seemed to realise

⁹² When presenting the results of this thesis research project to the teaching staff of MAPS, this 'technical term' arose and was recognized by many (Pers. comm. May 25th, 2022).

the transhumanist 'wet dream' of uploading one's consciousness into a computer. However, bodyminds do not hold a separate consciousness to be uploaded into the computer. Clearly, knowledge does not stand outside of the world. Rather, it is enmeshed in it and emerges from it only through "direct material engagement" (Barad 2007, 49). In fact, our consciousness is thoroughly embodied, embedded, extended, and enactive, and our bodyminds from an integral part in critical thinking and meaning-making practices. For students to learn anything at all, they must be able to "assign value to [a] subject matter, and develop an understanding of the relation of it with their lives" (Mishra and Koehler 2006, 1034). Preferably, lives which are not dictated by regimes of docile, individual productivity and a position in the passenger seat. Instead of centralizing tradition or course content, educators should "approach the distance education process with a student centred view and redesign the learning environment in such a way to ensure that students are at the heart of the teaching-learning process" (Arik 2021, 114). Moreover, the education should have a logical position within their lives: it should suit their specific dispositif. Using the integrated model, as demonstrated in this section, helps in specifying this dispositif.

Subquestion 2: Cybernetics and Cyborgs

In this section, the second subquestion will be answered by giving a concise description of how the use of emergency online education impacts the information flow within and between students, teachers, and ICT's. To visually illustrate these information flows, figure 10 will be used (see figure 10: Mijland 2021). So far, chapter 3 has paid attention to each individual pole and their overlapping areas, in accordance with the integrated model presented in part I. Dispersed over each pole are cognitive processes and pedagogical implications, as made clear in the additional considerations in chapter 2. Building on the analysis above, this section will pay explicit attention to these cognitive processes and pedagogical implications of synchronous online lectures, making use of both Hayles' understanding of cybernetics and Haraway's notion of the cyborg. The aim is to arrive at and speculate on a comprehensive view of both, and meet some of the larger challenges (emergency) online education has presented HEI's with.

In figure 10, the position of the participants in both offline and online education is outlined. The arrows highlight several feedback loops between the participants, technologies, and informatters entangled in both educational situations. The purple zigzag lines call attention to possible sources of distraction, such as classmates, buzzing phones, and pop-up messages. The educational experience as a whole is placed in undetermined, white space. To reiterate: on-site, this would have been a lecture hall, hence the positioning of the students (human figures in black) directly across from their teacher



Figure 10. On-Site and Online Lectures

(human figure in grey), with the orange arrows representing the educational exchange. Behind the teacher, a whiteboard, smartboard, or projector screen allows them to share their slides behind them. The students are able to use their devices to take notes (or to access other realities, albeit at the risk of being corrected by the teacher), but they can also resort to old-school pen and paper. In this situation all participants share the same physical space, which allows them to be affected by each other as the educational spacetime unfolds. This spacetime is mostly determined by the rules of physical place and the educational regime of the traditional frontal mode of address. Online, the students and teachers are separated physically, but connected through the interface of the chosen communication platform. Due to the material logic of the platform, the teacher becomes one little webcam feed alongside the feeds of the other participants in the lecture. That is: if the students keep their webcam on and if the teacher is not sharing slides. The students need to use their devices to participate in the educational situation, forcing the students to disperse their attention over the physical space of their home environment as well as the virtual educational exchange.

Cognitively and pedagogically speaking, the on-site lecture hall enables the teacher to express their informatter through gestures, images, speech, and other direct modalities. They can create a spacetime which actively engages students as it unfolds, especially when the 'sage on a stage' style of teaching becomes more of a collaborative effort: switching their role from transferers of knowledge to facilitators of learning (Carrillo and Flores 2020). To start, the teacher can introduce a problem or question based on their expertise, triggering the impulse to learn. Together, the participants can explore a matter, see if they can integrate it with prior knowledge, exchange different points of view, connect it to their life-world, i.e. their expertise. Instead of only offering students a position in the passenger's seat, it allows them to bring in their own "history, [...] biology and [...] particular way of seeing the world" (Hayles and Pulizzi 2010, 135). In doing so, the educational exchange becomes mutually meaningful, making it both personally and collectively relevant. The collective act of critical thinking might even allow the group to solve or answer the problem. At the least, it enables them to stay with the trouble without having to face difficult matters alone. Here, the participants can cash in on both their nonconscious and conscious cognitive abilities, as the spacetime enables them to physically entangle themselves with the informatter at hand. In this educational exchange, information flows within and between students, teachers, and ICT's with relative ease and minimal distraction. Moreover, it allows for a balance between deep attention on the one hand, fostered by the introduction of the problem by the teacher, and hyper attention on the other, fostered by associative, explorative discussions. That is: when the pedagogical approach chosen for the 'lecture' supports this type of learning.

Trying to mirror the on-site spacetime online, several crucial differences become immediately apparent. Firstly, the participants do not share the same physical space, which prevents them from being affected by one another and cashing in on their nonconscious attuning to the educational exchange. Instead, participants have to make do with feedback loops accessible through codes, displays, and screens, bringing forward a second important difference: the material architecture of the online platform, which separates verbal, visual, and written communication over several channels and disrupts fluent flow of feedback within and between students, teachers, and ICT's. Regarded through Haraway's cyborgian logic, participants in emergency online education had to become (more) cyborgian beings, extending their bodies through interfaces, webcams, and microphones, trying to live (more) symbiotically with technology (Hayles 2002b; Hayles and Pulizzi 2010; Hayles and Sampson 2018, 76). Thirdly, with extremely limited preparation time and a different set of modalities, the teacher needs to trigger the students' impulse to learn through a platform with favours hyper over

deep attention. Cognitively and pedagogically speaking, these three key differences between on-site and online lectures present considerable challenges for teachers. Those teachers willing to break up their unidirectional approach to lectures did assign their students a more active role, by allowing them to moderate discussion or working with smaller break-out rooms (Kubica et al. 2020; Quezada et al. 2020; Meij et al. 2021). Other teacher resorted to a so-called 'flipped classroom approach', working with asynchronous pre-recorded lectures or knowledge clips (Meij et al. 2021). This approach allowed their students to watch the material in a self-chosen spacetime directed at deep attention. Moreover, instead of passively listening to a two- to four-hour lecture online, it meant students only had to attend a one-hour synchronous Q&A session online.⁹³ Cognitively and pedagogically speaking, these solutions do not mitigate the loss of "the closeness achieved in the live, face-to-face classroom" (Smith, Jeffrey, and Collins 2020, 90) and the meaning-making and critical thinking physical proximity encourages. Yet, they represent a constructive step away from the traditional lecture format.

What the analysis presented above makes clear, is that our "embodied interactions with the environment generate, direct, and change the information flows surging ceaselessly around us" (Hayles 2002b, 302). The several (non)conscious feedback loops which occur in on-site education are inaccessible online without a computer to couple them. However, even with a computer the access them, they remain fragmented, incoherent, and incomplete. Considering these differences in information flow within and between the students, teachers, and ICT's, the ineffectiveness of frontal teaching online is demonstrated again. Clearly, "[I]earning cannot be realized effectively with learners being just passive receivers of knowledge. [... Therefore] active participation of students in learning activities should be increased through multi-faceted communication and various interaction opportunities" (Arik 2021, 114). Even before the pandemic, the one-to-many approach common to lectures was already failing the students (Serres 2014; Hayles and Pötzsch 2014; Garrison 2017; Kubica et al. 2020; Arik 2021) and the synchronous online format presented even larger pedagogical challenges (Kubica et al. 2020). Throughout the pandemic, many teachers started to recognize that online education cannot be a direct copy from the traditional teaching format, especially with regards to lectures (Garrison 2017; Singh and Thurman 2019). Instead, it became clear the course design should suit the online format (Banjeree 2020; Bedenlier 2020; Meij et al. 2021) and account for the changes in cybernetic exchanges between students, teachers, and ICT's. There is a clear need for "a comprehensive and solid view of the pedagogy of online education" (Carrillo and Flores 2020, 478). Specifically a dispositif and cybernetic informed pedagogy, sensitive to technologies, bodies, and (their) informatter, involving both teachers and students in its development (Arik 2021; Criolo et al. 2021; Di Gesú and González 2021b). As formulated in the central research question, this thesis is aimed at presenting such sensitivities based on the concept of somatechnics. In the next section, these will be presented.

Somatechnical Analytical Sensitivities

In this section, the central research question will be answered. As stated above, the concept of somatechnics calls attention to the inextricability of bodies and technologies. Emergency online education seems to be a prime example of such an inextricable link: only through ICT's were students able to continue their studies during the COVID-19 pandemic. Yet, this is an understanding of

⁹³ For more didactical suggestions, please see the University of Amsterdam's research report on didactical strategies which support social and cognitive processes in online learning (In Dutch: 'Online Onderwijs op de UvA tijdens COVID-19: Didactische Strategieën om Sociale en Cognitieve Processen te Ondersteunen', see Meij et al. 2021).
somatechnics in a narrow sense, as it only considers the 'hard technologies' without looking at the broader dispositif of the student. Taking a closer look at this dispositif uncovers several important disciplinary and regulatory techniques which also determine the educational situation, and have determined it long before the COVID-19 pandemic. It highlights how the "ingrained modes of learning and teaching [... have a long history of privileging] the cognitive, the disembodied, the mind, the intellect and the abstract over the felt, the tangible, the touchable and the material" (Taylor 2019, 46). What synchronous online lectures have done is perpetuate a disembodied curriculum, reducing education to a "mechanical [... practice] increasingly remote from the world of experience" (Wang and Zheng 2018, 220). Yet, it is the connection to this 'world of experience' or, in Baradian terms, the 'world-in-its-becoming', which makes education meaningful. In this world, the new media with which the current generation of students has grown up take a central role: their corporealities are formed and transformed by intra-actions with these technologies. Therefore somatechnical analytical sensitivities that can be considered when designing (emergency) online education relate to this corporeality, and are informed by the three poles form the integrated model.

Firstly, the students bodies should be considered and the sensorimotor experience (online) education grants them. Instead of restraining students in a passive posture for several hours, it might be possible to think of ways to physically engage students. How is the body involved? Are students sitting or standing? Listening or talking? Can the students take their lecture standing? Or move through the space as part of an exercise? Can an energizer at the start break up the activity to bring back attention to the class? And how much time is actually necessary for a lecture? As suggested above, a Q&A of 1 hour can be enough to discuss and situate pre-recorded material. Instead of having to spend much time 'in class', this would allow students to more flexibility in their studying. Designing such lectures does require extra preparation time for teachers, which should be accounted for, especially when they have to record lectures or knowledge clips (Hayles and Pötzsch 2014; Meij et al. 2021).⁹⁴ Moreover, not only teachers need extra time: students also require extra preparation time outside class in order to have a valuable shared experience during the shared educational activities (Smith, Jeffrey, and Collins 2020; Carrillo and Flores 2020). In addition to being considerate to the students biological body in front of the computer, attention should also be paid to their embodiment in the world. How is the body situated in the physical space? In the digital space? Within the institutions? What is expected of the body? What can be expected of the body? Is this expectation beneficial for the learning process? How does this technology apply power to the body? Is this acceptable? What other effects might there be of the used technology?

Secondly, as the question in the previous paragraph already hint at, the technologies involved in online education should be considered. In addition to the positioning of the body through technology, attention should be paid to the position higher education takes in the students' life. Unlike generations before, many Dutch students cannot rely on government grants to pay for their education. Due to this, they have to work in addition to their studies to keep up with living expenses. As stated before, online education has the air of flexibility and efficiency, granting students more time to spend on other important activities (Shutkin 2019; Smith, Jeffrey, and Collins 2020; Xie et al. 2020; Chaudry 2021). Moreover, the "flexibility and convenience of online education can foster the inclusive, accessible, democratised, and action-oriented approaches that are the very goals of critical

⁹⁴ instead of writing out a general structure and possibly prepare some slides, a pre-recorded lecture or knowledge clip demands a well thought-through script and usually takes several takes to record. To do this properly, teachers need to a sufficient level of technological efficacy (Blankenberger and Williams 2020).

pedagogies" (Smith, Jeffrey, and Collins 2020, 87). However, the connotation of efficiency surrounding 'flexibility and convenience' should be critically reflected on by HEI's, as it is based on a paradox: student expect to save time, but "any time gained through online education is bound by the markets' logic of increase" (Smith, Jeffrey, and Collins 2020, 76). More time left over means more time can be spent on other important activities leading in effect to the exact temporal scarcity many like to prevent by taking their degree online. So, "[d]igital technologies create capacities to increase the quantity of work just as people experience a shortage of time, result in the giving up of activities deemed unproductive" (Smith, Jeffrey, and Collins 2020, 86). Resisting the neoliberal demand of being productive all the time, a demand which is especially apparent in academia (Pereira 2015), becomes even more difficult if educational activities are increasingly made more 'efficient'. The paradox of efficiency lies in the ideal of optimal use of time, conflating efficiency with effectiveness.⁹⁵

Being effective is what conscious educational design should amount to, as it focusses on students achieving the learning outcome they should and want to achieve. Being efficient holds the risk of cutting corners, which usually does not result in a rich learning outcome. To direct higher education away from economic instrumentalism, "input-output assessments, and competitive individualism" (Taylor and Ulmer 2020) towards an education based in ethico-onto-epistemology and an ethics of care higher education needs to reconsider what they can ask of their students, and taking out two hours of their time to sit silently in a lecture hall clearly is not cutting it for the current generation of students. What is appreciated is flexible access to educational material. It has been one of the key arguments for students in higher education to continue (parts of) their degree online (Bedenlier 2020; Arik 2021). However, as mentioned before, students should be made aware of the time saving paradox, and HEI's should consciously consider how they can enable flexibility without promoting excessive productivity. Moreover, it is the task of the HEI to call attention the importance of serious studies, whilst being attentive to what is necessary and valued by their students. Like a theatre performance or cinema visit, HEI's can gift their students a spacetime reserved solely for their education, which brings in the last and most speculative analytical sensitivity.

Thirdly, online and on-site educational activities could benefit from a rethinking through the medium within which they take place, a "re-thinking of [...] the communicative patterns and practices which [...] we simply take for granted" (Jenks 2018, 608). Instead of taking educational traditions for granted, "institutions will need to adjust to broadened use of online delivery modalities" (Blankenberger and Williams 2020, 411) to attune higher education to the students' life-world and to accommodate for a possible future pandemic. Currently, the conventions surrounding these communicative patterns and practices shape expectations and experiences of all participants in (online) education (Mills and Unsworth 2017), for example in many Dutch HEI's it is common to heavily rely on written verbal information (Constantino and Raffaghelli 2021). However, written language is just one of many modalities in educational exchanges, and the current generation of students is used to actively interacting with several non-language based modalities at once and this unavoidably impact education.⁹⁶ Especially online students can encounter *TikTok* and *YouTube* videos, *Instagram* pages, news feeds, popular culture, high art, fashion shows, and other cultural phenomena (Unsworth 2008), simply by clicking through hyperlinks. In our hyperconnected society, everything has become an object for recombination and manipulation (De Mul 2009). Incorporating such processes in education

⁹⁵ Effective refers to achieving the intended result adequately. Efficient refers to achieving the intended result adequately whilst saving on time and effort.

⁹⁶ Here, language is understood in a narrow sense, referring specifically to spoken and written word.

connects it in the life-world of the student, but also requires an expressive leap away from written and spoken language, a critical understanding of modalities, and an openness to digital (and other) media. Moreover, it requires a sufficient level of literacy of all participants to allow multimodal *learning* to occur (Unsworth 2008; Unsworth 2011; Beatty 2013; Mills and Unsworth 2017; Heersmink and Knight 2018; Bhagat and Kim 2020; Bleeker 2021; Constantino and Raffaghelli 2021).⁹⁷

In the fields of multimodal literacy studies and cultural psychology of education, several suggestions have been made as to how multimodality and multimodal learning can be achieved. One reoccurring suggestion is that of transmediation or transliteracy, which refers to the "shifting or transferring [of] semiotic content from one mode or sign-system [to another]" (Mills and Unsworth 2017, 5). In media studies, this phenomenon known under the term *intermediality* or *transmediality*: "Transmediality refers to the transfer from one medium to another medium. [...] Intermediality refers to the co-relation of media in the sense of mutual influences between media" (Kattenbelt 2008, 20-21). In comic books, for example, visual cues are the main mode through which artists communicate, "reinforced by textual information" (Drucker 2011, 4), jingles on the radio cue in different sections of the show, with a specific tune for the news or a quiz segment, and "[t]he visual aspects of a graphical interface connects it to the embodied condition of users" (Drucker 2011, 5). As of now, on-site lectures still form the frame of reference for synchronous online lectures, using its modalities, conventions and material logic to shape the mode of address and rhetoric strategy. In online education, however, the first modalities to consider are the webcam and microphone, accompanied by the chat window and the student's bodily position. The material logic of working with a webcam and a microphone, understanding them in terms of what they can do and how they work "within machinic, systemic, and cultural domains" (Drucker 2013a), requires a different approach to teaching. Specifically, it calls for a focus on how materiality performs (Drucker 2011). Teachers can take inspiration from other media modalities and how they situate informatter (Taylor 2019). Playfully staging (Gruber 2010) a lecture, for example, as a news episode or radio show could create "a dynamic relation between provocation



Image 8: News Episode Online

⁹⁷ Literacies relating to, e.g., digital, visual, auditive, corporal, haptic, olfactory, gustatory, tactile, textual, proprioceptive, multimodal knowledges.

of the object's characteristics and an interpretative process" (Drucker 2013a).⁹⁸ Using the performative qualities of the medium, a teacher could apply a virtual background emulating a news studio or choose the 'share slides as background' function in *MS Teams* (see image 8: Mijland 2021). Starting the lecture with a characteristic news tune, the teacher calls attention to themselves within the dispersed architecture of the interface, using an auditive cue indicating students to mute themselves. Now, the focus lies on the teacher, and the presented material. Building on the news' connotation of urgency, the presented course material is situated as important. Additionally, it holds an implicit embodied watching regime, a regime we nonconsciously recognize: you listen and take in information. A news episode is usually clear, concise, and only takes half an hour. Nonconscious schemas like these "are the basis for our motor-programs, allowing us to interact with objects" (Heersmink and Knight 2018) and shape our understanding in the process.

Online education allows an educator to do is blur the boundaries between a 'normal' teaching setting and popular entertainment based on cameras and sound, such as film and television. Changing material-discursive environments, semiotic resources, and modalities like this, as the news example suggests, allows for an expansion in meaning outside of the social, cultural, and historic context within which they were formed (Unsworth 2008, 385). As a process, transmediation takes time, as it encompasses

more than the straightforward reproduction of knowledge. [... Rather, it] "involves a process of incremental knowledge transformation as users continually adapt their intentions for representing knowledge. [Incremental transformation, however,] is required [...] in response to the possibilities and limitations of sign-making systems, including the affordances of digital platforms" (Mills and Unsworth 2017, 5).

Therefore, teachers should situate their medial use in such a way it relates to the conceptual knowledge within their domain and the prior knowledge of their students to allow meaningful learning to occur (Schnotz 2014).⁹⁹

As stated above, concerns have been expressed in regard to building solely on pre-recorded materials creates an on-demand, urgency lacking, 'Netflix-like' entertainment which can easily cause students to fall behind (Strijbosch 2022). These concerns are valid as put forward by, for example, the time saving paradox. Yet, if online education already unintentionally incorporates the operation and identity of digital media, taking inspiration from popular forms of entertainment to rethink the current practice of teaching lectures could prove to be successful (Mills and Unsworth 2017; Constantino and Raffaghelli 2021). In fact, the benefits of gamified and on-demand materials have proven to give students a sense of autonomy in their studies as well as foster interactivity and social contact between participants (Hayles 2007; Garrison 2017; Bedenlier 2020; Versnellingsplan.nl n.d.(a) 2021). So, including a focus mediality in educational design offers a playful approach to meet the challenges of

⁹⁸ As part of a previously written paper, a video-essay was made on intermedial practices within online education, inspired by *Unruly Gestures* (2019) by Janneke Adema and Kamilla Kuc (see https://www.youtube.com/watch?v=u B5gSsUbl). Though the video is presented in Dutch, visually the video provides the viewer with some preliminary suggestions. Using the [cc] button, English subtitles are automatically generated to a sufficient degree.

⁹⁹ As explained above, this allows students to participate in the lecture with a low change of cognitive overload, a higher chance of relating the matter to working memory, and store it in their long-term memory (Schnotz 2014).

(online) pedagogy. Most importantly, consciously incorporating bodies, technology, and informatter serves a clear purpose: not to embellish education, but to ground it in matter.¹⁰⁰

Conclusion

In this chapter, the analysis of the emergency online educational situation developed at Dutch universities during the COVID-19 pandemic was presented. Based on the integrated model presented in chapter 2, the participants pole, technology pole, and informatter pole were discussed first. Secondly, the insights from the analysis of each separate pole were combined to answer the first subquestion, by describing the educational experience of students partaking in synchronous online lectures. Though students want and are expected to seriously participate in their education, the passive role they are assigned does not set a helpful learning climate. Moreover, the communication space and rhetoric strategy online are not helpful in regulating learning, and the one-to-many mode of address does not incite students to participate in constructive discourse. Altogether, synchronous online lectures create an unconducive and restricting dispositif for students.

Based on this dispositif, the third part of this chapter presented the answer to the second subquestion, by describing the cybernetics and cyborgian logic of the pandemic online educational situation. This mostly brought attention to the difficulties of not sharing the same physical space, the extension of the senses through technology, and the challenges this presents both pedagogically and cognitively. Pedagogically speaking, teachers had to learn how to create a worthwhile educational experience in a medium unfamiliar to them and their students, unable to build on nonconscious feedback loops to inform their teaching and learning. Additionally, in a synchronous online lecture, students can easily disperse their attention over several channels at once and feed into their need for cognitive stimuli. Such hyper attention is not the type of attention education is built on. Or rather: traditional lectures are specifically tailored to deep attention, but this is difficult to achieve in a synchronous online lecture during a pandemic and this evidently impacted the information flow between students, teachers, and ICT's.

Considering the differences between on-site and online lectures, the necessity for different teaching strategies is clear. So, as promised in the central research question, the last section of this chapter presented multiple somatechnical analytical sensitivities which can be considered when designing synchronous online lectures. Using the integrated model, these analytical sensitivities have been based on the participants, technologies, and informatters entangled in (emergency) online education. The first sensitivity relates to the physical positioning and life-world of the student. The second sensitivity considers the technologies which enabled emergency online education: the ICT's, the educational traditions, and societal expectations which situate the student and their learning process. The third and last sensitivity relates to the informatters all participants encounter both as part of the educational exchange and in other material assemblages. Informatter positions the body through technology, as the technology pole makes clear, and technology is also positioned through the body. Or rather: it is this material instantiation of the information-pattern which educators can use to their advantage. Using well-known embodied schema and playfully incorporating modalities in online lectures, teachers should be able to create an educational experience which is both nonrestrictive and conducive to learning. Moreover, introducing embodied experience holds the promise of creating a worthwhile educational spacetime based on the student and their life-world.

¹⁰⁰ Or as Hayles' formulates it: "[L]et us also remember the fragility of a material world that cannot be replaced" (Hayles 1993, 91).

Conclusion

In the introduction to this thesis, the empty lecture halls in Dutch research universities were used to introduce the question concerning *the somatechnics of emergency online education*. According to the matters presented in this thesis, the empty lecture halls signal to the same phenomenon all-round philosopher Michel Serres and media scholar N. Katherine Hayles have observed long before the COVID-19 pandemic began: the dispositif of students in Dutch universities is no longer compatible with traditional, one-to-many, sage on a stage style lectures. Due to their emersion in new media from an early ages, this generation of students 'inhabits the virtual'. Or rather: they inhabit a world which, in its becoming, dynamically connects both physical and virtual realities. These realities are laced with intra-actions between technologies, bodies, and informatters which have formed and transformed the student's corporealities.

Due to the COVID-19 pandemic and the additional lockdown restrictions, the students' intraactions changed in a matter of days: it changed the way they encountered their classmates and teachers, the material substrate of the educational exchange, and the spacetimes within which they had to study, work, and live. For higher education to continue, synchronous online curricula offered the best possible solution. Generally, synchronous online education can be flexibly incorporated in personal schedules, synchronous online classes can foster direct engagement between participants and, if thought-through, offer a dynamic learning environment. However, a fully online curriculum also requires a high level of self-sufficiency, a solid internet connection, a functioning technological device with webcam and microphone, a concentration space which sets a climate conducive to learning and supportive of discourse, and a healthy academic and societal culture, most of which were not accounted for during the COVID-19 pandemic.

Creating a worth-while educational experience with limited time and training proved to be difficult, as has been shown through the dispositif analysis above. Connectivity and collectivity were easily lost, and the curriculum became (even more) disembodied, disembedded, inactive, and goal-oriented. Yet, for constructive meaning-making and critical thinking to occur and make education valuable, the educational experience needs to be firmly situated in the world-in-its-becoming: it requires a somatechnically sensitive pedagogy for which initial suggestions have been presented in this thesis. To further develop this pedagogical approach, the actionability of the integrated model and suggested somatechnical analytical sensitivities could be evaluated through design experiments. Additionally, further research could be performed to account more thoroughly for the individual differences in the experience of emergency online education during the COVID-19 pandemic, for example of students with (learning) disabilities, mental health issues, or other personal circumstances which diminish their access to higher education.

Though the immediate thread of the COVID-19 pandemic is over, the virus is still with us. Instead of *merely responding* to a future emergency, HEI's have the opportunity to *become responsible* by critically reflection on the online educational situation of the past two years. Furthermore, instead of considering it as a mere interlude, I would like to stress again the importance viewing emergency online education as an opportunity for rethinking the educational practice altogether. During the pandemic, students had to adjust their daily activities to suit the restrictions and over many have found new ways of studying, working, and living. Laziness is not what is keeping students from attending traditional lectures: it is their educational experience during the pandemic, their experience with different educational formats, and their current dispositif which have granted them a choice in what to spend their time on. Moreover, it changed their attitude towards and expectations of higher education. Evidently, the 'new normal' has become entangled with online education: it has become

part of higher education even if it is not used in current curricula. The HEI's choice to re-instate prepandemic educational norms in the hopes of filling up the lecture halls is an inadequate course of action: it is an attempt to return to a pre-given educational state which cannot be accessed. In fact: it does not even exist. Clearly, current educational spacetimes consist of different material assemblages as before. Therefore, they require a different pedagogical approach: one with an attentiveness to bodies, technologies and informatter. **Bibliography**

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Figures

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Appendixes

Appendix A: Dutch Research University Cohorts Affected by COVID-19

The table below outlines the cohorts which were affected by the COVID-19 pandemic in research universities in the Netherlands. The horizontal axes represents the academic year, with the pandemic years highlighted in orange. The vertical axes represents the year in which the students started their degree. In the table, the bachelor (Ba) and master (Ma) programs are numbered using subscript (years_{1/2/3}).

	Academic year \rightarrow					COVID-19 pandemic					
Start bachelor or Master program $ ightarrow$, 14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
	2014	Ba₁	Ba ₂	Ba₃	Ma1	Ma ₂					
	2015		Baı	Ba ₂	Ba₃	Ma ₁ *	Ma ₂				
	2016			Ba1	Ba ₂	Ba₃	Ma ₁	Ma ₂			
	2017				Ba1	Ba ₂	Ba₃	Ma1	Ma ₂		
	2018					Ba1	Ba ₂	Ba₃	Ma ₁	Ma ₂	
	2019						Ba1	Ba ₂	Ba₃	Ma1	Ma ₂
	2020							Baı	Ba ₂	Ba₃	Ma1
	2021								Baı	Ba ₂	Ba₃
	2022									Ba1	Ba ₂
	2023										Baı

*One year master's students were not affected in this year. For those students in a two-year program were affected, as their second year partially took place online.

WO	Bachelor	of 3	years:
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5 cohorts 3 cohorts

+ Master of 1 year:

4 cohorts

(start in 17-18-19-20-21) (Start in 19-20-21) (Start in 18-19-20-21)

+ Master of 2 years: