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In Between Continuity and Rupture

On Taskified Classroom Practices

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The classroom, Maryam Alirezabeigi

"…I can't quite tell which of my thoughts come from me and which from my books, but that's how I've stayed attuned to myself and the world around me for the past thirty-five years. Because when I read, I don't really read; I pop a beautiful sentence into my mouth and suck it like a fruit drop, or I sip it like a liqueur until the thought dissolves in me like alcohol, infusing brain and heart and coursing on through the veins to the root of each blood vessel."

Bohumil Hrabal, Too Loud a Solitude

Abstract

Since the pandemic has put a halt on schools as physical gatherings of humans and non-humans over the past months, the question of digitization of classroom practices has become an ever more pressing issue. Even though the research for this dissertation was conducted before the current crisis, it was already guided by an interest in the configuration of classroom practices with personal digital devices. In this sense, digitization is mainly approached through following concrete classroom practices when personal devices become an active part of this arrangement.

In order to investigate classroom practices, this research project adopts a sociomaterial approach as its overarching theoretical and methodological framework. As such, the dissertation revolves around a sociomaterial ethnography that was conducted in an international school. Each chapter uses a heuristic device to investigate the specificities of implementing a Bring Your Own Device (BYOD) policy. These heuristics are conceptual vantage points that allow an aspect of schooling with personal devices to be scrutinized.

The introductory chapter situates the case of study (i.e. a BYOD school) within a network of actors that play a role in the constitution of classroom practices, including International Baccalaureate (IB) organization, the school board, and learning platforms. By adopting the concept of fast policy as a heuristic device, the chapter shows how these actors enter the classroom and 'do' policy in situ. It further demonstrates the tensions between shorthand policies of 'e-Assessment' and 'BYOD' on the one hand, and local classroom practices on the other hand. As a result, it brings to the surface how these fast policies are adopted as a best practice, while they are also slowed down and resisted and at the local level.

The next three chapters focus on the specific composition of classroom practices and their spatiotemporal features. The second chapter deploys the heuristic of agencement in order to scrutinize how common practices come into being regardless of the subject matter and they put forth a taskified form of schooling. The third and fourth chapters address the temporal and spatial configurations of classrooms by adopting heuristics of timescape and social topology. They identify different types of times and spaces produced in classrooms when tasks are being instructed and conducted. Here, personal devices are regarded both as material objects that occupy and reconfigure the physical space of the classroom and time of a lesson, and also as apparatuses on which the lesson time majorly passes. Both chapters challenge the rhetorical personalized space and time that is often associated with the use of personal devices in schooling and specify that the taskified time has specific characteristics; it is ritualized, standardized and follows algorhythmic patterns.

After elaborating on the spatiotemporal features of classroom practices, the fifth chapter closely scrutinizes classroom practices through the lens of breakdowns. The breakdown acts as a heuristic device to surface different interruptions in the stabilized routine practices and thus, showcases more silent doings of actors. The chapter argues that digital interactions are so heavily entrenched in the classroom's daily functioning that a new techno-scholastic milieu is created.

Lastly, the sixth chapter of the dissertation casts an insider gaze on methodologies of investigating BYOD policy performances and shows how our methods did not merely describe the world but they actively participated in generating new worlds.

Samenvatting

Sedert enkele maanden doorbreekt de huidige pandemie de evidentie van de school als een fysieke verzameling van menselijke en niet-menselijke actoren en dient de kwestie van digitalisering in en van klaspraktijken zich meer dan ooit als prangend aan. Hoewel dit doctoraatsonderzoek werd uitgevoerd voor het begin van de huidige crisis, richtte de centrale onderzoeksinteresse zich op het op begrip brengen van de configuratie van klaspraktijken in aanwezigheid van persoonlijke digitale hulpmiddelen. In deze zin thematiseert dit onderzoek digitalisering voornamelijk door naar concrete klaspraktijken te kijken en naar wanneer persoonlijke apparaten een actief deel beginnen uit te maken van hun arrangement.

Deze dissertatie neemt een socio-materiële benadering als theoretisch en methodologisch uitgangspunt om klaspraktijken te onderzoeken. Een socio-materiële etnografie, uitgevoerd in een internationale school, vormt de centrale spil van dit onderzoek. Elk hoofdstuk beroept zich op een bepaald heuristisch instrument om de kenmerken van de implementatie van een Bring Your Own Device (BYOD) beleid op begrip te brengen. Deze heuristieken vormen conceptuele uitkijkpunten, die het elk mogelijk maken om een bepaald aspect van school maken met behulp van persoonlijke apparaten onder de loep te nemen.

Het inleidende hoofdstuk situeert de onderzochte casus in een netwerk van actoren die een rol spelen in de vormgeving van klaspraktijken, onder andere de International Baccalaureate (IB) organisatie, het schoolbestuur en leerplatformen. Vertrekkende van het concept van fast policy als heuristisch instrument, toont dit hoofdstuk hoe deze actoren de klas binnenkomen en er aan in situ beleid doen. Verder legt het de spanningen bloot tussen enerzijds ingrepen als e-assessment en BYOD, die worden voorgesteld als versnelde en eenvoudig uitvoerbare beleids(binnen)wegen (short-circuit policies) en lokale klaspraktijken anderzijds. Het toont het aan hoe het lokale niveau deze fast policies, die vaak worden aangenomen voor best practices of modelvoorbeelden, vertraagt, zich ertegen verzet en er op eigen manier mee omgaat.

De drie volgende hoofdstukken focussen op de specifieke compositie van klaspraktijken en hun spatio-temporele kenmerken. Het tweede hoofdstuk maakt gebruik van de heuristiek van agencement om te onderzoeken hoe continue herhalingen ervoor zorgen dat specifieke praktijken tot stand komen. We geven aan hoe dit geheel aan praktijken een taskified of taakbeheerde vorm van scholen vooropstelt.

Het derde en vierde hoofdstuk onderzoeken temporele en spatiale configuraties van klassen door, respectievelijk, te vertrekken vanuit timescape heuristiek en vanuit sociale topologie van ruimte. Deze hoofdstukken identificeren verschillende soorten tijden en ruimtes die geproduceerd worden in de klas via de instructie en uitvoering van taken. Hier worden persoonlijke apparaten beschouwd als materiële objecten die de fysieke ruimte van de klas bezetten en de ruimte re-configureren, alsook als apparaten waar de lestijd grotendeels op wordt doorgebracht. Beide hoofdstukken stellen de retorische gepersonaliseerde ruimte en tijd in vraag, die vaak worden geassocieerd met het gebruik van persoonlijke apparaten op school en specifiëren de karakteristieken van taakbeheerde tijd als geritualiseerd, gestandaardiseerd en volgens algoritmische patronen.

Na verder in te gaan op de spatio-temporele kenmerken van klaspraktijken, neemt het vijfde hoofdstuk klaspraktijken onder de loep en gebruikt daarbij breakdowns als lens. Breakdowns brengen, als heuristisch instrument, naar voor hoe verschillende onderbrekingen in de gestabiliseerde routines van praktijken de stillere, minder opvallende uitvoeringen van klaspraktijken kunnen etaleren. Het hoofdstuk geeft verder aan hoe digitale interacties zozeer ingeburgerd zijn in het dagelijks functioneren van de klas, dat er een nieuw techno-scholastisch milieu ontstaat als resultaat.

Ten slotte biedt het zesde hoofdstuk van dit doctoraatsonderzoek een intern perspectief op methodologieën om BYOD beleidsuitvoeringen te onderzoeken en toont het aan hoe onze methoden niet enkel de wereld hebben beschreven, maar ook zelf deel uitmaakten van het genereren van nieuwe werelden.

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Every beginning
is only a sequel, after all,
and the book of events
is always open halfway through

Wislawa Szymborska

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PREFACE

In her book, *Ontology of Accident* (2012), Malabou contrasts two distinct understandings of aging. The first conception characterizes aging as a gradual and slow process that might be nonlinear or perhaps even with some turbulences. Nevertheless, aging as a process traverses the subsequent stages in an orderly manner (p. 40). The second conception, however, characterizes aging not as a gradual process but as an event. A sudden rupture that is unpredictable, unexpected and upsetting after which, one is suddenly old. Here, aging cannot be termed as *becoming old*, but instead, we should understand it as *the instantaneity of aging*.

> "Her hair went white overnight." [original emphasis] Something happens that precipitates the subject into old age, imprinting a collapse on becoming-old that both is, and is not, its realization. A stupid accident, a piece of bad news, mourning, pain —and abruptly becoming freezes, creating an unprecedented being, form, individual (p. 41).

Since January 2020, the corona crisis has challenged the world. As a first reaction to manage this crisis, many activities got suspended. Among the chaos of measures and guidelines aimed at controlling the outbreak in different parts of the world, there was one common factor: only essential activities could resume, and schools were among the first institutions that were obliged to close. As a result, and to keep educational practices alive, the organization and structure of school activities were shifted towards online and distance education. Many schools that didn't have any initial encounter with digital and distance schooling had to immediately come up with improvisations and ad hoc online and digital solutions in order to hold up their educational practices. The corona crisis forced a condition on schooling that neither policymakers nor educators or educational scholarship could predict. During the past months, and still, as I am writing this introduction in November 2020, the schooling condition has faced a sudden, unprecedented rupture compared to its common condition. Even if temporarily, the corona crisis has annihilated the physical gathering at school and forced classroom practices to be reinvented.

Before the pandemic emergency, conditions and processes of school digitization were debated by policymakers and critical scholars, making a turbulent but gradual move towards digitization. On the one hand, *The Digital Education Action Plan*

published in 2018 by the European Commission stated that even though mobile internet access has increased and more than 80% of young people use the internet for social activities, education is lagging behind in using technology for learning (2018, p. 2). While the education sector was 'lagging behind' (to reuse the language of the European Commission) in making the most out of potentials of digital technologies for educational purposes, Ed-Tech businesses have been extending the spatiotemporal borders of school learning outside of formal and organizational arrangements of the classroom into students' digital devices with the motto of learning anytime and anywhere.

On the other hand, critical scholarship has been increasingly raising questions on the implications of embedding digital technologies such as learning platforms and online material provided by third parties for school education (see for example, Bhatt & MacKenzie, 2019; Hillman et al., 2020; Williamson, 2019a). Educational studies warn against integrating classroom practices with digital products, which allows a range of actors such as Ed-Tech businesses, private organizations, algorithms and codes that function according to a marketized logic to enter educational settings and configure classroom practices. Furthermore, they equally warn against the steady increase of using students' and schools' data gathered through online tracking, continuous measurement and data analytics, solidifying surveillance and standardization of classroom performances (Selwyn et al., 2020).

In this preface, I make a parallel between an accident that engenders abrupt aging by cutting through processes of getting old and the emergency situation that the corona crisis imposed on processes of school digitization, engendering an abrupt digitized state. Regarded as an accident, it can be argued that the corona crisis challenges the abovementioned *gradual* yet turbulent processes of school digitization with a possibility of 'changing all of a sudden' (cf. Malabou, 2012, p. 48). In fact, similar to the instantaneous event of aging, *school digitization* has been suddenly concretized and materialized into a radically digitized form as an effect of this accident. Like a piece of bad news that turns hair white overnight, the corona crisis has disrupted the gradual yet contested processes of school digitization. Whereas the term digitiz*ation* is concerned with continuity and the procedural nature of *becoming*, digitiz*ed* refers to a state of 'being' as an existential break in the continuity of becoming. Malabou describes an accident as a "power of change without redemption, without teleology, without any meaning other than

strangeness" (p. 24). The peculiarity of the accident is that it "does not allow us to anticipate its instances" and is, therefore "surprised by its own instances" (p. 30).

However, during the pandemic emergency, online and distance schooling was mainly rendered possible through web technologies and personal/family devices (even though bearing a serious social inequality issue concerning access to digital infrastructure). The fact that school practices on a 'survival mode' (cf. emergency education proposed by Williamson et al., 2020) could only be held together by and through digital technologies makes investigating the role of these technologies for school education even more crucial. When Selwyn and colleagues (2020) speculatively imagined the future of schools in the ten coming years, their imaginative future was, as they acknowledge themselves, somewhat 'ordinary':

> The everyday realities of education have rarely proven to be spectacular over the past 100 years, so we were interested in imagining what schools might be like 10 years from now if things do not somehow turn out to be radically different (p. 91).

The pandemic emergency has put forward a future similar to what they did mention yet could not imagine: things somehow turned out to be radically different. Similar to overnight aging, their speculative imagination for the school state in the year 2030 was realized to an unexpected extent only a few months after the publication of their paper. Speculatively, it can be said that schooling has aged around ten years over a few months when turning into a digitized form. After more than half a year, even though in some parts of the world schools could be resumed physically at the moment of writing this introduction, the situation remains unstable, and the future unpredictable and ambiguous. In some countries (e.g. Belgium, Italy, Iran, the US), the second and third waves have again rearranged schools' physical gathering.

As such, the pandemic emergency has broken 'familiar conditions' of schooling and created a fully distanced and digital form that will have long-term effects on how classroom practices will be reflected upon and organized in the future. The current situation for Ed-tech businesses and companies who provide learning platforms was perhaps an opportunity to replace the school as a centralizing institution. As Williamson and colleagues (2020) note, Ed-Tech businesses may have seen the situation of the pandemic "as a rapid prototype of education as a

private service and an opportunity to recentralize decentralized systems through platforms" (p. 108).

Drawing a parallel with Malabou's ontology of the accident, one question comes to mind: will schools remember their precedent forms once the accident is somehow sorted out? Accidents as possibilities of explosion amount to the fabrication of a novel form. Describing the new form after an accident, Malabou (2012) claims that this new form has nothing in common with its preceding form, and it is entirely indifferent to what came before (p. 18). Phrased differently, there can neither be remorse nor regret over what has happened -a digitized form of school that is suddenly concretized- nor can there be any hopes that what has emerged is a better way, as teleologies of progress or regress cannot apply here (Alirezabeigi & Lewis, 2018). However, can we claim the same thing about school education in corona times? This study will shed light on school digitization before this time and reflections about possible directions of post-corona schools can perhaps be inspired through reading this study.

Introduction

The general interest of this study is school digitization and more specifically, the configuration of classroom practices when they undergo processes of digitization. The study scrutinizes how classroom practices are configured when a Bring Your Own Device (BYOD) policy is implemented at school. As such, this study deals with the situation right before the school buildings were abandoned. At first glance, the school observed in this study does not bear many resemblances with school practices during the pandemic, as observations took place in a physical building and therefore included embodied educational gatherings. Whereas the pandemic emergency education has brought schools into students' homes, creating a Bring Your Own School Home (BYOSH) movement (Williamson et al., 2020), this research project explores a situation in which home devices were brought to the school through the implementation of a BYOD policy.

As mentioned in the preface, before the pandemic rearranges schools' practices, digital and web technologies had already penetrated school education by implementing Learning Management Systems (LMS), classroom management platforms (e.g. Google classroom) and parental portals on the school's organizational level. Moreover, the deployment of Interactive Whiteboards and digital devices during lessons had been proliferating on the classroom level. This study scrutinizes classroom configurations of a BYOD school setting, in which students are asked to bring personal devices to school. The interest in scrutinizing BYOD classrooms lies first in the prevalence of personal devices at schools (Selwyn et al., 2017a). Secondly, the BYOD policy is one of the common models supported by governments and policymakers worldwide to integrate education with digital technologies (Dussel, 2018a; Maher & Twining, 2017). Consequently, scrutinizing the implementation of the BYOD policy at schools is significant to understand how school digitization in one of its common models shapes classroom practices. Our specific case can perhaps be considered the closest situation one could get to the current digitized emergency education in which classroom practices are interwoven with personal or home devices.

In order to set the scene for the study, which has been conducted over the past six years, first, the study will be situated within the field of digital education and the key issues that are addressed in the literature will be outlined describing the current state of school digitization. Secondly, the theoretical and methodological

approaches that framed this study will be elaborated, and the research processes through which this study was conducted will be described. In the final section of the introduction, the general overview of the six chapters that constitute this doctoral research will be presented.

In elaborating on the main issues that account for the current state of school digitization concerning classroom practices, I present a threefold focus on platformization, datafication and personalization of school as processes that characterize school digitization within the field of educational research. Even though these characterizations are intensely entangled, each of them illuminates a specific dimension of the schools' current situation. This introductory section only allows for a brief overview of the main topics discussed in the body of literature, as writing extensively on any of these issues might amount to a whole dissertation in itself.

The Platformization of School

Digital platforms constitute one of the key elements through which the scholarship addresses the current state of school digitization. Described as sociotechnical intermediaries, platforms refer to a specific organizational form, as well as a data structure that facilitates the distribution and exchange of content, goods and/or services (Lewis, 2020; Srnicek, 2017; Williamson, 2017). The explosive growth of learning platforms in the past years has altered school education as these platforms translate the educational values and ideas into a set of user types and actions that are defined for them (Decuypere & Landri, 2020). In school education, digital platforms have intensified the distribution of online course materials that effects the school curriculum (van Dijck et al., 2018). For instance, teachers regularly use YouTube videos to instruct students or select them as course material (Fyfield et al., 2020).

Moreover, platforms have the capacity to shape classroom practices through circumscribing a range of activities defined for specific users (e.g. teachers and students). Finally, they redistribute power by allowing private actors (e.g. Ed-Tech businesses) to permeate into national and local policy-making processes and produce a sort of digital governance (Williamson, 2016, 2019a). In sum, the proliferation of platforms contributes to the decoupling of education from school as an institution and creating a platform-based learning environment in which

platform providing companies are among the centralizing powers, and hence, they privatize and marketize school education (Hillman et al., 2020). The expansion of platforms that accumulate, order, and analyze data has intensified what has been named as the datafication of education.

The Datafication of School

In close relation with school platformization, the datafication of school can be considered the second main aspect that characterizes the digitization of schools. Data can be considered the fuel of platforms which through the pervasion of digital technologies and online platforms at schools have gained an accentuated role in different levels of school education. At the level of the individual student, data that is extracted from the students' interaction with platforms are tagged, analyzed, and categorized in real-time; this can lead to the creation of data-driven subjectivities (Bradbury & Roberts-Holmes, 2017; Jarke & Breiter, 2019). Machine learning algorithms make optimal use of students' data to capture their patterns of learning more accurately and finally, to be able to predict their emotions, behaviors, and performances (Williamson, 2015, 2019b). Consequently, learning processes are translated to data processes and are regarded in terms of students' outcomes and performance which are increasingly standardized (van Dijck & Poell, 2018). At the school level, it has been argued that data on student performance can be closely surveilled and compared by teachers, parents and heads of school. In this respect, the term dataveillance describes the systematic use of data to monitor students' actions (Manolev et al., 2019; Selwyn, 2015).

The Personalization of School

The personalization of school emerges as an effect of datafication and platformization of the school. The more data is collected, the more precise user profiles can get and thus, the predictions on users' future behavior and their pace can be more accurately made. It is argued that personalized practices heavily rely on ideas of efficiency and effectiveness as the purposes of learning and teaching. As such, they minimize the role of teachers as their expertise, experience and decisions are deemed less accurate and efficient compared to predictive algorithms (Roberts-Mahoney et al., 2016). Scholars warn that personalized adaptive learning can undermine the value of public curricula by replacing commercially driven and algorithmically constructed curricula (Hillman et al., 2020). Moreover, the

teacher's collective role is equally argued to be marginalized in favor of a role that is facilitating and analyzing students' learning data on platforms (Ideland, 2020; Ratner et al., 2019). In sum, these three characteristics point to privatization, standardization and marketization of schools, in which teaching and learning practices are more and more decoupled from the classroom space and sculpted by private actors and their market-driven interests.

This doctoral study is conducted within the sketched background, even though it does not take the described features as its point of departure. That means, this study does not already assume a datafied, platformized and personalized school that its instantiations or manifestations are to be found through the study. Rather, in this dissertation, school is approached through its concrete, day-to-day and mundane happenings. This way of approaching the school implies that every time Interactive Whiteboard, lesson plans, platforms, teachers, digital devices and students come together, they enact school in a nuanced way. This enacted school may be datafied, but also maybe not. As Gorur and Dey (2020) demonstrate, "users don't always follow the programs of system designers" (p. 13).

In this respect, it is important to meticulously investigate the classroom's day-to-day activities and follow closely how actors form specific practices together and which actors achieve to become central in these practices and how. As such, this study aims to understand how the school comes into being through its daily enactments of classroom practices. The study takes a close empirical look at classroom practices and observes how they are composed of digital devices. In order to scrutinize the school's concrete and daily happenings in which digital actors are given a voice, this study adopts a sociomaterial approach as its overarching theoretical and methodological framework. In the following section, I briefly outline an overview of the key characteristics of these approaches and their implication for this study.

A Sociomaterial Approach towards Classroom Practices

Sociomaterial approaches are by now established approaches that allow researchers to study different dimensions of educational practices in various fields, such as policy studies (Gorur, 2015; Landri, 2015), academic practices (Decuypere & Simons, 2014b, 2014a), organizational learning practices (Thompson, 2016) as well as classroom practices (Röhl, 2012a; Vanden Buverie & Simons, 2017). These approaches emerged within the underlying posthumanist turn in social sciences that aims to go beyond the anthropocentric view in which humans, their interactions and individual skills are accounted as the only central elements when studying a phenomenon (Fenwick, 2014; Sørensen, 2013). In opposition to this view, the posthumanist turn acknowledges that humans have always been hybrid or heterogeneous creatures (Adams & Thompson, 2016). As such, the posthumanist turn takes the central attention away from humans and casts a light on the material and social dimensions, and particularly on the entanglement between the two.

In line with this posthumanist turn, sociomaterial approaches in education can equally be situated in a close neighborhood of theories with common conceptual grounds namely science and technology studies (STS), actor-network theory (ANT) and assemblage studies. Even though each approach delineates different specifications that cannot elaborated on here, the central focus of all these approaches is directed towards relations (Decuypere & Simons, 2016b). In order to elucidate how sociomaterial approaches perceive relations, we will first need to define what is considered an actor.

Sociomaterial approaches dismiss the separation between human and non-human actors and account for both of them on the same plane. Here, an actor refers to "anything that does modify a state of affairs by making a difference" (Latour, 2005, p. 71). Thus, an actor can be a blackboard that centralizes the classroom, or it equally can be an algorithm of YouTube that, fabricates the lesson material by recommending specific videos, and it can also be a teacher who resists the protocols of a learning platform. This way of accounting for actors constitutes a shift in the status of material objects, which previously were perceived as passive objects in service of humans' needs or commands.

This shift, first of all, means that the division between the human and non-human are rejected while searching for agencies of settings. Here, settings are observed and investigated by identifying different actors that populate the setting and actively contribute to its composition without prioritizing humans over non-humans. As such, the symmetry of actors is the first key characteristic of sociomaterial approaches. Sociomaterial researchers account for the heterogeneous actors in a symmetrical vein in which human and non-human, material and social, as well as physical and virtual can be studied on the same flat plane. The implication of the first characteristic for this dissertation is that digital devices are not considered as passive objects in the background, fulfilling (or not) particular human expectations. Instead, they actively co-constitute what it is to be a(t) school today. Secondly, this shift means that the agency is now not only distributed among different actors, but it is also only enacted when the interplay of actors forms a specific practice. This will lead us to the second characteristic of sociomaterial approaches, that is, focusing on relations.

The second key characteristic of sociomaterial approaches is how educational settings are perceived when human and non-human, and material and social, are entangled. That means, actors do not exist in isolation, but they establish specific relations with other actors of the setting. To give an example of specificity of relation, let us review our examples on actors. The blackboard can be enacted as an actor that centralizes knowledge and this way creates a relation of reference with other actors, namely, students. Likewise, algorithms of YouTube can preselect what is displayed on the students' personal accounts and in this way, they establish a relation of pre-configuration with students. In a similar manner, the teacher who does not follow protocols of a learning platform, enters a relation of resistance to the designated role of the platform.

In this respect, adopting a sociomaterial approach necessitates this research project to be sensitive about different types of actors and what they do or make other actors do by identifying these relations. Moreover, focusing on the specificity of relations between actors allows this research to discern particular effects that these relational interplays bring about, that is, identification of practices. Practices that are perceived as effects of the specific interplay of actors, point to the doings, sayings, activities and routines that take place in the setting of observation and they specify the spatiotemporal features of it (Decuypere & Simons, 2016b). As such, this study perceives classroom practices as the effects of entangled relations between human

and non-human actors and acknowledges that these practices are not there to be found by the researcher and it is the researcher who puts boundaries to a specific practice, trying to see when it starts and when it ends or how. As such, in this research I trace how "a flow of situated activities is connected into streams of action" (cf. Gherardi et al., 2019).

An important consequence of adopting a sociomaterial perspective is that school cannot be understood as a given container of isolated actors, which exists a priori. Sociomaterial approaches emphasize how through the enactment of concrete practices that characterize specific times and spaces, school is constantly in-the-making (Fenwick et al., 2011; Vanden Buverie & Simons, 2017). Phrased differently, while approaching a school setting, one cannot assume certain practices pertaining to school and others not. Rather, school is always enacted through specific operations performed by actors that are specific to this setting (Fenwick & Edwards, 2010; Law, 2009; Sørensen, 2009). In sum, adopting a sociomaterial approach urges this study to first of all, take into account a range of human and non-human actors that establish specific relations in a classroom setting. Secondly, it necessitates scrutinizing practices that come to being as an effect of these established relations. Thirdly, in observing relational compositions of classrooms, descriptions count as a crucial part of the research. In order to scrutinize and describe these practices, actors should be followed closely, and this implies the importance of registering and analyzing seemingly mundane day-to-day activities (Latour, 2005).

It is important to note that the analytical gaze of sociomaterial ethnographies diverges from traditional ethnographies in which exclusively immersive tactics are deployed to give a description of the daily life in the school. These canonical ethnographies place an immense emphasis on the interactions of humans and the way meaning is made through these interactions. Meanings that are constructed by humans in an exclusively human world (Decuypere, 2021; Röhl, 2012; Vanden Buverie & Simons, 2017). In contrast, sociomaterial ethnographies that aim to trace the network of digital and immediate relations are more focused on the life of school which is "a result of the continuous fabrication of things, time(s) and space(s)" (Vanden Buverie & Simons, 2017, p. 117). These sociomaterial accounts necessitate to reimagine ethnographies and the presence of the researcher precisely because of the vast reach of platforms and digital data beyond the traditional sites of the classroom (Decuypere, 2021; Landri, 2013; Seaver, 2017). In this respect,

this study equally fallows a methodological objective towards finetuning sociomaterial ethnographies that observe digitally saturated settings.

The first period of observation was done as an explorative pilot study. The purpose of this explorative ethnography was first, to render myself familiar with the school, and the variety of activities carried out at school. Not being familiar with how BYOD policy implementation make classrooms look like, (i.e the specific activities and assignments) was the initial motive to conduct the first ethnographic observation. Second, as digital devices were deployed in different grades from elementary to high school, the pilot study was a period to choose the grades and classes in which the main study was going to focus on. Third, this pilot observation was developed to tailor the methodological adaptations necessary for the main ethnographic study.

I began my observation at this school from the IT room and in close contact with the IT teacher and coordinator (my first and main contact person from the school). The IT room and the IT teacher were the most evident spaces in which 'the digital' was present. As he was responsible for all digital related activities including school policies, maintenance and infrastructure of devices and networks, educational technogoly gatherings such as assemblies for parents, students and teachers, I followed him for the first week throughout the course of the day.



Figure 1: The IT room and the researcher's laptop

The international school offered all International Baccalaureate (IB) programs for students aged 3 to 19 and the way digital technologies were integrated with classroom activities differed in different programs. For instance, the first grades of Primary Years Program (PYP) could only use school Chromebooks in specific hours and with the presence of the IT teacher who taught fast typing through an online learning platform[1].

At this stage, I observed different classes and grades from literature and languages to mathematics and science labs three days a week. In some classes I could have access to the class material and instructions. During the pilot observation, I observed what happened in classrooms, the library, cafeteria and the playground. This period was a regular recording of what was going on, how activities were arranged in different spaces, arrangements in which devices were present and the way they gathered other actors (e.g., teachers, notebooks, earbuds, etc.) around

[1] After the analysis of first observation, it was decided to observe nine and ten graders whose educational program support BYOD policy and are at the age in which they can independently use digital devices.

them (if they did). My fieldnotes consisted of notes I took in the class about the happenings of the classroom, with the focus on the situations in which the device was present, being addressed or used. These notes were typed on my personal device in the classroom or other spaces of the school. Similar to students who brought personal digital devices to school, I brought my digital devices to the field. Therefore, my laptop and my smartphone were the recorders of the scenes. Besides the real-time typed notes, I collected a series of photographs and short video recordings inside and outside of the classroom to capture the arrangement created with and around these devices. To capture the audio setting and the discussions some voice recordings of some lessons were registered. I had a train ride of one and half hour to get back home from the school and that was the time I wrote my impressions, not only of events I observed, but about the act of observing and describing. After the train ride, upon a visit to a café next to home, I re-read notes of the day, added highlights of my visit, sought to find new relations, connect them to theories and raise new questions.

On the one hand, in this period, the presence of devices at school and, more specifically, during lessons engendered various challenges for teachers and the school staff. Formal emergency assemblies, overnight changes of policies, or announcements popping up on school walls constituted how the staff and teachers dealt with these challenges. Consequently, these spontaneous and emergency breakdowns of the school's stabilized order became parts of my data collection and, at times, significant parts of it. On the other hand, parallel to these breakdowns, the pilot observation made me sensitive about specific classroom practices that continuously and persistently took place regardless of the subject matter. Practices such as making PowerPoint presentations were ubiquitous in different lessons and following how the actors' interplay performs these practices in a specific way signaled another focal point of the main study. In this regard, I decided to focus on observing formal lessons to scrutinize classroom practices across subject matters and signify a type of continuity (if any) that comes into being when practices are set in motion.

The concepts of continuity and breakdown are both significant concepts for sociomaterial approaches. Tracing how practices are performed allows sociomaterial researchers to signal possible types of continuity even when some relations change in the composition of practices (Decuypere & Simons, 2016b; Law, 2002). Concerning the topic of this dissertation, for instance, the practice of

making presentations is performed in a specific way in different subject matters (literature, geography or sciences) which can signify a typical form of doing (making a presentation). Being sensitive to these continuities allows to capture the emergence of typical forms of doing a practice or forms of schooling[2] (Decuypere, 2019; Gherardi, 2016). Breakdowns that disrupt routine relations of a setting reveal what silently is being done, that cannot be traced when actors are smoothly embedded in the practice (Latour, 2005). Being sensitive to breakdowns suggests a way to make sense of the ruptures observed during the pilot study further specify the role of actors in creating conditions of continuity (or not). In sum, focusing on the continuity of practices on the one hand, and being sensitive to breakdowns and ruptures, on the other hand, was an essential step towards making methodological adaptations of the main study.

Sociomaterial approaches serve researchers with sensibilities through which they can show how specific practices are being done, rather than a ready-made theory adopted to explain social phenomena. As such, adopting these approaches as (meta)narrative theories falls prey to seeing the same thing over and over again. Statements such as non-humans actively contribute to the composition of practices, or relations are to be found everywhere are examples of such fallacy (cf. Decuypere, 2019). Even though these statements can be driven from adopting a sociomaterial approach, limiting one's research to these explanatory statements does not do justice to the adopted methodological framework. Respectively, sociomaterial approaches do not "necessarily offer a coherent framework, but may as well be an adaptable, open repository" (Mol, 2010, p. 265). This means that each study needs to meticulously specify and adapt these approaches according to the study's particular focus (as mentioned, one of the goals of the pilot study).

In this respect, another essential step towards tailoring methodological adaptations of this study was the design of six 'heuristic devices' during the research process. Heuristic devices can be regarded as starting points for further experimentation and refinement (Adams & Thompson, 2016, p. 19). They show a way "to start out on a footpath taken by others before, but with an eye for surprises and a willingness to make unexpected detours" (ibid, p.20). As such, more than being prescriptive methods, they provide possible approaches to inquiry (ibid). In this respect, heuristic devices are methodological vantage points that direct methodological

[2] The second chapter elaborates on this point extensively.

sensitivities and each allows a specific dimension of classroom practices (in a BYOD setting) to be scrutinized. The heuristics are chosen to help investigate the research question, and as such, they correspond with the main question of the study. I will elaborate on these heuristics while giving an overview of the chapters in the next section.

Following the lessons learned from the pilot study, the research question of the study was finetuned as: How classroom practices are configured with digital devices in a BYOD school setting? This question is then translated into minor questions that reflect the methodological adaptations:

- What kinds of practices come into being in such a setting and is there a sort of continuity to be recognized as classroom practices are set into motion? (chapter 2)
- What kinds of times and spaces do these practices produce? (chapter 3,4)
- What role does each actor take up and what does the enactment of these practices signify? (chapter 1, 2,5 and 6)

In order to answer these questions, the main study was then designed to observe fixed classes of geography and history (which in this school is called as individuals and societies), literature and mathematics in ninth and tenth grades at the same school. This time, I sat at different corners of the classroom and observed the lesson while taking notes on my laptop. I completed my notes after the lesson by having informal interviews with teachers to clarify the original sources of lesson material, the lesson plan and the use of digital learning and learning management platforms. I had full access to the lesson material of two subject matters (geography and literature) and could follow more actively how classes evolve over formal lessons. As the specific focus of the study was classroom practices the attention was mainly given to the interplay of actors and the corresponding practices as an effect and interviewing students or teachers about their experience or feelings was not of interest.

General Outline

This dissertation consists of six chapters that correspond to the six heuristic devices that were deployed to help us specify different aspects of classroom practices. Even though each chapter is a self-standing piece that has already been published or submitted to journals or books, they all revolve around one ethnographic study and reading them together illuminates a holistic view on classroom practices. That is, firstly, the network of different forces that decide on the presence of devices and their usage will be demonstrated with the help of fast policy heuristic. Secondly, common practices of different subject matters will be illustrated, and their inventive agential power will be analyzed with the help of the heuristic agencement. This agential role of enacted practices will be further specified with the help of the heuristic of breakdown. The heuristic of breakdown pinpoints the central actors and their doings. Furthermore, the spatiotemporal characteristics of these practices, that is the different sorts of space and time produced when practices are enacted, is discussed with the help of heuristics of timescape and social topology. All these aspects demonstrate what classroom practices look like and more importantly these chapters together portray how digitized school education can be understood.

Each chapter tries to reflect the ethnographic aspect of the study by means of describing practices or situations that constitute the core of the analysis. However, the nature of the dissertation, that is, a collection of articles, does not grant having expanded and elaborated descriptions of the site or manifold of practices as each journal article is bounded with word limits. This has been a difficulty of this dissertation through the process of writing, but all effort has been put to have the descriptions of the discussed situations as elaborate as possible in each chapter.

The first chapter of the dissertation situates the observed school within the network of human and non-human actors that decide on the presence of technologies in the classroom. These actors include the International Baccalaureate (IB) organization, the school policy that requires students to bring their own personal devices to school through the implementation of a BYOD policy and online learning platforms deployed in classrooms. As a way of contexting (Piattoeva et al., 2019) our ethnographic study, we argue that these actors are positioned within a growing concept termed as ‘fast policy’ which emphasizes the accelerated movement of policies between often distant sites and compressed decision-making moments that

prioritize the deployment of so-called ‘best practices’. We adopt the concept of fast policy as a heuristic device to showcase the kinds of tensions between the global and local decision-making processes. Furthermore, we trace how classroom practices deal with fast policies. The chapter emphasizes the role of the teacher as a policy actor who can appropriate, slow down and resist fast policies.

In order to explore how concrete, day-to-day classroom practices give shape to distinct forms of classroom practices, the second chapter focuses on the daily organization and structure of classroom practices. By deploying the heuristics of agencement (a French term translated to English as assemblage) specific classroom practices that are constantly being practiced in different subject matters are described. The chapter demonstrates how a taskified forms of schooling comes into being as a result.

In the third and fourth chapter, we scrutinize more specifically the spatial and temporal configurations of classrooms by adopting social topologies and timescape as heuristic devices. As such, these chapters identify different types of times and spaces that are produced while classroom practices are done on personal screens. Whereas in the fourth chapter, personal devices are regarded mainly as material objects that interfere in the physical space of the classroom and reconfigure the space, in the third chapter we focus on what appears on the screen, and thus account for other actors (e.g., learning platforms and social media accounts). Both chapters challenge the rhetorical personalized space and time that is often associated with the use of personal devices in schooling and discuss the specificities of the taskified time and space. The third chapter chiefly scrutinizes students’ screen activities and as a result of this focus, it loses the direct interactions with other actors present in the immediate environment.

Turning to breakdowns, the fifth chapter examines how different interruptions in the stabilized routine of practices showcase the more silent performances of digital devices in the classroom and their role. That is, digital interactions are so heavily entrenched in the classroom’s daily functioning that a new techno-scholastic milieu is created.

Weaving the second, third, and fourth chapters together, the concept of agencement allows us to see how specific practices put forth a taskified form of schooling with specific spatiotemporal configuration. Furthermore, the study of breakdowns that is reported on the fifth chapter, shed a light on how interruptions can illuminate the silent ways in which practices are constituted but are not easily recognizable when everything is smoothly in order.

This dissertation takes a particular road to talk about methodologies of researching digitally saturated settings as well. In the sixth and final chapter, the dissertation casts an insider gaze on methodologies to investigate BYOD policy performances and shows how methods do not merely describe the world, but they actively participate in generating new worlds. In this sense, devices or a BYOD policy are not isolated from the relations and practices that do policy and do research on these policies. Following these lines, the educational order then becomes very local, provisional and specific.

CHAPTER I

Dealing with Fast Policies of IB Schools:

(Re/Un) Making Classroom Practices [3]

[3] This chapter has been submitted to *Journal of Education Policy*

Introduction

While internationalization of education is mostly discussed within the context of higher education in educational studies, in the past decade, international schooling has also gained growing importance in educational research. The reason for this can, on one hand, be traced back to the intensive growth and proliferation of international schools in many countries (Resnik, 2012a). On the other hand, the increasing tendency to internationalize public education has resulted in the integration of international curricula into state-funded and national school programs (Resnik, 2020; Steiner-Khamsi & Dugonjić-Rodwin, 2018). As such, international schooling can be divided into several types. The first type reflects the initial emergence of international schools as a "response to a particular segment of the internationally mobile population" (Bates, 2011). These schools cater international expatriates working abroad and seeking for an international environment. The second type however, are schools that cater local upper- and middle-class families, that wish for international qualifications beyond national policies (Hayden, 2011; Waterson, 2016).

The best-known organization providing international curricula is the International Baccalaureate organization (IB). The expansion of the IB programs has grown to the extent that, within the second type of international schooling, governments in some countries make contractual arrangements with the IB organization in order to offer an international track within the country's public education (see Steiner-Khamsi & Dugonjić-Rodwin, 2018 for the list of governments collaborating with the IB organization). The IB organization offers four different programs for students aged 3-19, which include Primary Years Program (PYP) for students of 3-12 years old, Middle Years Program (MYP) for students of 11-16 years old, and Diploma Program (DP) and Career-related Program (CP), for students aged 16-19. Private schools or local governments can provide one or more of IB programs at their schools (Resnik, 2016).

Another feature of IB programs which make them attractive for schools or governments is their focus on the use of technology in the way curriculum is designed. In this respect, IB programs are considered to be the hubs of innovation that can reform school education (Steiner-Khamsi & Dugonjić-Rodwin, 2018). Schools' adoption of IB programs over the years not only has led to the growth and expansion of IB as an independent education providing organization, but it has also

standardized international education to the extent that IB programs are depicted as synonymous with the international education (Dvir, Shields, & Yemini, 2018, p. 456).

The distribution of policy processes among local and state actors on one hand, and international organizations and businesses on the other hand, next to the expansion of digital technologies has given a rise to a policy *condition* termed as 'fast policy' (Peck & Theodore, 2015). With regard to IB schools, this means that, more than being linked to local and state-imposed policies and curricula, international schools are tied to a range of international and global actors such as the IB organization and Cambridge International Examinations which have the responsibility of teacher training, certifications and curriculum developments that usually is controlled by states (Resnik, 2012, 2020). Moreover, fast policy condition equally entails the influence of non-humans such as learning platforms and digital devices on the policy work. Williamson (2019a) argues that "[t]he networked, accelerated, fast policymaking condition has proven ideal to the expansion of educational technologies and media" (p.1) which makes Ed-tech businesses increasingly present and thus influential within formal school education. In this sense, the case of international schools namely, schools that adopt IB programs, is an example in which fast policy is manifested through non-governmental organizations and businesses who influence the direction of school education and blur the boundaries of policy work.

What is particular for us in this study with respect to the condition of fast policy is the role that digital devices and technologies play in accelerating, short-cutting and short-circuiting the policy work. We focus on international schools that adopt IB programs, referring to them as IB schools. In this respect, the general interest of this chapter is to understand how these so-called fast policies enter the classroom and what they do in practice. More precisely, we want to trace how fast policies are *being dealt with* in concrete ways with a special focus on decisions with regard to technology integration (e.g. implementing a newly designed e-assessment, using specific platforms in the classroom). In order to do so, we conducted an ethnographic study in one international school in Belgium and we followed different classroom practices.

In the following sections, we will firstly elucidate how the notion of fast policy can be understood within the context of IB schools. This way we situate our school

within a network of deciding forces in an attempt of contexting (Piattoeva et al., 2019). Secondly, we elaborate our methodological approach on tracing fast policy relations which lead us to identify three instances of fast policies, namely e-assessment, BYOD and learning platforms. Furthermore, we discuss how these instances are dealt with through local practices of the classroom. We conclude that teachers' work has become more of a policy work aimed at slowing down and stabilizing the fastness of policies.

Tracing Fast Policies of International Schools

The condition of fast policy as conceptualized by Peck and Theodore (2015) has arisen as a result of increasing cross-border policy work that accommodates accelerated decision-making processes and logics of a 'best practice' model. These models, they argue, emphasize the referencing and adopting of decontextualized and distant policy models for local affaires. Moreover, fast policy stresses the rapid and immediate decision-making processes that increasingly appear next to the deepened interconnectivity between policy spaces (Gulson et al., 2017; Williamson, Bergviken Rensfeldt, Player-Koro, & Selwyn, 2019).

In the case of IB schools, recognition of IB's Diploma Program by higher education institutions, next to programs with global and international orientation, is a significant driver for families and even local governments towards introducing IB programs as an alternative to local curricula (Wright & Lee, 2020). Currently IB strives to gain broader recognition of its curriculum by local education policy actors, with the purpose of entering the field of public education (Dvir, Shields, et al., 2018; Resnik, 2019). In this sense, IB continues to expand in scope and significance, becoming embedded into public schooling in Anglo-Saxon countries including the UK, Australia, Canada, and the US (Dvir, Shields, et al., 2018; Resnik, 2016). At the same time, in some other countries such as Israel, IB's entrance into public education is in its infancy (Dvir, et al., 2018). In this respect, the case of IB schools not only demonstrates how school policy intermingles with ideas and decisions of the IB organization which can circumvent local and state policies, but more importantly, their direct implementation within public education, policies coming from the IB organization influence the direction of public education (Lakes & Donovan, 2018; Steiner-Khamsi & Dugonjić-Rodwin, 2018).

As we briefly mentioned in the introduction, one of the crucial elements in introducing new policy actors in school education, is the expansion of digital and web technologies at schools. The work of non-human actors such as learning platforms, Learning Management Systems (LMS) and digital devices in respect to school fast policy has not yet received ample attention in the literature (Williamson, 2019a).

In this sense, studies of fast policy have been primarily engaged with the distribution of policy making processes among private and public, local and global actors (see for example Hardy et al., 2019; Lewis & Hogan, 2019). This chapter aims to address this gap and scrutinize how the network of (socio)digital actors influences school education at the level of classroom practices. To pursue this aim, the case of IB schools gains yet another significance since these schools grant a significant role to the implementation of digital technologies within their curriculum. In fact, the technology use is introduced from the IB's early years program (PYP): "Technology in the PYP immerses students in the interplay between learning technology, learning about technology and learning through technology" (IB, 2018). IB supports teachers to implement and integrate digital technologies. As such, using several digital technologies such as tablets and laptops for learning is perceived by the IB organization as the general condition of students' daily life and thus equally part of school's daily life and learning (Jarrett, 2017). The recently introduced onscreen assessment at the MYP level supports the idea that a huge part of everyday life of school organization and classroom activities is interwoven with these digital technologies (Wilkinson, 2018). Moreover, this assessment is universal for all IB schools over the globe and as such it reflects an instance of global and mobile fast policy dissemination. During our observation of an IB school, the e-assessment policy was implemented for the first time. This is one of the instances through which we disentangle fast policy relations.

The second instance through which fast policy relations are established is the use of digital devices for learning. Even though schools are independent in implementing the curriculum and technology integration, results of a study on the integration of digital technologies into IB's DP program demonstrates that many IB schools deploy the Bring Your Own Device (BYOD) policy (Cooker, Crook, & Ainsworth, 2015). The incorporation of personal devices for classroom practices paves the way for a range of Ed-tech businesses and platforms to enter the

classroom and reconfigure the organization of classroom practices as well as the roles that actors play. As Williamson (2019a) argues, devices like Google's Chromebooks and its services are much more than educational technologies: not only does their presence at schools showcase lobbying and commercial influences, their presence equally exerts power on how education is being practiced on a daily basis by embedding a wide range of platforms, apps and digital solutions produced by Ed-tech businesses which are easily available to students and teachers. As such, the second instance through which we trace fast policy enactments is by scrutinizing the use of personal devices and its corresponding policy relations.

The last instance that manifests fast policies in this school is the use of learning platforms which is steadily encouraged by the IB. The curriculum documentation of IB DP's program for instance, assigns a crucial role to digital technologies for the implementation of their programs, by pointing that "ICT provides unique opportunities for creative learning through student collaboration and the use of digital media products" (IB, 2009, p. 13). More specifically, Cooker and colleagues (2015) report that in their case study of IB schools' integration with digital technologies, there is a pressing expectation for staff to "usefully populate learning platforms" (p.85). As such, almost all IB schools deploy platforms in the form of using LMS (e.g. the IB specific of Managebac) or platforms for parent communication as well as for routine classroom practices (e.g. G suite services, Firefly). Similarly, in our observed school different platforms were used during lessons. Platforms are crucial in this study as they provide and enforce *rules* by which content can be created and in this way, they gain a capacity to steer user's activity through defining *regulations* (Lewis, 2020, p. 5) .

In this sense, integrating platforms provided by Ed-Tech businesses contribute to shaping what school education can be. Chang (2019) illustrates how these companies bring an imagined world into being and how, through their specific values and interests, they invent and mobilize competing visions of education. As such, platforms' imaginaries of education materialized through users' activity demonstrate that whereas the IB organization can impede the local and governmental policies of school education, learning platforms circumvent both the national education policies and IB organization at the same time and do policy directly in the classroom (Williamson, 2019a).

In sum, following a non-governmental curriculum program and policy provided by the IB organization which immensely embraces and supports policies such as BYOD and the use of learning platforms showcases how IB schools become novel spaces to investigate fast school policies on the ground. Long-distance interconnections between IB policies and different IB schools across the globe implementing a unified curriculum and assessment, together with local school policies resulting from the integration of BYOD policy, and finally the policy relations that platforms and Ed-tech businesses enact at the level of classroom practices makes a case for deeper investigation of what these actors concretely do in classrooms. As Theodore and Peck (2015) argue, the concept of fast policy equally points out how globalized and mobile policymaking imaginaries always bump into the local and hands-on realities of policy enactments. As such, it problematizes ongoing tensions between local specificities of practices on the one hand, and global interconnectedness of decision making on the other hand. In the following section we will elaborate on how our ethnographic observation disentangles fast policy enactments in the classroom.

A sociomaterial ethnography of fast policy enactments

The complex features of the fast policy condition that run through international schooling – namely *intense interconnectivity* between different sites of policy making and having a diverse range of *human and non-human* actors involved in doing policy - denote that fast policy research requires a methodological approach that can firstly acknowledge and adequately address policy relations that "extend beyond traditional territorial or political boundaries" (Gulson et al., 2017, p. 236). Secondly, these features call for an approach that equally accounts for the work of *non-human* actors such as learning platforms and digital devices.

In this study, we adopt a sociomaterial approach that avoids perceiving policy as a static object (like a policy document) that moves between different organizations with a fixed impact and effect. Instead, this approach sensitizes us towards the composition of concrete classroom practices and how these practices are enacted through the interplay of human and non-human actors. As a result of this approach, global policy condition of fast policy is broken down into specific, mundane enactments (Gorur, 2015). In this way, by specifically describing how classroom practices come into being, sociomaterial approaches allow us to show how some actors, such as learning platforms, become more influential than others or how

some actors, such as teachers, are included or excluded as practices take shape. Additionally, by focusing on concrete classroom practices we are able to specify how policies that move globally from the IB organization into the classrooms are dealt with. In sum, scrutinizing how classroom practices deal with fast policy through a sociomaterial lens necessitates an *empirical* orientation towards policy by focusing on *mundane, relational and bottom-up practices* that manifest the tangible work of policy (Gulson et al., 2017; Peck & Theodore, 2015; Williamson, 2019a).

Our ethnographic observation took place in one private international school that offers IBs' PYP, MYP and DP programs. For a total period of 5 months, we observed classroom practices of MYP program in different subject matters of English, Geography (as a part of the officially titled subject of Individuals and Societies in MYP curriculum) and Mathematics. Our guiding question in scrutinizing classroom practices was how the abovementioned fast policies can firstly be identified and secondly how they are being dealt with at the classroom level. Put differently, the issue is how fast policies are being unfolded on a day-to-day life of school.

In the following sections, we will firstly identify the network of actors that establish fast policy relations in our observed school, and we will show how these actors are able to establish fast policies at school. Secondly, we trace how these fast policy relations are unfolded and dealt with through the enactment of classroom practices. We explicitly make a case of three fast policy instances, including the recently introduced eAssessment policy, the BYOD policy and learning platforms policies. As Peck and Theodore (2015) point out, fast policies studies explore "both the connections and the contradictions between the smooth spaces imagined and made by global policy models and the more mundane and 'sticky' reality of day-to-day delivery" (p.xvii). The analysis of these three instances demonstrates the tensions between fast policy ideas that traverse across business and education sectors, on one hand, and the bounded practices of classrooms that slow down or resist these policies on the other hand.

The eAssessment policy

Grade 9 students are asked to attend an assembly. Today, grade 10 is going to introduce an external e-assessment developed by IB Organization. Grade 10

students were the first group to partake in IB e-assessment designed for the MYP. "E-assessment entails two different formats of evaluating students' performance. First is the e-portfolio that covers subject matters such as art and physical education and second is a summative 2-hour onscreen assessment that covers subjects like mathematics and literature", one 10 grader presents as he points to chart of subject matters displayed on the assembly hall's screen.

After this introductory presentation, a videoclip from the IB's website is played. In this video, onscreen assessment is presented as a concept-based exam in which students are expected to apply their conceptual understanding instead of memorizing content. The video makes a case for the specific format of the exam which is suitable for everyday internet users and reflects how students learn on a daily basis currently. The video states that onscreen questions are media rich and interactive, thus, new understandings which could not be presented on paper can now be visualized through manipulating data and tables. "The exam includes interactive functions that offer students opportunities to respond in engaging, innovative and efficient format including textboxes, drawings, flowcharts, and darted tables", the video adds while displaying sample questions in mathematics with graphs. "No way! Mathematics on the screen?" one of the students says to his classmate. "Onscreen tools include: drag and drop, cut and paste, copy and paste, play, pause and replay video and animations, as well as interaction with animations and simulations. These features allow to focus on higher order thinking and contemporary skills" (IB, 2016). *The assembly ends with students' personal experiences about time management and planning of e-portfolios.*

Since 2016, the IB organization has developed an optional external summative eAssessment for the final year of MYP which grants a "formal, internationally recognized certificate" to successful candidates[4]. IB states that "MYP grades provide important externally-verified results that are poised to serve as an alternative to state or national examinations and to support applications for university or other post-secondary education"[5]. Prior to the implementation of the MYP eAssessment, the IB's only external assessment was the DP's final year examination, granting the IB diploma.

[4] https://ibo.org/programmes/middle-years-programme/assessment-and-exams/
[5] https://ibo.org/university-admission/recognition-of-the-ib-diploma-by-countries-and-universities/recognition-of-the-myp/

IB's drive for implementing eAssessment as stated in the policy brief *assessment principles and practices* (2018) is to design and deliver an assessment that resonates with students' daily learning and communicating environment. The document states that writing for 2-3 hours on paper has become a unique and unfamiliar experience for students, whereas using the features of the eAssessment's software package allows examination of students' higher order of thinking, such as interactive graphs and drag and drop options. Moreover, IB declares that the eAssessment is advantageous for parents who need external verification of student achievement and for schools to measure the program's impact.

The recognition of the IB's diploma by universities creates a significant value for this program which makes a strong reason for international schools to deploy this program. More importantly, it convinces local districts (in the case of Canada) to implement the DP program in some publicly-funded schools, which consequently restructures public education through creating a network of competition between students who can enroll in these schools (Resnik, 2020). In this respect, by expanding the scope of external assessments to a younger age group of MYP, students and schools are placed against a standardized and unified assessment, which results are recognized by higher education institutions and governments as a quality standard program. This far, the eAssessment has entered England's Register of Regulated Qualifications (ofQual) and IB strives to expand the scope of its recognition to other institutions[6]. As a result of these recognitions, we argue that IB positions itself as a 'best practice' for on screen assessments to finally spill over to national schools and influence national and local policies not only with respect to the use of technology pushing them to adopt and support digital technologies, but also to account for IB as a solid model for secondary education.

As discussed above, the concept of fast-policy necessitates the investigation of a policy on global and local sites and trace possible tensions between fixity and movement. Whereas the above paragraphs focused on the global aspect of implementing eAssessment, the following section will trace how the transition towards eAssessment is dealt with locally, within school and classroom.

[6] https://ibo.org/university-admission/recognition-of-the-ib-diploma-by-countries-and-universities/recognition-of-the-myp/

Our observed IB school deploys the BYOD policy model for classroom practices. However, in order to carry out onscreen assessments, the school staff followed IB's guidelines that urges schools to use school provided devices for logistic reasons. The onscreen assessment is a software package that needs to be downloaded and installed on computers before the start of the exam. Once the software application is opened it lockdowns the computer from other applications until it is submitted and closed. Using school devices allows for installing the packages on computers a few days before the start of the exam as well as assisting in monitoring the assessment (MYP eAssessment Q&A Sheet – The How). By implementing this logistic solution and using school provided computers, the school's BYOD policy is suspended. On the classroom level and in order to get prepared and habituated to the environment of the software, the sample packages are purchased from the IB and practiced during lessons prior to the assessment date.



Figure 2: the MYP examination room

On the interactive whiteboard, the Math teacher is showing how to use the formula bar on the IB math software and he asks students to play with it by writing equations and making graphs. "Please open the software on your own devices and keep it open, do the sample questions! Even if you prefer to listen to music or do other activities in between working on the sample, you need to be able to focus for

the entire two hours of the exam. You don't want to spend time on learning how to use the formula bar during the exam. You can only practice this here and now!" the teacher demands.

As we argued elsewhere (third chapter), using personal devices during lessons creates a time and space in which listening to music or doing multiple activities (checking emails, news websites, etc.) becomes an embedded part of the lesson. As such, having the software package of onscreen assessment open for the whole time of a lesson on personal screens necessitates students to only focus on one thing, that is, doing the exam. This is in contrast to the the so-called *common rhythm* of working on lesson tasks when student constantly switch between different platforms. For this reason, students refrain from working on the assessment software for the entire time of the lesson. Some students enter the software environment to answer a few questions but jump in and out of the software to be able to keep both their usual rhythm, as well as the imposed rhythm of onscreen assessment samples. Whereas the screen task time is entangled and constantly synchronized with different platforms, the onscreen assessment time is asynchronous and linear. Beside the need to prepare for the environment of the onscreen assessment, the specific format of the assessment equally guides the direction of classroom practices.

In the last days of school, the literature teacher of grade 9 talks with students about the next year and how he is going to organize practice for essays. "Next year, your assessment is going to be external and onscreen, which means that you were the last paper generation" he says and introduces other mediums they will be working with in the coming year such as keeping a blog for their writing instead of a notebook. "The assessment wants you to produce internet material and we will need to practice for that".

As the introduction video mentions, the exam is about real-life situations that are claimed to be dealt with through digital content creating. Also, using drag and drops, darted tables and manipulating data for graph making are all named as benefits of onscreen assessment to invoke and examine higher order of thinking. As the above vignette shows, this specific format directs classroom practices in a way that the form (such as writing a blog) becomes the content being assessed and needs to be practiced for. This format directs the work of teachers into preparing students for such an exam and putting pressure on teachers, as they are increasingly

required to be digital learning designers (reports on eAssessment, Australian Council of Educational Research, 2019, p.8). It can be argued that even though the school has been integrating personal devices for a few years already, classroom practices have been only *slowly* shifting towards a different format. As such, writing essays on notebooks, or solving math problems on paper, which were practices previously decided by teachers, are subject of reorientation and adaptation.

In sum, examining eAssessment policy shows how, on the global level, external eAssessment is an instrument of the IB for standardizing international recognition and stabilizing the MYP as identifier of international education, as well as a 'best practice' that can in the long run elevate public education. On the local level, the fast policy of eAssessment is dealt with through *unmaking* the school's BYOD policy and *remaking* classroom practices based on the digital format, thus *short-circuiting* teacher's decision on the format of certain practices.

Bring Your Own Device School Policy

BYOD policy allows students to bring at least one device to school for learning. This policy has been initially implemented in the economic sector for reducing company costs, as well as increasing the well-being, autonomy and performance of employees (Doargajudhur & Dell, 2018; Lee, Warkentin, Crossler, & Otondo, 2017). In line with the school's vision that recognizes digital technologies as elements for fostering a climate of communication, creativity and innovation, the school adopted the BYOD policy model for their classroom practices. According to the school's website, this model gives the convenience and flexibility of using a single device for home and school. Moreover, through an interview with the IT manager, it was made clear that the school's decision for BYOD policy was equally driven by financial factors and in order to lower the school's costs of providing and maintaining digital devices.

The adoption of a policy originating from the economic sector, with its distinct ideas and values, to an educational setting, can be considered as a 'best practice' that would allegedly bring innovation and creativity as well as flexibility and comfort. The implementation of this policy at the classroom level was not regulated with guidelines or instructions by the school staff. As such, it was up to the decision of individual teachers how and when devices would be used.

When I am explaining a topic, I want laptop screens to be half down, so I can have eye-contact with students, because otherwise their eyes are on their screens and their facial expression is not the same as when they are looking at the interactive board or me. I can then recognize if they follow or not.

This is how one teacher regulates using devices in her own class. The same happens in other classes which leads to the creation of micro policy negotiations in the classroom, in which the teacher authorizes or prohibits the use of devices depending on the practice. This creates variety of modes in which personal devices can be used during lessons. That is, before each activity, the teacher announces the role devices need to play. These roles include firstly, active usage of devices during individual tasks, secondly, their complete absence in situations like class discussions and lastly, the idle mode in which laptops remain ready to use but the screen halfway down, as described in the above quote. Along with negotiating and regulating the device mode, other activities related to personal devices, such as listening to music while working individually or leaving smartphones on the desks were constantly negotiated with teachers. As such, not having a concrete and unified guideline for what delineates a BYOD policy in classrooms apart from just *bringing all* devices to school, resulted in an ad-hoc and bottom-up way of enacting the policy in classrooms which highlights how new spaces of policy making are opened up at the classroom level (cf. Selwyn et al., 2017).

"So, what about some funky jazz again while doing your tasks? This way you don't need to search for your own music, huh? Let's try that once more", the mathematics teacher states and immediately plays the music from his own device for everyone. He then walks into students' desk and checks how they are doing. Even though the music doesn't prevent some students from listening to their own music on their headphones, it fills the classroom space.

By creating a collective music listening time and space on the background, the teacher here tries to intervene in how a BYOD policy is usually enacted while students work individually on their tasks. Even though the teacher's collective music playing does not directly modify the policy enactment (some students still listen to their own music), it does reorient the spatiotemporal arrangement of the class from individual music listening to a collective one. As such, not only is the formal policy performed in an ad-hoc and bottom-up manner with regard to the

mode of device use, but also its *personal enactments* are at times resisted with the interference of the teacher.

The policy of 'just bringing all devices' was modified by the school board as an immediate reaction to an incident of cyberbullying which occurred in one of the classes. In this *reactive* decision, a new policy instrument (a basket) was added in each classroom so that smartphones would be collected before the start of lessons. In this case, the immediate and inclusive *absence* of smartphones, which was decided by the staff and enforced by teachers through implementation of the basket shows how the BYOD policy is un-made. The above situation in which a basket is introduced overnight to collect students' smartphones demonstrates that personal devices do *local* fast policy. Lewis and Hogan (2019) argue that it is not only the increased connectivity between spaces that invokes fast policies, but it is also the immediate and reactive nature of policymaking itself that makes fast policies. The immediate and compressed policymaking moments are reflected through the reactive basket policy implemented by the staff, which re-makes the initial policy of 'just bringing all devices'.

On the one hand, the ad-hoc and bottom-up decisions and negotiations of teachers and students shows how different components are assembled to *make* a specific BYOD policy come into being. On the other hand, this rapid modification of the policy showcases that every making already involves some *un-making* in which actors are dismantled from their stabilized form through contradictions and disruptions and enter into new relations that *un-make* the policy (cf. Decuypere, 2019). Even though the basket was forgotten over the weeks that followed and turned into a paper trash bin for teachers, the policy of BYOD minus smartphones was stabilized through monitoring of the teacher and staff and as a result, smartphones were kept in lockers or backpacks and they became less visible in classrooms, as well as cafeteria, hallways and library. These tensions highlight the dynamic movement and at the same time the contextual embeddedness of fast policies which are influenced by the overarching conditions of possibility that a given policy space provides (Lewis and Hogan, 2019). On the other hand, we see in our case that, it is the teacher whose interventions in the first place *regulate and resist* the performances of a generic BYOD policy of 'just bringing devices' to school and translate it to a policy bounded within the school's local milieu.

Learning Platforms Policies

Learning platforms are the third significant instance that bring their own policy to the classroom after IB and digital devices. Platforms are described as "programmable digital architectures designed to organize interactions between users— not just end users but also corporate entities and public bodies" (Van Dijk et al., 2018, 4). The designed architecture of each platform is specific in shaping the interactions through its interface. "Platforms are composed of interfaces, protocols, discursive elements, visualized data, and specific renderings of (educational) times and spaces, which are a conjoined production of social and material actors" (Decuypere & Landri, 2020, 4). Embedding learning platforms powered by machine learning and data science at schools has given rise to computational education policy that serves to intensify sociotechnical relations in education and bringing business principles into school governance (Webb & Gulson, 2017; Means, 2018). For this reason, platforms are considered one of the actors in making fast policies in the classroom through the way they regulate actors' actions.

In order to examine how computational fast policies of education are dealt with at the classroom level, we examine the use of three platforms during lessons. We firstly elucidate how these platforms situate their services in an existing ecology of platforms as well as their funding bodies. Secondly, we scrutinize the range of actions they make possible to be performed through navigating the interface (Decuypere & Lundri, 2020). Finally, by scrutinizing how platforms are realized, translated or worked around we take an in-depth step into understanding how they can mediate classroom practices (Ratner et al., 2019).

Desmos

Desmos' initial design was a graphing calculator imbedded in digital curricula and assessments in order to facilitate working with technology while doing math. The business model of this platform is built around paid partnerships with educational institutions such as the IB, assessment companies and publishers (https://www.desmos.com/about). This platform that had been ventured by one of the Google's funding arms (Heussner, 2012) expanded its services to offer digital activities that allow users to grapple with mathematics.

Apart from the graphing calculator which is accessible for general users, activities are designed to be used in the classroom. As it can be seen in the figure 2, student

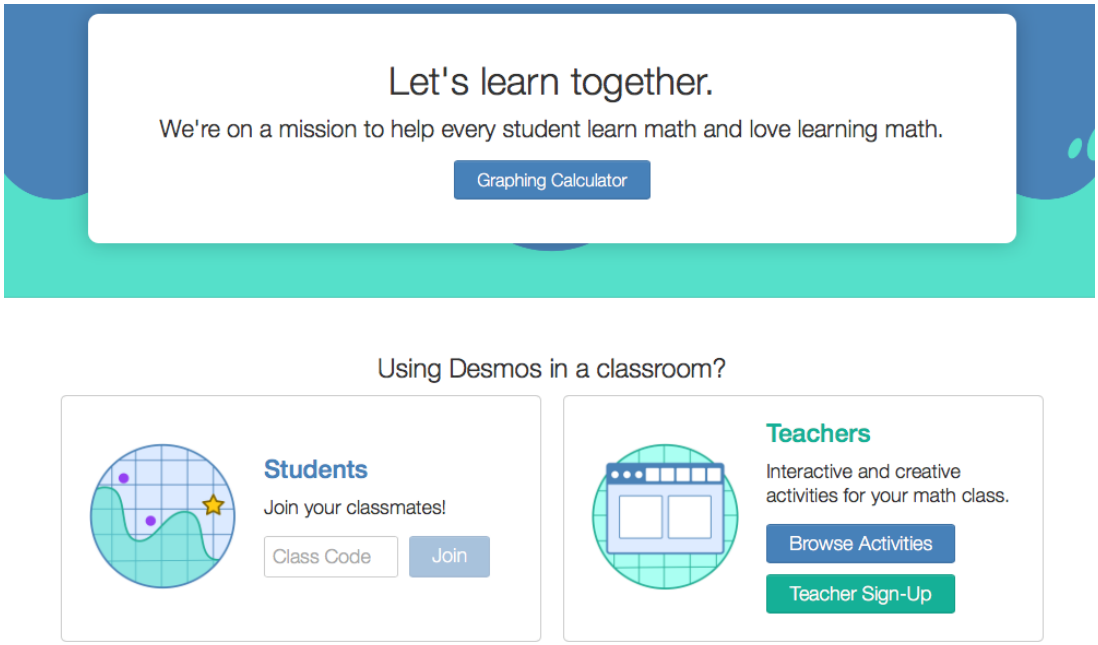

Figure 3: Demos' first page

users can connect to the platform only if they have a Class Code. For a teacher user, however, more actions are made possible. Teachers can browse classroom activities to pick a series of activities to be done by students during a lesson or they can follow a learning section to better implement the platform in the class. The learning section also instructs how teachers can build their own activities and share it with the community of Desmos users (other math teachers). As such, the platform mainly targets math teachers and proposes thematic activities to be conducted in the classroom. Activities entail series of exercises related to a mathematical topic and are occasionally accessible in languages such as Dutch, French or Russian as well.

Each activity includes a guide for teachers to be printed and completed prior to the run time of the activity in the classroom. The guide explains both the features of the teacher's interface as well as designing the lesson. As for the features, the guide encourages teachers to use the control panel of their interface while students are working on activities individually. The control panel allows teachers to monitor the progress of students and also freeze the activity on *students' screens*, hence, drawing their attention to the collective space of the classroom. This way the teacher can intervene in individual screens in order to make a collective point to

everyone. As for sculpting minutes of the activity, the guide employs imperative phrases for the teacher in each task:

> *Consider using teacher pacing on this screen and showing the range of student responses using the teacher dashboard. It's okay—even desirable—to lack consensus at this stage. Emphasize how tough it is to get the runway just right using estimation alone (Land the Plane Activity, Desmos platform).*

These instructions and guidelines, on one hand, show teachers how to work with the platform and its features. On the other hand, by means of these instructions in the teacher's guide, the platform rather provisions a sort of *platformed scripted curriculum.* The platformed scripted curriculum is like a range of pre-packaged lesson material which scripts out every action of the teacher and install him/her as a manual reader for delivering the lesson (Fitz & Nikolaidis, 2020). Through the platformed scripted curriculum, the platform not only takes a sociotechnical role, but it also installs a pedagogical role in which the teacher is the platform's performer and the platformed script is a standardized solution for any type of classroom. However, in order to elaborate on the tensions between the global 'one-size-fits-all' rules of platforms and what happens once the platform is implemented in the classroom, we analyze how the teacher deals with these platforms' policies.

Right before students start "Land the Plane" that the teacher chose on Desmos, a class code is shared on the interactive board. Students connect to the platform with this code on their own screens and sign in their names to the class activity. The teacher counts the number of signed-in usernames and compares it with the number of present students to make sure that everyone is now on the platform. "Okay, go through the seven activities everyone on your own pace" the teacher says, looking at the interactive board. Once everyone is singed in, the teacher's interface - which is displayed on the interactive board - turns into a dashboard in which he and all students can have a general overview of the whole class's progress on the activities. Students start playing with the plane they see in the first two activities and move it so that it lands 'safely' on a runaway. The activity covers the topic of linear equations and students practice with the lines of the plane's landing.

The teacher walks in between the students as they do the set of activities. He doesn't have to check all students' responses or follow up with them if they need a

small hint. The platform automatically checks each student's answers and if they face difficulties while doing an activity, some hints appear on their screens to guide them. The interactive board remains the control panel of the classroom at which the teacher takes a glance every once in a while. He observes how far along the majority of students are in doing the activities. "Okay, those who are at the end of the series can start the challenge section, and challenge your classmates", the teacher says and goes to those students that are left behind the majority. After having Talked with them individually, the teacher turns to the whiteboard right next to the interactive board and draws a graph. He asks everyone to pay attention and together with the students he explains the equation for everyone.

In the above vignette, we can see that even though the platform instructions and guidelines have scripted what the teacher needs to do, he does not follow the scripted curriculum of the platform. He is mobile in the classroom instead of monitoring students' progress from the dashboard of his own laptop screen. By sharing his dashboard on the interactive board, he shares the progression of the class with all students as well as improvising on his actions detached from the scripted guide. The teacher, here, *appropriates* the platform and makes something different than platform's guideline and how the features of his interface should be used in the classroom.

Students' interactions with the platform suggest learning math happens chiefly through visualizations of trial and error. Students tinker with different possibilities on the interface, such as moving the plane, entering or deleting numbers on the equations to observe the changes of the corresponding graph. The teacher's explanations on the whiteboard substantiates students' work on the platform. As such, even though the platform sets ideas of learning and teaching by assigning a range of actions on the teacher and students' interface, the teacher becomes a decisive actor in either completely adopting those ideas, playing around them or even resisting them. That is to say, even though as Hillman and colleagues (2020) discuss that by regulating groups of users, platforms become templates of how education is organized, we argue that this situation highlights the significance of the teacher's role in appropriating policies and templates of platforms, without completely rejecting them.

Kahoot!

The second platform that is used often in different subject matters at the school is Kahoot!. This platform was launched in 2013 at the Norwegian University of Technology and Science. Kahoot! initially addressed classrooms by putting school learning at the heart of the company, but later expanded its reach to corporate clients and big businesses such as Coca-Cola and LinkedIn, leading to a total number of 2 billion participant players (Kahoot!'s webpage). The platform's mission is to 'make learning awesome' and 'build the leading learning platform in the world'. Kahoot!'s statistics claim to have 5 million teachers who actively use this platform. In 2019, Kahoot! was selected as a Google for Education premier partner, a title that is reserved for partners that show higher level of competency and performance according to Google (D'Arcy, 2019). We argue that offering similar isomorphic services to Coca-Cola or LinkedIn employees as well as students put both employees and students under the same category of 'consumer-learner'.

The free and premium accounts for schools are offered *directly* to teachers. The free account has limited access to question sets and games formats, whereas the premium account gives access to more resources and questions, as well as various game types such as open-ended questions, puzzles and other types of games. Moreover, the company provides teachers a Kahoot! certificate for free by offering online plans where teachers learn how to master the platform and optimize learning through lessons on how to navigate, create games and analyze learning with the data provided based on games. Teachers are therefore the gateway of platforms into the classroom and the main customers of their services

Similar to Desmos, when used in classrooms, the interface is designed for two types of users; that is, one user who organizes a game and the other user who participates in the game. Teachers can either choose among ready-made quizzes, use the question bank that is the collection of user-made questions to assemble a new customized game or create new questions from scratch.

After entering the code, players enter the game space where they will be given an amount of time to read a question or a piece of information on the interactive board. As soon as the indicated time to read the question runs out, players see a set of responses on the interactive board and they need to interact with their own screens in order to pick an answer. A maximum of time is set for answering each question which privileges fast responding in scoring. Once the designated time for each question has passed, the correct answer is highlighted on the interactive

board with a loud sound, followed by players' scores. As such, playing Kahoot! focuses on speedy replying and competing with peers in order to score the highest. The game reports are saved for the teachers to analyze the students' performance after the game.
After each question, the math teacher discusses how the question is solved with students before moving on to the next question. In this way, he disrupts the speed playing that resides on the quiz taking logic of the platform and gives greater centrality to the questions than the speed at which they are played.

As such, not only does the teacher *slow down* the algorithmic design of the platform that is based on speed, but he is the actor that makes the practice something greater than playing a game. As Gorur and Dey (2020) argue, "despite a huge machinery being brought to bear on them, even the users at the bottom of this chain of command, at the school and cluster levels, do not always meekly follow the roles scripted for them – they can and do resist, subvert or appropriate the program" (12). The teacher in this situation equally becomes a crucial entry point for this policy work. While teachers of MYP only use free platforms, it becomes part of their job to discuss among themselves and estimate between possible platforms and pick those that are helpful. In this situation, platforms and teachers create a direct collaboration for governing the lesson and it becomes highly crucial for platforms to reach teachers. This is also the reason why Kahoot! directly addresses teachers as their customers.

Quizlet

Quizlet which was one of the most used platforms during our observation, is known as flash card study platform (Wan, 2020). This platform claims to be the largest student-teacher active community of 50 million learners which converts students into 'unstoppable learners who can master anything they want, faster' (Quizlet webpage). Working initially as flashcard sets, the platform has been working with retrieval practices that help in recalling information from memory in different subject matters (Quizlet webpage). Quizlet offers premium plans which provide access to ad-free personalized practices based on user behavior as well as

the analysis of user's performance. During our observation, teachers were using Quizlet Live, a feature that allows teachers to make a set of flashcards (terms and definitions including literary devices or geographical terms), split students into groups and let groups compete with each other to find all the corresponding definitions and terms and win.

"*you have two minutes to write 12 terms that we practiced on your small tablets (like small whiteboards)", the literature teacher says. Students count the words when someone shouts "I need two more". "Do you already have Onomatopoeia?" the teacher asks. "Okay, I see that most of you are finished. Let's now open Quizlet. We are going to make some flashcards and together come up with the definition of the words you noted down", she says as she opens Quizlet and starts with typing "poetry" on one flashcard. Her screen is displayed on the interactive whiteboard and she asks students to come up with possible definitions for poetry.*

In this fieldnote, despite the platform's plan of actions that assign the teacher to be the user who makes the flashcards, the teacher does something different and flips these roles. She turns the platform into a part of an activity that she herself organizes. During the lesson, students and the teacher dedicate considerable amount of time to making each card by using students' small whiteboards to write new words and then making examples for each term as they are being added to the platform. This highlights how the teacher *appropriates* the policy of platforms to some extent by reversing roles and engaging students in the process of making the game, instead of only playing the game.

Through analyzing how platforms are being performed in the lesson, on one hand, we see that they install a sort of standardized regulation for how learning can take place in the classroom. They assign distinct roles to teachers and students and the material these actors are working with. As such, even though platforms are alluring educators with a personalized and adaptive form of learning, we can see how they are still hugely part of the standardized and isoform learning they create through the way they define actors' roles and mediate between them. In this way, what they do is similar to the fast policy condition that Peck and Theodore (2015) describe, namely, creating isomorphic learning models to be imported in a borderless way in different contexts. However, what precisely makes these platforms somewhat personalized is the way teachers utilize these platforms in their lessons and

appropriate them. The analysis of these three platforms shows that it is in the ensemble comprised by the teacher, his lesson plans, the students, the material and the platform that practices are rendered personalized and yet collective.

What also comes to notice while situating these platforms, is the footprints of Google either as a venturing actor that supports small Ed-Tech startups or a direct partnership with these platforms. This way, Google indirectly partakes in the direction educational platforms will take by selecting to voice some platforms over others, or as a partner actor that allows some platforms to be integrated in Google for Education program (the main educational platform of Google). Here, Google performs a furtive type of fast policy that indirectly establishes a scheme of digital pedagogics.

Concluding thoughts

What is problematized in this chapter by focusing on the notion of fast policy in the current transnational and borderless policymaking climate, is the negligence of global imaginaries to hands-on, messy and local realities of policymaking (cf. Peck & Theodore, 2015). That is, policy is being made, re-made or un-made through day-to-day and mundane school practices despite the global and seemingly limitless and transportable worlds that the IB organization and platforms might install through implementing eAssessment or defining user actions. What is also important here is not only the tensions between the global and the local, between personalized and standardized ideas of learning, but also a tension between educational and corporate forms that are created as a result of embedding platforms in the classrooms. The consumer-learner model not only standardizes practices at the school level, but it also brings classroom practices closer to practices of corporate and work learning environments. As the analysis of platforms demonstrate, an isomorphic user is generated where a student and an employee are rendered as similar actors, through the platforms' plan of action which designs similar practices for both entities (e.g. playing collaborative games, learning concepts by flashcard).

Moreover, where assessments and certificates are concerned, students are addressed as 'candidates' by IB and they are called 'players' or a 'clients' by the platforms. A similar story applies to teachers as well. They are rendered as clients or game organizers. In this situation, what makes a candidate, a player or a client

into a student or a teacher is precisely how the ensemble of the teacher, the lesson material, the students and their devices come together and as a result of their direct interplay they appropriate, turn around, slow down or resist fast policies. As such, we see how the teacher becomes a crucial policy actor for platforms, a gatekeeper for the IB organization, and navigator in the BYOD policy. By choosing platforms and appropriating them based on their own plans and designs, teachers demonstrate to be the middleware and connecting tissue of the Ed-tech businesses, algorithms of platforms, devices and international organizations.

CHAPTER II

The Agencement of taskification: On new forms of reading and writing in BYOD schools[7]

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Introduction

Personal digital devices are no longer unfamiliar school objects and they have been globally integrated at schools by implementing different models in the last decade. One of the most common of these models is the Bring Your Own Device (BYOD) model (Carvalho et al., 2017; Selwyn et al., 2017; Song, 2014). It has been argued that deploying this technology model, which requires students to bring at least one personal device to school, rearranges school's space-time organization and activities in various ways (Decuypere & Vanden Broeck, 2020; Fenwick, et al.,2011; Beetham & Sharpe, 2013). In this regard, educational scholarship has developed several accounts and concepts that aim to conceptualize how the BYOD setting reconfigures our traditional understanding of learning, teaching, and school's spatiotemporal organization. For instance, the term 'networked learning' is one of the prominent models that provides a theoretical ground to capture how learning in the presence of digital networked devices is configured (Jones, 2012; Ryberg et al., 2012; Carvalho et al, 2107).

Networked learning was firstly defined as ways in which 'information and communications technology (ICT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources' (Goodyear et al., 2004, p1). For the implementation of this theory into classrooms and instructional practices, networked learning theorists deploy the Activity Centered Analysis and Design (ACAD) model. Emphasizing that learning cannot be designed, they adopt this model in order to recognize the role of emergent activities of students that shapes their learning during classes with digital devices. Nevertheless, they acknowledge that learning can be influenced by design, either physical, social or epistemic design (Carvalho & Goodyear, 2018). Design for learning is chiefly concerned with designing *tasks* to be carried out by students in environments in which digital technologies are an embedded part.

This implementing of a design perspective in the classroom, diverges from more traditional instructional takes on design, where the attention is merely paid to the designing tasks *prior* to the lesson (Beetham & Sharpe, 2013; Carvalho & Goodyear, 2018; Goodyear & Carvalho, 2013). In that context, it is then often argued that these traditional instructional approaches, by merely focusing on task preparation before lessons take the start, dismiss the *emerging* activities of teacher

and students *during* the lesson and possible adaptations and adjustment to designed practices (Fawns, 2018; Goodyear & Dimitriadis, 2013). Diverging from this traditional view, the design perspective adopted by networked learning theorists proclaims to be activity-based and focuses both on what is being designed and on what emerges in the moment of implementing (ibid).

Although networked learning theories and the corresponding ACAD perspectives contributed to our understanding of what concretely happens in BYOD settings, relatively little attention has been paid to emergent lesson activities, and in particular, reading and writing practices in BYOD contexts. In fact, the emergent activities are majorly seen in relation to designing future task rather than understanding what form of schooling comes forward as emergent activities are repeated over and over (Fawns, 2018; Ryberg et al., 2018). Articulating what these practices are and how they are constituted allows us to understand what form of schooling is being produced as a result of these lesson practices. Therefore, in this article we are going to observe lesson practices, in order to finally be able to denote the particular *form* of schooling that comes forward.

In scrutinizing lesson practices, not only is it our aim to pay specific attention to practices that are tightly connected with forms of reading and writing as these practices are one of the fundamental established practices of schooling (Vlieghe, 2017); we equally aim to observe and account for how these traditional school practices constitute complex and hybrid practices (such as note-taking) in the presence of digital devices. In contradistinction with more interactive and so-called digitally native practices such as video making (Toohey & Dagenais, 2015), these fairly 'traditional' but nevertheless profoundly hybrid practices are often less attended topics in educational scholarship when it comes to BYOD schools.

In this respect, Dezuanni (2018) argues for the need of much more expanded understandings in how more traditional practices (such as reading and writing) are formed at contemporary school settings with digital devices. In this study, more particularly, we focus on these traditional practices, yet at the same time avoiding to approach them as being entirely isolated or self-contained. By introducing the fairly uncommon concept of *agencement* in educational studies, we aim to show how practices always entail an aspect of *practice-ing*, which points to different forms of action that actors set into motion while practices are being practiced (Gherardi, 2016).

In order to do so, we conducted a sociomaterial ethnography (cf. Latour, 2005) in which we followed and closely observed different lessons such as geography, literature, history and mathematics over a period of five months in a school that implements the BYOD model. In the following sections, we firstly elaborate the theoretical framework that constituted this study. As stated, we adopt the notion of *agencement* as a heuristic device that allows to scrutinize processes of practicing and their capacity to act and therefore, invent a form of schooling. Secondly, we analyze different BYOD lesson practices by means of presenting four exemplary vignettes that are structured into two sequential compositions of introducing and executing tasks. Finally, we discuss how BYOD schools are structured around tasks and they introduce a form of schooling of which taskification is at the heart.

Agencements, sociomaterial studies and BYOD practices

In sociomaterial approaches, the focus on practice is one of the main points of departure (Decuypere & Simons, 2016b; Fenwick & Edwards, 2010). More particularly, practices are perceived performatively, i.e. as the effect of relations between different actors (Law, 2007a). This means that practices are conceived to be the result of interrelations between entangled actors such as humans, artefacts, as well as documents and policies and thus, adopting a sociomaterial lens necessitates to account for these heterogenous actors and relations in a symmetrical vein (Decuypere & Simons, 2014b).

Decuypere (2019) argues that sociomaterial approaches serve more as *sensibilities* that allow researchers to see how specific practices are being made and effectuated, than as theoretical narratives that make general repetitive claims about how reality is constituted. In particular, we introduce the concept of *agencement* as a methodological heuristic device towards BYOD lesson practices.

The term agencement is a French word which is commonly translated to English as assemblage (and sometimes as arrangement). Callon and Çalişkan (2010) firstly re introduced this concept in social sciences by drawing on socio-technical agencement. They argued that, although 'agencement' is very close to assemblage or arrangement, the English concepts nonetheless imply a divide between agencies and arrangements (Çalişkan & Callon, 2010). Later, Callon (2016) set out from the way market is used in economic studies and established a novel understanding of market relations by arguing for market-agencement instead of market-interface.

The notion agencement was precisely proposed by Deleuze and Guattari (1987) to stress that agencies and arrangements are not separate. Rather, the notion agencement allows for tracing agency in the configuration of the arrangement instead of tracing it in sole actors.

In the context of practices, the English translation as 'assemblage' equally suggests that practices are to be conceived as finished states or final products, whereas the French term agencement points to the 'becoming' of practices, to practic*ing*. The word agencement in this respect means 'in connection with' and shows how practices are connected and in constant state of becoming (Gherardi, 2016). Gherardi, in elaboration of this notion of agencement in relation to the more familiar concept of 'practice' states that:

> what we call 'practice' is a heuristic move that de-territorializes and re-territorializes the unfolding of a flow of practicing. It is within practicing that connections are established and dissolved without a pre-defined order, and it is the process of agencement (of connecting with) that creates it' (p. 689).

This means that by adopting the term agencement, the attention is relocated from merely *identifying* all the actors and subsequently accounting for them in isolation, to sensitizing oneself to seeing how these actors in *connection* enact a specific practice that is then constantly in the process of becoming (ibid.).

According to Gherardi, another advantage of using the notion of agencement as a sensitizing device is 'that *agency* is reformulated as the outcome of the process of establishing associations' (p.689). In this way, we can approach practices as having agency, rather than looking how specific distributed agencies make these practices. As such, considering the agential element of practices, that is, the active process of agencement, allows the inquiry to denote a specific *form* that is generated as a result of the effect of practicing. That is to say, using the notion agencement points to 'socio-technical arrangements when they are considered from the point view of their capacity to act'(Çalişkan & Callon, 2010, p. 9). The notion is mainly deployed as a methodological term designed to study the variety of *forms* of action that different practices are capable of generating. In this sense, agencement can be described as 'arrangement + specific action' (Gherardi, 2016, p. 688). Put differently, "through privileging dynamic articulation and its effects, agencement

targets not the assemblages per se but how they produce particular forms of action and agency" (Mcfall, 2009, p. 51).

While exploring different practices with regard to reading and writing, this notion will help us, firstly, to focus on the totality of practices in which digital devices as well as other actors are accounted for as an embedded part of the practice. Thus, as a sensitizing device it avoids separating practices to different segregated actors such as digital, teacher or student. Secondly, by adopting the notion agencement we will be able to observe and analyze practices of reading and writing that emerge during lessons, constantly enacted in the spatiotemporal organization of the classroom and above all common between different subjects. As such, we are not looking at *particular* reading and writing practices, such as a form of reading that might be specific for the subject of literature, rather we focus on practices that are common among different classes. Finally, by not considering these practices in isolation and analyzing their effects, we portray what forms of action are put forward in BYOD schools.

In the process of data analysis, two distinct sequential compositions were identified in different lessons that we will discuss in the remainder of this chapter. Arranged around a task (in the specific design-based sense as introduced above), in the first sequential composition a task is being *introduced* and in the second one the introduced task is being *conducted*. By elaborating the specific practices of each composition, we will discuss particular forms of action that are generated in each composition.

Introducing tasks

The first composition that mostly takes place in the first fifteen minutes of lessons portrays different practices.

Task presenting

'How much does a pair of jeans cost?' This question is displayed on the interactive whiteboard below a picture of a pair of jeans (through the teacher's laptop). The teacher is sitting behind his desk and the slide is frozen. This 'frozen' mode only displays the slide on the interactive whiteboard without making visible what the teacher does on his own personal laptop screen. The pair of jeans creates a lot of talk: as students enter the classroom, the slide is the first thing that captures their attention. They start to relate to the slide by speculating with each other. 'It all depends on where it was designed and where it was manufactured', one student says. The teacher leaves his seat, as he uses their input to give further explanations. As he talks, he walks between students' desks who have their laptops open in front of them. The slides change smoothly with the remote controller and occasionally, the remote's laser light is casted on one part of the slide in order to point to where the teacher is explaining. The slides include headlines, few bullet points, and one or two pictures explaining the different resources used in the production of jeans such as cotton, fertilizers, etc. 'All eyes on board', the teacher loudly announces as he goes on to the next slide where resources are classified to natural and human. 'No need to take notes, I will put the slides on the learning management system (LMS)', the teacher says while glancing at students' laptops. He asks for students' attention on a graph that is now being projected on the interactive board and asks students to analyze what is being displayed. 'Look at the map here and discuss TEA', he announces and walks to the whiteboard next to the interactive whiteboard. 'T stands for trend, E for example and A for anomaly', he writes while recalling loudly what each element means. Students start discussing by looking at the map. After listening to their responses, the teacher announces: 'Now, your task is to identify the resources posted on LMS. Articles, videos, and PowerPoints are the resources I shared. Write one sentence per each factor', and he continues by reading the last slide that concretely explains the task.

The above scene describes part of the first fifteen minutes of a geography lesson. The first part of the lessons in this school serves as the point of departure for introducing and contextualizing a *task* that students need to work on individually

(or sometimes in duo) for the rest of the lesson. This introductory part, which is performed at the collective level of the classroom, can equally be recognized in other lessons and subject matters. That is to say, this vignette is illustrative for the more general observation that prior to the description of concrete tasks, each task is always *contextualized.* Mostly in the form of slides, the teacher often a range of educational and noneducational online resources, and then customizes and re-assembles them into slides based on the local lesson plan and finally *presents* in this introductory part. The slides materialize the sequence and impose a linear order to the practice of task contextualization, e.g. in case of the above vignette, starting with definitions, then classifications and finally examples. The imposition of the slides' order becomes more apparent when in the moment of presenting, the teacher dismisses his spontaneous explanation when it is not in line with the sequence of slides. Moreover, as argued by Friesen (2019), the slide form necessitates an act of selecting from a realm of information and illustrations which generates a kind of second order pointing. The second order pointing of PowerPoint means "a highlighting a representation, something selected" (p.19).

With regard to practices of reading and writing, prepared and written points on slides frees the teacher from the space in front of the interactive whiteboard and mobilizes him through fixating knowledge. Consequently, for any type of immediate textual interaction, the teacher uses the whiteboard next to the interactive whiteboard, where he can write, erase, and edit. Despite the interactive board that presents the end product of teacher's preparatory work and produces designed interaction, the whiteboard remains the space of spontaneous interaction.

The presentation of the task incorporates an act of *instructing* at the same time, which is in connection with the way task contextualization is being presented. The file of the PowerPoint slides shared with students creates a specific relation with them where they are instructed *not to take any notes* and only look, listen and participate in questions. Not only the slides freeze and fixate the knowledge while presenting the context of the task, but they also serve as student's note. In this regard, the established lesson practices of lecturing and note-taking are configured by the embeddedness of digital actors in such a way that the composition is coordinated in a specific way, between what appears on the interactive board, what is said by the teacher and its order, and how students are instructed. This means that the teacher talks to students majorly to elaborate on the slides, and as the slides are compositions of visual and textual elements, they serve as notes which are

concretized, and thus students do not need to take any action in this regard. As such, students are constantly being instructed by the teacher, to how to relate with digital actors, by looking and not taking any notes. By means of the above vignette, we demonstrated how different practices in connection with one another arrange the lesson in the form of the first sequential composition. However, task presenting can be organized differently, which leads to producing other type of practices that we will illustrate in the second vignette.

Templating and micro-compiling

The students have their laptops in front of them while the video of a BBC documentary about a London cabdriver who travelled to Mumbai is being displayed on the interactive whiteboard. The students are expected to fill out a template word document (made by the teacher and shared on LMS) by the end of the lesson. One student googles Mumbai, opens the city's Wikipedia page and scrolls through the text. On his screen, the templated word document, Google map of India, a pdf file of the web of deprivation that the teacher shared with them, and a folder where these documents are saved can be seen as he is switching between different tabs. 'Do you know how this is called? The process of sending money home?', the teacher asks as he pauses the video. 'It's remittance, and it's a popular way in LIC (low income countries)', he continues as he writes the word on the whiteboard and mimes the gesture of writing to encourage the students to take note. One student googles remittance, and copy-pastes the first definition he finds on his template note. The template focuses on the main keywords that students should know in this lesson, such as remittance, deprivation and despair. 'Let's review and reflect on resources that is shared with you. Please check definitions and do apply some judgment when writing about the slums', the teacher says after the video is over. One student googles 'web of deprivation and ethnic diversity'. He takes a minute to scan the search results and finally asks the teacher for the relation between the two terms. After explaining the relation to the student, the teacher asks everyone to google the keywords in order to find answers for their questions while conducting the task.

In this vignette, the task is introduced and put forward before its contextualization through the video. Here the act of presentation is majorly done by means of the video and the teacher only occasionally highlights and comments the notable parts.

Unlike the slides where the points were already written a priori, in this vignette the visual content needs to be translated into a text, and thus students are instructed to take notes. In doing so, students not only type what is being said or shown in the video into the template, but they also make a compilation of texts gathered and selected from different online resources and thereby, their notes extend from the immediate and collective source (the video and annotations of the teacher) to individual online searching. The online search materializes and fills any instantaneous line of thought that comes to students' mind in the form of keyword searching. As such, notetaking as we see in the vignette, is not merely transcribing sayings of the teacher or what is being showed and said on the video, it equally includes a component of searching, scanning, copying and pasting. This way, the writing for the students is partly structured by the teacher through the act of templating that organizes the notes in the format of bullet points or boxes that need to be filled, and partly by the features of networked screen through online searching and text editing.

Rather than writing, what the student does here is the orchestration between these different inputs and compilation into a comprehensive format. Thus, the practice of notetaking comes into being as a non-linear process in which different multimodal elements such as pictures, maps, hypertexts, and copy pasted resources come together in one plane. Being engaged with digital texts by means of adding and modifying visual elements constitute the practice of *templating* and *micro-compiling*. In this constellation, the teacher comes into being more as the commentator of what is being presented. At the same time, it can be argued that teacher's instructions (announcing when to take notes or not) install a form of learning that is equally formatted by digital actors.

The architecture of this composition sets the conditions for assigning different forms of actions. As such, based on the above exemplary vignettes, the task is contextualized and introduced by means of slides or video presentations. Different situated practices such as, notetaking and templating are generated as a result of the form in which the task is presented. This points to the fact that, task contextualization and instruction with digital devices requires its own particular *template*, and actions are framed to follow the template of the digital. As similarly argued by Selwyn et al. (2017), teachers are tasked to curate the teaching content from the pre-existing online material. Students are then, templated to work closely with keywords, tagging the resources by the keyword, and micro compile them. At

the same time, these templates install a specific format of how the task should be done. As Gherardi (2016) argues, these interrelated practices are doings such that while they do, they invent "the way of doing" (690) and that is how agency comes as the product of the process of practicing. The constant practic*ing* around tasks in different forms brings forward the task-agencement that will be elaborated after the second composition of executing the introduced task.

Task execution

Introduction of the task is the first sequential composition that takes place in most lessons. The second composition that occupies the larger part of the lesson, reorganizes the actors for the execution of the introduced task. This rearrangement is particularly done through individual engagement of students with their personal screens. By drawing on two vignettes that portray the practices created in this composition, we elucidate the task-agencement that puts forward a particular form of schooling.

Resource scanning

The teacher walks between students, who are now working individually on their personal devices, to monitor what they do and answer their potential questions or unclarities. 'Do the task for as many resources as you can for the next half an hour. You have seven resources. What is your job? Looking for information', he says loudly and continues his walk. As some of the shared resources are online videos, the sound of videos on personal screens fills the classroom, while some students are watching the videos without headphones. An article on Guardian website can be spotted on one student's screen. A grey layer is covering the lengthy article's text, and the keywords are indicated in white to be easily findable. The student goes back and forth between opened tabs, that are the article and an online word document. 'We don't read, we want to access essential information. Try to do ctrl +F to shorten the time and find keywords, also just physically with your eyes scan those keywords without reading the whole text' the teacher announces, and glances at screens to make sure that students are clear on how to proceed. He walks between students and answers their questions. 'When you find the information write them in bullet points. The shorter, the better. You don't need to write full sentences.'

In this vignette, the second composition is arranged around the students' individual work on the task. Although the tasks differ in different lessons and subject matters, the composition of executing a task is framed similarly among different lessons. Examples of these tasks in different classes include investigating the supply chain of a smartphone in geography lesson, highlighting the main arguments on different book reviews in literature lesson, recommending a gothic church to visit in Paris with arguments for history lesson.

In the above described vignette, the task is arranged around multiple resources selected by the teacher and shared with students via LMS. These resources include videos on YouTube, articles on news websites, blogposts, and online slides. After the task's formulation in the first composition, the teacher's instructions navigate students to how to execute the task. The teacher instructs students with different forms of reading and writing. As the time of the lesson is limited for reading the shared textual material in entirety, much of the work is done through scanning these resources with commands like Ctrl F and rephrasing the information in form of short bullet points that are not full sentences. As such, in working with resources a new form of reading and writing is introduced.

In elaboration of different forms of reading, Hayles (2013) argues that the screen space suggests hyper-reading which invites for spatial scanning of the text instead of deep and linear reading that happens with printed text. However, scanning is only one of the ways in which reading can take form. As it is shown in the vignette, the teacher promotes searching keywords which is another form of engaging with textual resources. By doing ctrl F, students only work with keywords and read sentences that are spatially close to these keywords. Thus, the text is read only fragmentedly which introduces *keyword reading* as another form of reading. Moreover, comparing reading a written text with reading an image, Flusser (2002) argues that in order to get the message of a written text one needs to follow the linear order of the words, whereas an image doesn't follow a linear order and its message is seized at a glance in its totality on the surface of the page. Similarly, in this case students extract the message through the keywords they already have.

It can be argued that in this form of reading the text is considered and treated the same as visual materials. In this vignette, the task is translated into core keywords that act as a compass for carrying out the task. The execution of the task proceeds when the essential information is extracted from resources and is then reformulated

by micro-writing in the form of bullet points. In these practices, a form of doing a task - reminiscent of how algorithms work (T. Bucher, 2018) - is formatted by actions of keyword searching and micro writing: Similar to search engines, students are instructed to act like a search engine, by working with keywords and reconstructing meaning in bullet format. Proliferation of socio-algorithmic logic frames the ways in which tasks are being conducted, introducing practices of *keyword reading and micro writing*.

presentation making

A new task has been introduced by the history teacher, in which students need to give a presentation on an artefact's process of innovation, development and its possible future. The teacher provides an example in which he presents the first photograph as his selected innovation. 'The slides are shared in LMS and you can use them as a template and source of inspiration to create your own slides. You should take into account that you can only use four slides. The first slide should be dedicated to the title of your innovation. You have only five minutes to present your artefact for your classmates, and in the end of the presentation I ask you a general question with regard to your innovation', and he moves to the second slide that explains the innovator of the first photographs and its history. The third slide is dedicated to its development and the last one discusses its possible future.

After this collective introductory task presentation which is part of the first composition, actors are reorganized for the individual work of task execution. With the start of the second composition, students immediately put on their headphones. Keywords such as 'top innovations in the last century' and 'funny innovations' pops up on their search engines as they search in order to pick an innovation. One student opens a new PowerPoint slide and fills in the headlines in line with the instructions. Then, she switches between her Spotify, Google tabs that are getting opened and closed and the PowerPoint slide. Browsing among image results of the washing machine keyword, it seems that she has chosen her innovation. The presentation topics are chosen individually based on students' personal interests. She drags and drops one of the images into her slide and reopens the Wikipedia page to scan. Scrolling to the history of early washing machines, she copies part of the text in another slide, and reformulates the sentences into a textbox. She then, selects an image of an early washing machine and drag and drops into her slides.

Resizing the picture, adding a title with a different font for the slide as among the actions that follow. Next keyword is 'washing machine innovator' that appears on the search bar. She opens the first three search results in different tabs. The process of opening and closing tabs, selecting the useful information and assembling the slides happens swiftly for this student, while a fellow classmate is still undecided about the topic of his presentation. Flickering over the web results of different innovation, he compares the printing machine with the webpages about gaming consoles. After two more consecutive lessons dedicated to individual work, it is time for each student to give a presentation of their slides to the rest of the class. While students present their slides, the teacher takes notes according to his evaluation rubric.

The practice of making presentations and presenting is one of the most common practices in different subject matters at this school. The above vignette tries to demonstrate the different practices that are generated while the task of making presentation is being conducted. As it was shown, the process of making a presentation includes online searching, scrolling and browsing, copy pasting images and rephrasing texts into a specific sequence and format that is given by the teacher.

This form of selecting and re-assembling can be conceptualized with the notion of making a bricolage. As Johri (2011) explains, making a sociomaterial bricolage includes using existing resources for a short term goal while by making it one creates a new use. Multiple media formats such as audios, videos, texts, and images from different available sources are selected, taken out of their context and crafted anew in order to serve a different goal that is carrying out the task. The last part of the task, that is *presenting*, shares the result of the slide making (the bricolage) in the collective space of the class. This means that, at the moment of presentation, the bricolage/slides act as a single actor, concealing processes of translation from heterogeneous multimedia resources into one unit of presentable slides (Law, 1992). This also shows that in this task different media are assembled next to each other not as standing alone products, and they are not meant to be read, but they mainly enhance the oral presentation. Equally, at the moment of presentation to the public of the classroom, they act as resources for teacher's evaluations and students' questions.

By elaborating on two exemplary vignettes, we illustrated how a task is being executed by means of working with online resources. Whereas in the first example these resources are selected by the teacher, in the second example of making presentations, it is the student who performs processes of making a bricolage by going through available online resources. The analysis of the compositions demonstrates how during the individual work the lesson is being taskified in a specific way by active processes of task-agencement.

The above analysis of lesson practices in this BYOD school demonstrates that tasks are not self-contained units that solely constitute a part of the lesson activities, rather, it could be argued that they *form the school* through the ways in which they are presented, contextualized, and executed, and the practices (such as keyword reading) they generate as the effect. In the last section of this chapter, we will discuss taskification as a form of BYOD schooling that is formatting school practices.

Concluding Thoughts: Task-Agencement, Taskification as a form of schooling

The aim of this chapter was to analyze the form of BYOD schooling through tracing lesson practices and more in particular, reading and writing practices. By means of deploying the sensitizing device of agencement as a heuristic methodological device, we argued that lesson practices are centered around tasks that put forward a form of school, of which taskification is at the heart.

Traditionally situated within the context of networked learning, tasks are one of the components of ACAD. According to ACAD theories, tasks are to be considered as instruments to achieve the desired learning outcomes (Carvalho & Goodyear, 2018). Hence, the main concern of design work is directed towards designing good tasks, whilst at the same time acknowledging that learning cannot be fully determined (Goodyear & Dimitriadis, 2013). This way, tasks are entities designed by teachers or designers *prior* to the lesson and are orchestrated *during* the lesson, in order to provide responsive guidance for students. The students, then, carry out the task by interpreting and customizing them. That is to say, ACAD differentiates and strictly separates design, orchestration and student activities, but similarly and equally recognizes emerging practices of students and teachers during the lesson (Fawns, 2018).

Scrutinizing lesson practices in this chapter, we argue that there are similarities between the way ACAD approaches lesson practices and how the notion *agencement* allowed us to analyze these practices. By taking emergent practices seriously, and thus studying them, both perspectives provide strong analytical lenses to observe school lessons. However, by adopting the notion agencement, different actions of the lesson are *not* divided among designated agencies (e.g. the teacher who designs and orchestrates, the student who practices), rather, agency is accounted for as the outcome of different lesson practices, directed by *collective* action. By adopting such an analytical perspective, tasks find a different status for the lesson *beyond* designed entities that are performed to achieve learning outcomes, and which require teachers' orchestration and students' activities.

The task-agencement that we presented in this article illustrates that tasks are not merely instruments of learning, but more importantly, they are central factors in coming to terms with what BYOD schooling is all about. The notion task-agencement allowed us to trace the *processes of taskification* during multiple lessons. On the one hand, tasks are the connecting tissue between all the actors, that is, actors are related with each other through the task. On the other hand, tasks are materialized on the surface of personal screens (both on students' and teacher screen). This means that the lesson is structured in a specific (screened) way around tasks, directing collective actions towards contextualization, instruction, presentation and execution of the task. As we argued, this structuring of the task is achieved through a set of framings variously identified as working with templates, socio-algorithmic logic, and bricolage. These framings give the collective action the format it is designated to have.

These specific framings portray that processes of taskification constantly *task* different actors accordingly, and therefore, tasks don't act as bloc entities, but rather, they actively format how the lesson and its activities should look like. Even stronger, we would like to conclude with arguing that in and through this task-agencement, the task always entails a process of *taskification* that formats BYOD schools. With 'taskification', we mean that the task-agencement expands the domain in which tasks not only influence the organization and structure of lessons, but equally the very organization of this BYOD school by enacting particular form of schooling.

In sum, the notion agencement proves to be a valuable sensitizing device for educational studies that seek to disentangle and come to terms with discussions of educational *forms (*Decuypere, 2019*)*. As such, in the context of BYOD schooling and similar to what Selwyn et al. (2017) argue, namely that, "task-based activities are understandably core elements of the 'job' of being a school student" (306), it seems that the *taskified* form that is characteristic of BYOD schooling, comes close to the labor or work form of activities (Bucher & Fieseler, 2017). The very pressing questions that require further research and reflection, then, are first of all how this taskified form of schooling is to be discerned from other pedagogical forms, and secondly whether there (still) is a clear distinction between school forms in general, and forms of other social orders such as labor or family forms.[8]

[8] For further explorations of these questions, see Laboratory for Education and Society, 2018 and Masschelein & Simons, 2019

CHAPTER III

The Timescape of School Tasks: Towards Algorhythmic Patterns of on-Screen Tasks[9]

[9] This chapter is accepted for publication in: *Critical Studies of Education*

Introduction

Daily school activities are becoming increasingly integrated with digital devices through the implementation of different models, amongst others, the Bring Your Own Device (BYOD) policy that allows students to bring at least one personal digital device to school for the purpose of learning (Selwyn et al., 2017; Song, 2014). The growth of this policy in different countries is partly driven by financial advantages it offers to schools, such as reducing costs of purchasing and maintaining school devices and computer laboratories. BYOD is a favored model also because of the one-to-one relation that is created between students and their own devices at home and at school (Conrads et al., 2017; European Schoolnet, 2013; Maher & Twining, 2017; Selwyn et al., 2017). For school education, which was – and still is – dominated by paper and printed textbooks, turning to personal digital devices means a turn from paper to screen. This implies turning to a different apparatus that has its own particular characteristics and that forms classroom practices accordingly (Marin, Masschelein, & Simons, 2018; Vlieghe, 2019). Elaborating on the initial implications of this turn, Kress (2003) argues that the shift from the paper page to the screen surface has resulted in a turn to multimodal texts. These texts are composed of mixed elements such as images, words and equally audiovisual materials that are organized on a digital page on screen.

Similarly, in the classroom, the implementation of personal digital devices introduces new actors that give shape to novel forms of *lesson tasks, assignments and activities* that are significantly mediated by and through these devices and their features. These tasks and assignments that are given to students by teachers are often conducted individually such as making PowerPoint presentations or animated movies about an individually selected topic. Conducting these tasks which necessitates a specific set of activities on screens alter temporal and spatial dynamics of traditional classrooms (Bhatt, 2017).

Although the first steps towards integrating personal digital devices in schools can be traced back to a decade ago, Smith (2017) emphasizes that research has only scratched the surface of understanding how the spatiotemporal features of classroom activities are shaped in a particular way through multiple screen activities. In a similar vein yet more generally, Lingard and Thompson (2017)

argue that through processes of digitization of educational institutions, we have stepped into a new *temporality* that requires new lenses, methods and theories in order to grasp its emerging implications for education. As Sheail (2017) argues, this gap is particularly traceable within the *empirical* studies that can shed a light on understanding temporalities of digital education.

Drawing on this empirical and theoretical gap, some empirical educational studies have recently attempted to *re*-install temporality in educational studies as an analytical dimension that has been overshadowed by excessive focus on space and spatiality (e.g. Lumino & Landri, 2020). The focus on spatiality which was initiated after the introduction of the spatial turn in social theories (Soja, 1989), inspired educational scholarship to explore spatial relations connected to distance and digital education to the degree that temporal arrangements were left undertheorized (Decuypere & Vanden Broeck, 2020; Lingard & Thompson, 2017). As a matter of fact, time and space are interdependent notions that cannot be perceived separately in isolation (May and Thrift, 2003).

Contemporary critical studies that investigate temporal features of digital education, majorly conceptualize temporal complexities in line with macrocosmic theories of neoliberalism that put forward the dominance of a sort of time. That is, along with recent technological developments entrenched with economic logics of neoliberal societies, 'our time' is conceptualized by several scholars in educational studies as a time of *acceleration* (Buddeberg & Hornberg, 2017; Sellar & Cole, 2017). In this respect, Hassan (2017) terms the time that is experienced online on the screen, as "network time" which points to situations when the relevance of clock time diminishes or becomes secondary. Although network time can be felt slowed down or speeded up, he stresses that this sort of time is mainly oriented towards acceleration, when various tasks are fitted into one's hours, it leads to a domination of fragmented and discontinuous time that colonizes educational institutions (ibid).

In line with recent calls to more meticulously investigate the specific temporalities of digital schooling, this chapter aims to shed a light on temporal configurations of classrooms that integrate digital devices during lessons. Particularly, the interest of this chapter is to explore *temporal specificities of screen mediated tasks* during formal lessons. For this study, personal screens are considered as a site of appearing and disappearing activities during the lesson time. They acts as active

devices that perform particular operations and equally make other actors act (Decuypere and Simons, 2016, p.133). While exploring how digitally mediated tasks are conducted on screens, we are not solely concerned about so-called on-task activities, rather, we observe all various sorts of activities that appear on the screen while a task is being conducted in the classroom. Put differently, we do not dismiss activities such as chatting or checking social networks if they are done during the task time. Precisely by taking all sort of screen activities into account on a collective level, we let screens reflect how the classroom looks like when students are individually working on a task.

In this chapter, we adopt the timescape approach as a heuristic device that sensitizes us towards qualities of time and the ways in which different sorts of time can be produced when activities take place on the screen. The following sections will firstly elucidate this approach towards time and elaborate the implicated temporal relations through which we can investigate the task timescape that is produced. Secondly, we proceed by analyzing the screen activities gathered by means of an online guided tour on students' screens. Our analysis introduces different sorts of time such as enveloping time, multiplicative time and dividing time. Moreover, following the chronology of task time, we show how particular temporal zones of synchronization, focalization and diffusion are produced. Lastly, we conclude that the taskified time has specific characteristics and it is ritualized, standardized and it follows algorhythmic pattern.

Studying the Timescape of Screen Mediated Tasks

In order to scrutinize the task time produced on the screen, we adopt the timescape perspective which was coined by Adam (1998, 2004) as a heuristic methodological device to make us sensible for qualities that are specifically temporal (and not only spatial) and can show different productions of time through social and technological orders. This perspective allows us to describe time as a cluster of associated temporal elements that entail timeframe, timing, temporality, tempo, duration, sequence and temporal modalities of past, present and future. These temporal elements are mutually entangled (even though not always with equal significance) and work to produce a particularized temporal landscape (Adam, 2004; Kitchin, 2017). As such, the timescape perspective serves as an analytical tool to grasp the specificities of time and how it is collectively produced (A. Burgess, 2010).

In educational research, this perspective is mainly deployed in critical studies of higher education, namely in order to examine temporalities of academic life. The deployment of this perspective in higher education has led to the identification of a timescape that is associated with notions of regulated and bounded time and it shows how for academics, time is produced within the boundaries of meeting timelines, fast producing and reaching milestones which are majorly recognizable in entrepreneurial pseudo-corporates (Baker, Irwin, & Freeman, 2019; Bennett & Burke, 2017; Guzmán-Valenzuela & Barnett, 2013; Manathunga, 2019). In the context of school education studies, the adoption of the timescape perspective led to understanding that school learning requires an expansive time rather than a regulated time that is marked by following the linearity of time, embedded in calendars and lesson plans (see Povey, et al., 2019).

The first element is the *timeframe* that specifically indicates if the practice under investigation pertains to a subjective and personal frame, like the time of illness or stress, or it is bounded by some externally located frames that are socially agreed upon, like the school calendar (Adam, 2008, 8). As such, the timeframe that bounds our study, is the time that teachers allocate for conducting a given task during a formal lesson. *Timing* is the second element that stresses "social synchronization, coordination and what are good and bad times for action" (ibid, 8). In other words, timing sets the good or bad time to do something. Associated to the element of timing, the third temporal is characterized as *temporality* which pertains to the quality of the time whether it is measured, regulated, fixed, or it is expanded.

Along with these elements there is also fourth, the element of tempo that accounts for the speed, pace and intensity at which activities are conducted. One of the central questions that can be asked in relation to this element is which actors are establishing the pace, for whom and on what basis. Moreover, this element allows to become attentive to potential clashes of tempi, that is, when actors need to adapt and conform to another tempo, and what the consequences of this adaption are. The fifth and sixth elements are duration and sequence.

For instance, with relation to digital developments, Adam (2006) explains how "succession and duration have been replaced by seeming instantaneity and simultaneity" (p. 124). The element of sequence points to the order and succession of activities, whereas the other side of its spectrum points to simultaneity. Lastly, temporal modalities are connected with notions of past, present and future and how

memory, perception and anticipation are being constructed. The multitude of these elements give rise to patterns of rhythmicity which we will discuss at the end of this chapter.

The mode of data collection

This study is part of an ethnographic observation in an international school in Belgium that adopts the BYOD policy model. In this policy model, students frequently use their personal laptops during lessons either for personal activities such as messaging and online shopping, or for conducting school tasks like making a PowerPoint presentation and notetaking. As the aim of this study is to account for the time that *all* students spend on screens while doing lesson tasks, the simultaneous observation of all students' screens during the lesson time becomes an impossible mission for one researcher. Moreover, as personal and private actors intermingle with school actors on a single screen, it makes the observation also ethically complicated.

For these reasons, and in order to render personal screen activities public to the research, as well as bring these activities to the front for students, we conducted an online guided tour technique followed by a mapping exercise with students. This technique was adopted parallel to the ethnographic study of school subjects, in which classes of history, geography and literature of 9th and 10th grades were observed. The online guided tour is designed with the aim of introducing the researcher to the field in a short and planned manner. This technique involves participants to lead the researcher through their personally meaningful space while describing and explaining its features (Thomson, 2015). This technique mainly takes place in physical sites such as the library or the museum, but it can also be implemented in online platforms, for example for scrutinizing online activities of a YouTuber. For online space, this method is advantageous as it is unobtrusive and respects the privacy of the participants. Additionally, the guided tour technique positions researchers and participants as "co-researchers" in situ (Everett & Barrett, 2012, p. 33).

As such, the guided tour in this study provides an entry point to students' screen activities during the lesson. As mentioned earlier, we focus on students' screen activities during the time when they are asked by the teacher to conduct a task. For our online guided tour, the time dedicated to conduct a task was divided into 4 time

slots, each slot entailing 7-8 minutes. At the end of each phase, students were asked to interrupt their ongoing activities and describe what they did in the past minutes anonymously on a shared online document. These descriptions include listening to the music or searching a keyword online. While students described their activities during the four time slots, complementary questions were asked next to their descriptions that further specified their descriptions. As far as the timeframe element of a timescape is concerned, we are aware of the research's timeframe that fragments the time of conducting the task and adds an extra activity of describing.

In analyzing the temporal elements of the timescape, we make use of two visualizations, one of which only focuses on different types of activities and dismisses the chronology of the linear time. The second visualization traces the identified activities along the linear time. The first visualization is presented with circles as the beginning and the end of each activity is not of significance, whereas in the second visualization lines are deployed as a way to show the direction of time and the intensity of activities within that frame. As such, the circular analysis focuses more on the temporality that each type of activity creates, and the second one stresses on the sequence and duration as well as the intensity of these activities over time.

Different Temporalities of the Task Timescape: Following the Entangled Screen Activities

The circle in figure 4 that encircles smaller bubbles, shows the aggregation of all the screen activities that are described by students during the execution of the task. The size of these circles shows the occurrences of these activities in students' descriptions and each color highlights a specific category of activities that we elaborate in the following section. As mentioned above, the circles do not show the distribution of activities over the progression of linear time, rather the attention is given to different sorts of activities and their overall presence during the task timeframe. In the following section, we will elaborate how each of these activities create a specific temporality.



Figure 4: Different range of activities during the overall task time frame

The enveloping time

> *Before starting with anything,* I went on iTunes and into my playlist. I wanted to listen to [artist's name] new album whilst working so I searched in iTunes for '[album's name]' [authors' emphasis].

The first category entails activities that are in relation with listening to music. Students listen to their personal music while working individually with their headphones on. The analysis of students' descriptions shows that task related activities are majorly *wrapped* within the frames of personal music listening. Ash (2015) describes that the specific function of a paper envelope is to cover and protect what comes inside the folded paper from the outside environment. Through this protection, the envelope creates a time and space for new capacities of action,

like the possibility of travelling and transporting which is afforded by and through the folded paper (82). Even though music doesn't create distinct boundaries of inside and outside, it does shift localizations of time and space that make other activities possible. It can be argued that by cutting out the off-screen audio receptions, listening to music forcefully directs the attention from interactions of the immediate environment towards activities on the screen, thus creating a specific attention and immersion towards screen activities.

Bringing *personal* devices to the classroom implies having constant access to already signed-in accounts, saved playlists and thus, carrying the personal music *memory* while working on the task. The way music is described elucidates that it has become one of the embedded activities for studying and doing the task: "I also had Spotify open with my playlist *ready to be played for studying*" [emphasis by authors]. Here, music not only envelopes other activities by creating an individual and personalized time, but it also *punctuates* the starting moment of studying. However, the enveloped time that is created through listening to the music in the background of other activities enforces its own specific *tempo*, which can at times become inconsistent with other activities that engage with the task.

> I tried to read the poem, however this was not going so well due to my music being a bit too loud and so I couldn't hear the poem in my head. The music was a sort of electronic music with quite a fast beat, I got quite unfocused on my work due to this music and it would've been better if I listened to something calmer and more relaxing.

Here, even though in the background, the music is not synchronized with the kind of time needed for the task [annotating a poem]. What can be noticed here, is a clash of times between the time of the music and the kind of time needed for conducting the task. In this context, picking the *right* music gains importance and becomes an active contributor to the task time, as descriptions constantly point to searching for a *suitable* playlist or picking the *right* music. As such, even though music envelopes other activities, there should be a temporal compatibly between the chosen music and task related activities in order to achieve a good timing (cf. Adam, 2008, 8).

The intensive time

> I looked up [poem's name] poem summary on Google search and clicked on a couple of pages until I found a Prezi link that gave me further insight into the poem, to help me while doing the class assignment.

The second type of activities is categorized for being directly engaged with the task assigned by the teacher. Activities that are located at the center of the circle (the two biggest green circles) in the above visualization are those that occurred the most in students' descriptions. These activities consist of online searching, browsing results and producing the content for the task. Online searching is one of the primary ways in which students engage with the task. Even when the task material is selected by the teacher, turning to Google's search engine remains highly present. Online searching starts from translating the main elements of the task into keywords; this act brings forward an ordered list of results that stand for task material and interferes in the relation students establish with the task. It works at the fundamental level of *preconfiguring resources* through which students further engage with the task. It equally delegates parts of the epistemic activity to the authority of algorithms that order and display search results automatically. Put differently, by preselecting resources, the search engine also carries out parts of the analytical or creative process needed for doing the task.

> I found an in-depth analysis of this poem on a Prezi slideshow which I'm using to develop a better understanding of the poem.

Online searching is followed by processes of navigation and browsing search results. Several multimodal web results are opened swiftly one after the other in different tabs and scanned one by one with the help of keyboard shortcuts (such as Ctrl F) and scrollbars of videos that allow scanning the material in a swift manner. Navigating and browsing is done with the aim of arriving at helpful resources which is done by a quick evaluation of the content of each tab. In this situation, on the one hand, the time that is allocated to each separate content unit on a single tab is *compressed* as the spaces are dispersed and the content is mainly scanned quickly, and on the other hand, the time dedicated to hopping between different tabs is greatly endured and enhanced. Consequently, it can be argued that not only activities of searching, browsing and evaluating incorporate a fast pace, but it also shows how the epistemic process is initialized by dedicating time for finding and

selecting the relevant resources. This is done without having to bare the temporal delay that results from linear reading of each page's content (cf. Hayles, 2012).

As such, it can be argued that doing screen mediated tasks during the lesson, installs a specific *sequential* order on the lesson time. Not only does *searching* happen in the classroom and during the lesson time, instead of for example after or before the formal lesson (in case of visiting a library for instance), but more importantly it also sequentially happens as the initial form of engagement with the task. This highlights the *algorithmically mediated* relation that is established while students engage with different types of tasks.

While educational studies on task performances recognize online searching mainly as a component of specific type of tasks categorized as *information seeking* (Knight & Mercer, 2017; Reisoğlu, Çebi, & Bahçekapılı, 2019), our observation shows that online searching is not only limited to these kinds of tasks. For instance, in a class where students were asked to write a time capsule letter about an innovation that would exist in the next 25 years, students' screen activities reveal online searching to be equally a significant component of a task that incorporates imagination and creativity.

> I searched up on google: 'possible innovations in 25 years'. The first link was an article on The Guardian, so I decided to check it out.

As such, students' initial encounter with the task is *ritualized* towards online searching to the extent that it has become an a priori relation with the task. It equally emphasizes the *standardization* of imagination that students collectively perform here. Moreover, the online searching of different individual students leads to the same few pages which demonstrates that even though tasks are pursued individually and on allegedly personalized spaces, the same content is reached collectively. Online searching and browsing are always closely entangled with processes of production in form of a bricolage, that is, a synthesis of evaluated and browsed results which is assembled into multimodal content (Alirezabeigi et al., 2020). These processes are not linear and entail *multiple* threads of actions that are spatially fragmented, temporally compressed but thematically related and bounded.

> I opened Google Doc on ugliest animal list I made last class. Searched up habitat of naked mole rat, searched up what south Ethiopia was, searched up layers to add on ArcGIS like country boundaries, added it to map, tried to build my own boundaries so I searched it up on Google, but it was too hard to understand so I just chose unrelated layers that highlighted the boundaries.

As we see in the above description, different steps of engaging with task-related activities like searching, browsing and bricolaging are entangled in a non-linear manner. The three types of activities are constantly refined, leading to new threads of searching or new pieces on the bricolage. Even though the duration of each activity on a single webpage is minimized (which brings to mind what in everyday language is called multi-tasking) and activities alternate at a fast pace, there is a synergy between the three types of activities which gives shapes to an intensive time. This time plays with the succession of task related activities and iterations between searching, browsing, and bricolaging and highlights the synergic intensity that is created as a result.

The dividing time

> I went to [LMS name] to see if there were new grades up online. Then I went to YouTube, wasn't sure why I just typed it [You-Tube] in. Then, I went to Facebook, because I was bored for the first minute of class. After that, I went and looked up [painter's name] paintings because of what my teacher said from [another subject]. Then, I went on YouTube again to see videos the teacher shared. Lastly, I went on Spotify to play music, so that I could begin working.

The third type of activities are the blue bubbles in the visualization which illustrate activities that are neither directly related to the task at hand nor to the music that is being played in the background. Students' descriptions show that these are floating and short-lasting single activities that appear and disappear as students work on the task. It is noteworthy that these single activities take place on the same spatial surface and temporally parallel to other activities.

> I was watching a parody video whilst also having my presentation on one half of my screen and the video on the other.

These activities do not populate a central part of the above visualization and entail a wide range of activities from instant messaging, online shopping to watching YouTube videos and gaming. Even though the time needed for watching a TV series is longer and thus continuous in comparison to the time of receiving a text message (in parallel to reading an article for the task) these are still considered as short-lasting single activities because of the physical environment in which these activities are taking place, that is, during the formal lesson time. The physical environment of the class and the presence of the teacher, who can be mobile in the class and observe students' performance, makes these activities short-lasting and fragmented.

These fragmented activities that mainly pertain to students' social and personal dispositions, occupy the screen space simultaneously to task related activities and divide time into smaller units and ask for a reorientation of attention. By creating intermittent effects that divide the attention very quickly between different activities and only dealing with one activity at a time (Citton, 2017, p.135), these activities produce an attentional redirection between pop-up notifications, saved personal accounts of social networks that are instantaneously accessible, and task related activities. This way, the instantaneous boredom and daydreaming times in the classroom are immediately materialized, that is, filled up with random searching on YouTube or scrolling on already signed-in social media accounts. Similarly, Webb and colleagues (2019) argue how learning adaptive platforms can "end the habitual boredom of schooling" by accelerating the waiting times of anticipation. As such, through anticipating students' desires (on the content that they would like to see or hear) based on the accumulated data on their personalized profiles of YouTube or Spotify, the bored and waiting times of filled up.

In sum, the interplay of all above activities during the task timeframe highlights that the device plays a significant role in configuring a digitalized attentional zone (that is, the screen's space). Each of these activities on the screen process time differently and produce specific temporalities. The entanglement of spatially-fragmented, temporally contrasting (e.g. intensive and dividing time) and instantaneous activities in which duration is replaced by simultaneity, demonstrates that not only attention is being structured in a specific way (through activities of listening to music and iterative searching and browsing), but it is also constantly captivated and attracted through automated processes (such as pop up notifications, logged in accounts and data traces and histories). In this situation, a

constant state of *alertness* is being produced while working on screen mediated tasks (cf. Citton, 2017, p. 41). This alertness can be compared to the alertness of a driver in a multiple lane highway and contrasted with the sort of free-floating attention of a passenger in the car while looking at the passing landscape (Serres, 2015, p. 35). Students, thus, adapt and conform to this sort of screen alertness.

It is important to note that we tried to see these activities in isolation whereas on the screen they are entangled and interwoven, thus necessitating to look at the chronology of the task time and analyze the distribution of activities during the task timeframe. Below, the direction of the time, as well as the beginning and ending of activities will be discussed. Based on the intensity of activities in the timeframe, we suggest three temporal zones.

The chronology of the task timeframe: synchronicity, focalization, diffusion

In this section, we investigate the distribution of activities within the linear timeframe of the task. That is, the institutional time demarcated by the clock, calendars and timetables in which time is divided into blocks of repeatable, school-defined durations and has a direction, a beginning, and an end (Adam, 2006). This timeframe is firstly structured through the school's program and secondly, by the teacher who inscribes the task and general sequence of class activities, such as the amount of measured time required for doing a task. Analyzing screen activities along the linear time highlights how the progression of time plays a role in choreographing a collective tempo and intensity, which is elaborated in three temporal zones. As mentioned previously, the second timeframe that resides within the task timeframe is that of research and it can be traced in figure 2 by following the numbers on the horizontal axis. The numbers indicate the intervals in which students were asked to interrupt their work and describe their activities. As such, we do not claim to have captured all screen activities during the *task* timeframe, rather what we see in the visualization is the aggregation of activities that are described by students, within the frame of the online guided tour.

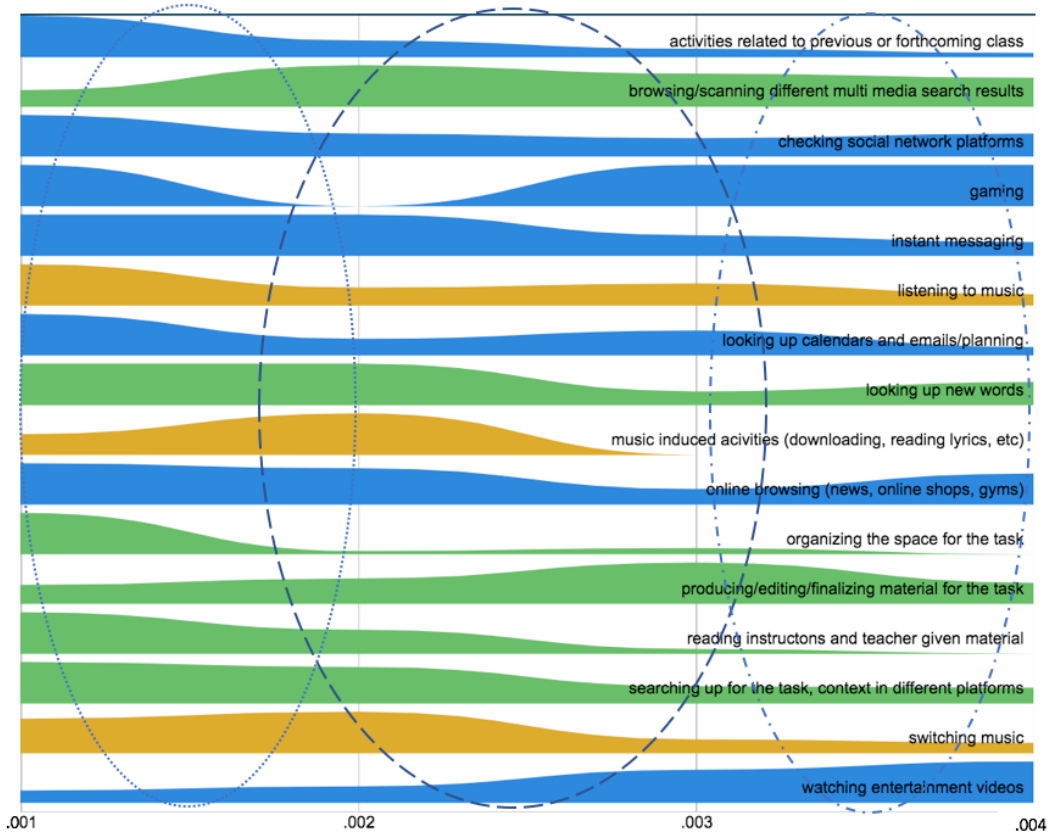

Figure 5: The linear progression of activities and the emergence of three temporal zones of synchronicity, focalization and diffusion

The left zone in figure 5 that encompasses the beginning of the task time illustrates the first temporal zone of *synchronicity*. The significance of this zone lies in the range of activities that can be observed, such as a mix of music and task related as well as singular activities. This temporal zone highlights the starting point of turning to a networked space which is in need of *synchronicity*. The synchronicity zone entails numerous short-lasting and nonrelated activities that become an initial embedded part of the screen work. Regardless of the physical environment and established or expected relations, the synchronicity zone traverses the immediate environment and creates an expanded screen navigation in which different personal accounts, emails, social networks' feeds and news are *updated*. This fragmentation compresses the time and provides a fast and dispersed tempo in which all personal spaces are synchronized to the time of 'now'.

In the second temporal zone, that is the zone in the middle of the figure, the intensity of activities lies on recursive activities of online searching, browsing and bricolage. The aggregation of these task related activities changes as time passes, starting from searching, to browsing and finally to the bricolage. How the

progression of linear time affects screen activities is traceable in students' descriptions:

> My work has changed, and I have a lot more tabs than I did in the starting of the lesson. My music also changed into more of a fast pace song than slower songs.

Although this temporal zone equally includes fast pace shifting between different links and spaces of searching, browsing and noting down, these spaces are thematically related and engaged with the task, hence creating a continuation. Singular and music related activities occasionally pop-up and fragment this time, however, the main focus of this zone is given to the engagement with the task. As such, the middle part of the task time points to an intensified relation as pages are opened, scanned one after the other, keywords are refined, and this cycle is repeated. This *tempo* of activities puts forward the temporal zone of *focalization*. Focalization explains the tempo at which the relation with the task is shaped through intensive and networked chain of activities that deepen the time. As time passes and the end of the lesson approaches, these activities gain a higher tempo.

The end of the lesson is highlighted by low amounts of described activities. In this zone, the intensification that was created diffuses as the thread of activities gets dispersed between different screen and non-screen spaces.

> I found that as the lesson progressed, I lost concentration and decided to watch YouTube and go on Instagram.

As it can be noticed, single activities such as gaming or watching videos gain more centrality and dilute the intensity of the focalized time that was created in the middle part of the task time. As such, the temporal zone of *diffusion* highlights how time is stretched in connection with the progression of the linear time that signifies the end of the lesson.

Following the different temporal zones that are created across the linear time of the individual work, we observe how the variety and intensity of activities at the beginning, middle, and the end of the task time are specific to these moments. In this regard, we see that students' actions are directed towards *completing the task*, and this is achieved to a large extent before the inscribed time of the teacher, partly

due to the externalization of the speed at which a task can be done. Consequently, it can be argued that working on personal screens introduces a different sort of relation in which *task completion* gains higher significance than *task duration*. That is, the goal orientedness that lies in tasks sets the tempo of activities in such a way that this goal is fulfilled in order to 'gain time' for other personal activities, rather than staying with the task. In this situation, algorithms play a crucial role and in the next section, we elaborate their role in fabricating *algorhythms*.

Following the rhythms of the task timescape

The final lens through which we explore the timescape of screen mediated tasks focuses on the element of rhythm. The first two sections and elements of the timeframe, timing, duration, temporality, tempo, intensity as well as the sequence will help us in characterizing rhythms of tasks. Rhythms of screen mediated tasks are not merely generated through the pattern of interactions between students and their devices. Rather, these rhythms are heavily interwoven with internal processes of search engines and platforms, which are based on arithmetic calculations and algorithms.

As such, we argue that rhythms of screen mediated tasks are better captured through the term *algorhythms.* The concept of algorhythm, which is a combination of algorithm and rhythm, is conceptualized by Miyazaki (2012) to highlight the interplay, orchestration and synthesis of abstract algorithmic and calculable organizational concepts and rhythmic social life. The first element of this concept, 'rhythm', is the time-based order of movement that captures a pattern of action which is repeated, and, in this way, it can sustain and mutate. Rhythms emerge as multiple and heterogeneous temporal flows and routines (Alhadeff-Jones, 2016; Coletta & Kitchin, 2017, p. 3). Second, the concept is equally constituted by the term 'algorithm', which points to a "finite sequence of step-by-step instruction, a procedure for solving a problem, often used in computers as a fundamental principle of software" (Miyazaki, 2013, p. 135). As such, algorithms are sociotechnical *products* which are rather unfixed objects and are sociotechnically *productive* as they are enacted by screen activities. As such, algorithms are not only already situated in our socio-economic contexts, but they strongly determine how students encounter information, as well as how they imagine, communicate, and see things. This way, as Miyazaki argues, algorithms literally put things forth, forward or further (Miyazaki, 2019, p. 273; Seaver, 2017). Both concepts come

together in the notion of 'algorythm' that points to the very processes of computation which "makes time itself logically controllable and, while operating, produces measurable time effects and rhythms" (Miyazaki, 2012, 10).

As we discussed, the analysis of students' activities and the fact that while conducting a task, they arrive at similar webpages, precisely shows how these activities create a sort of collective *pattern* even though they are done individually. Furthermore, turning to search engines as one of the initial steps of conducting any type of tasks (information seeking or rather creative) implies that once the task is translated to a set of keywords, it is to a great extent up to algorithms to perform the task's *rhythm-making* (Coletta & Kitchin, 2017). Even though working on tasks suggests a more individualized way of working (through one to one interaction with devices and platforms), following a similar pattern of work as we see in the second figure as well as arriving at same webpages, suggests that a sort of collective individuation (cf. Scott, 2014) is constantly being constructed.

In understanding algorhythms, it is crucial to realize that they are combinations of symbolic and real physical structures. "They occur when real matter is controlled by symbolic and logic structures like instructions written as code. Algorhythms let us hear that our digital culture is not immaterial, but lively, rhythmical, performative, tactile and physical, and, most importantly, that algorhythms are not just normal rhythms" (Miyazaki, 2015, p. 135). Rather, algorhythms signify that algorithmic terms such as automation, code, architecture, and materialization are strongly interwoven with symbolic social terms of labor, text, infrastructure, and sociomaterial (Seaver, 2017). As such, algorhythms highlight that automated processes that function based on the numeric logic of visibility in the context of conducting a task, prioritize and accelerate *task completion*. Here, completion and performance equally embrace a more computational meaning. Put differently, learning can be conflated with performance and completion "which itself is positioned as a matter of algorithmic tractability based on temporal sequences of inputs and outputs" (Perrotta and Selwyn, 2019, 13).

The omnipresence of algorhythms equally occupies moments of boredom or pausing during the task time. Furthermore, these algorhythmic patterns condition how temporal modalities of past, present, and future are understood. That is, they condition what kind of past is being remembered by memorizing more clicked links which follow a marketized strategy. As such, a specific memory is constantly being

created (Webb et al., 2019). Similarly, the future is equally conditioned by the anticipations of the same kind. The present is therefore, productively linked to particular pasts and futures that are codified and are rendered more *visible* (cf. Ash, 2015; Citton, 2017).

Concluding Thoughts

This chapter sought to elucidate the specificity of temporal relations of screen mediated tasks in BYOD schools. By adopting the timescape perspective, we investigated how screen activities are shaped with different durations and sequences which put forward an internal temporality specific to personal screens and the connected space it offers. We discussed how collectivity is being reoriented in this situation and extends from the immediate physical space to a sort of interlaced network collectivity between students. Finally, we elaborated on the rhythms of the task time and how they are ritualized and standardized through algorhythms. The timescape of the task time shows how the interplay of these temporal elements creates a manifold of different times that we specify here as a *hybrid time*. Whereas through learning platforms it can be claimed that learning is decoupled from the physical place of school, thus putting forward possibilities of all-the-time-school or anytime school (Idleland, 2020), the task timescape shows that while conducting tasks in the classroom, the time is occupied by different temporalities that intervene, interrupt, fragment or deepen the time. As such, what is illustrated by the task timescape is that the allegedly 'anytime school' can also mean 'anytime any activity' on the flip side, which precisely shows the significance of stressing on the characteristic of a hybrid time.

On a concluding note, the analysis of screen mediated tasks points to the translations of different educational gestures to the language of protocols and algorithms, such as searching, reading, and creating. We argue that in doing so, the element that is perhaps "lost in translation" is the delayed, waiting, and differed time that is inherent to cultivate and reflect on a question, a task or an exercise. In order to re-potentiate the constantly 'occupied' time, it is worthwhile to dwell on untranslatable elements of task time that are waiting, delays, and differences. This attention does not suggest demolishing translation as such, rather it asks for *re-formulations* of approaching a school task in which delayed, waiting, and differed time would be embedded algorhythmicly.

Finally, this chapter took the entirety of students' screen activities seriously and investigated the interwoven temporalities that were produced while doing a task. Instead of falling prey to a priori schemes (such as notions of time, related to market strategy and capitalism) that result in reactionary critique, we need to prioritize understanding the interplay between students, their devices, and the task in order to critically scrutinize the produced time. We believe that critical studies of time need to incorporate more seriously the empirical dimensions of digital education and to go away with the implied normativity resulting from ambiguous modes of analysis (May and Thrift, 2003; Decuypere and Simons, 2020). As Decuypere and Simons (2020) argue, this mode of approaching temporalities risks shadowing the understanding of challenges of living within the lines of such temporality on the one hand, and not seeing the openness that this temporality offers to intervene and interfere on the other hand. In this respect, it is noteworthy to further investigate the relation of the task time with other parts of the lesson, as well as scrutinizing strategies that are adopted by different actors such as teachers, school staff or certain platforms to configure the timescape differently.

CHAPTER IV

Classroom spaces in the making: a sociomaterial account of digital screens in BYOD schools[10]

[10] This chapter is published in an edited volume: N. Vansieleghem, J. Vlieghe, & M. Zahn (Eds.), *Education in the Age of the Screen* (pp. 51–67). London: Routledge.

Introduction

[*scene 1] The teacher is sitting in front of the classroom when he loudly asks one student to turn off the lights and pull down all the window blinds. The video on the interactive whiteboard starts immediately after the class goes dark and silent. Students are all facing the big screen, most of them have their laptops open in front of them. On the big screen, a man in the middle of a desert points to a windmill behind him. As he talks about different inventions of the golden Islamic age, such as algebra, an online game interface pops up on the laptop screen of one pupil who is seated in the front row. His fingers move on the touchpad silently and his body is aligned with the borders of the screen as he guides an animated worm that crawls in the space and eats others to get larger. His gaze shifts constantly from the laptop screen to the big screen. It doesn't take long before another laptop screen displays the same game from a row behind. The class is quiet – only the voice of the man talking about the history of algebra breaks the silence. On the spur of the moment, the teacher stands up and walks to the back of the class. With each step, finger strokes switch the screen back to the course material (a PDF file). Sitting behind all the students now, the teacher can see what appears on the pupils' personal screens. One of them, seated on the last row, bends the screen and aligns her body with the edges of the screen. She turns her back every few minutes to see in which direction the teacher is looking.*

[scene 2] There are not so many voices in the classroom, and everyone is gazing at their personal laptop. One pupil opens her laptop's browser and types 'gothic churches in Paris' in the search bar. Her earbuds are in her ears, and her phone is on the desk. She doesn't wait to see what the search results are. Instead, she turns away her gaze to select another music track on her phone. Her gaze turns back to the search window and she clicks on the few first links. A notification abruptly pops up in the corner of her laptop, and she scans through the message she received on WhatsApp. Afterwards, she turns her eyes back to the search results and skims the contents of the websites that have been opened. She takes her earbuds out and asks the teacher to come to her desk. The teacher walks to her desk and stands behind her to be able to see the screen, which they continuously look at when talking.

Bring Your Own Device to school

Personal digital devices such as laptops and tablets were introduced in schools around a decade ago, thereby integrating formal school education with digital and web technologies. The Bring Your Own Device (BYOD) model is one of the clearest manifestations of how personal digital devices are present in today's schools. This model refers to 'the technology model where students bring a personally owned mobile device with various apps and embedded features to use anywhere, anytime for the purpose of learning' (Song, 2014, p. 52). While the most common objects in the 20th century classroom consisted of slates, boards, pens, sheets of paper, chairs and desks, personal digital devices have become central objects in today's BYOD schools.

One of the main characteristics of deploying computers at school in general, is the one-to-one interaction of the pupils or the teachers with these devices. However, the specific element of the BYOD model is that it involves the use of devices that are *owned* by students. They bring their personal stuff, stored onto these devices, to school (Carvalho et al., 2017). This includes music playlists, pictures, and social contacts. By bringing personal devices (and therefore one's personal stuff) to school, it could be argued that, to a certain extent, the classroom journeys to multiple (e.g., gaming, music) places that cannot, all of them, be situated within the physical confines of the classroom itself. Nevertheless, the immediate physical environment is directly affected by these journeys, as the two vignettes with which this chapter opened demonstrate. The space of the classroom is changed by the presence of personal devices, and by activities performed on these devices, which are not related to the lesson instructed by the teacher (e.g., playing online games, and scrolling through social media feeds and personal contacts). The question is now what happens when such activities are becoming dominant in the classroom, and how precisely then? We investigate which sorts of space are enacted in such a BYOD classroom, and what happens to the role of the teacher and students in such spatial enactments? This is the issue that is central in this chapter. More exactly, we aim at exploring the emerging spaces of the class- room during formal lesson hours by means of an ethnographic observation inside one BYOD school (Belgium).

A sociotopological approach to space

To pursue our research question, we adopt a sociomaterial approach that enables us to scrutinize the different actors in the classroom that are constituting space in a specific way. Sociomaterial approaches allow for disentangling the construction of various classrooms in a symmetrical vein, thereby focusing on different spatialities that are enacted in and through the various relations being established between human and non-human (e.g., digital) actors. This feature of sociomaterial approaches implies that the focus of the researcher is not merely directed towards students, teachers, and their interactions in the classroom. Rather, the materiality of the classroom, including the blackboard, the desks, the textbook, and the devices equally plays an active role in the construction of classroom space. These things and humans are called *actors*. 'Actor' refers here to 'anything that does modify a state of affairs by making a difference' (Latour 2005, p. 71). Put differently, through a sociomaterial lens, classroom settings are observed and investigated by identifying the different actors (both human and non-human) that populate these settings, and that actively contribute to their spatial composition (Decuypere & Simons, 2014b). In this regard, Fenwick (2014) elucidates the principle of symmetry in sociomaterial approach: Instead of examining only human actors, their individual skills and their social inter-relationships, a sociomaterial view treats the social and material elements of knowledge practices as entangled and mutually constitutive. (p. 258)

Approaching actors present in BYOD schools in a symmetrical vein means that digital devices are not considered to be passive objects that remain in the background, fulfilling (or not) particular human expectations. Rather, by implementing them at school, they actively co-constitute different (sorts of) spaces at school. A prime characteristic of sociomaterial approaches is that actors are not considered in isolation, but rather in view of the *relations* they establish with one another (Law, 2007b). Focusing on the specific types of relation that are established between different actors allows sociomaterial researchers to discern the particular *effects* that this relational interplay brings about in the setting. This relational interplay suggests an understanding of space that is not pre-given, or absolute. In this sense, space does not exist prior to the actors and their relations, and it does not take a singular and fixed (e.g., Cartesian or Euclidean) form. Rather, space is a product of 'relations which are necessarily embedded material practices which have to be carried out, it is always in the process of being made' (Massey,

2005, p. 9). The relational approach to space stresses that space is always being constructed, and hence, that different *types* of space are constantly in the process of being enacted (Law, 2002).

Although sociomiaterial approaches stress the situated enactment of space (and time), the different *types* of space that come into being are not often subject of fine-grained analysis (Decuypere & Simons, 2016b), we have argued that social topology offers a complementary yet more specific perspective in order to account for different *types* of time and space being enacted through such relational compositions. As such, we adopt sociotopology as a heuristic device to specify the spatial characteristics of a classroom setting.

The origins of topological thinking are to be situated within the mathematical field of topology. In mathematical topological thinking, the form and size of actors is never pre-given or absolute. Rather, actors can be deformed. The same applies to practices as a whole: depending on the relations established between actors, a practice might change (or keep) shape (Law, 2002). Inspired by such reasoning, the field of social topology adopts a similar argument with respect to space, and concretely analyzes the multiplicity and complexity of specific spaces that are generated in and through the relational composition of a particular educational practice. For instance, within one and the same setting, different spatialities such as regional, network, and fluid ones might be enacted and manifest themselves (Law, 2002; Mol & Law, 1994)

Sociomaterial and sociotopological studies of space in educational research

In previous years, there have been several sociomaterial explorations of how space is being relationally constituted in educational settings (e.g., McGregor, 2003, 2004; Nespor, 1994, 2002; Paechter, 2004; Rißler et al., 2014). All these studies show in a concrete manner how the spatiality of educational institutions, such as schools and universities, is not confined to their physical walls. Rather, these studies have shown that relations established between a variety of educational actors such as the curriculum, policy actors, specific educational objects, or the physical environment all enact different spaces. The sociomaterial and sociotopological studies of space have found new grounds of exploration with the introduction of information and communication technologies (ICT) to educational

settings. These technologies raise the issues of virtual vs. physical, presence vs. absence, cyberspace vs. immediate physical space in educational studies of space (for an overview on sociomaterial spatialities, see Fenwick et al., 2011).

However, the number of studies that explore these new topological accounts of space are limited. As an example of such approach, and drawing on the concepts of regions and networks, Sørensen (2009) observes how the blackboard creates two homogenous and clearly separated spatial regions. First, the region in front of the blackboard to which everyone's attention is drawn. This region acts as the proverbial 'home' for the teacher, and students can only be invited (by the teacher) to go there. As such, they are the 'guests' in front of the spatial 'black- board' region. A second region being enacted is the 'pupil' region, where the pupils take seats and from where they look at the blackboard.

Sørensen (ibid) argues that these two distinct (and physically situatable) spaces become more fluid in a virtual learning environment. Students constantly edit stuff and add elements to the virtual space, through which they overcome the physical distance that used to exist between them and the blackboard. In a similar vein, Decuypere and Simons (2016c) draw attention to the roles the screen plays in academic practices. They describe how specific ways of relating with the screen enact different spatial and temporal relations (such as the space of the big screen as a 'common reference space', or the time 'before' the presentation), and demonstrate that the screen is an active informer that performs specific operations in educational settings. This chapter is situated within this context of sociomaterial and topological studies in educational sciences, with a specific interest in the enactment of different spatialities, and it does so by focusing on the role of digital devices as active contributors to and (co-) constructors of various classroom spaces in a BYOD school.

Towards the sociotopologies of BYOD classrooms

Our ethnographic study took place over two periods of time (2016–2018). For this study we observed what happens in classrooms as well as in the library, cafeteria, and the hallways. Our classroom observations included various lessons in secondary and high school grades. We observed these settings with a specific attention for various actors present in the classroom, and particularly for how these actors relate with each other.

In the school where our ethnographic study took place, there is a classroom for each teacher of a subject matter, which has its own specific class design (wall decorations with pictures, quotes, diagrams, and maps). Thus, students and their devices are the actors that have to move and change classes every lesson, whereas the teacher remains in his/her own classroom space.

With regard to digital devices, a first thing to note is the diversity of these devices present in each classroom. During a formal lesson, what is manifestly present are student laptops (on their personal desks), the interactive whiteboard (on the wall), and the teacher's laptop (personal desk up front). On a closer look, however, smartwatches here and there (on the wrists) and smartphones (in pupils' pockets on or under their desks) can equally be discerned. Attached to these digital actors, we can often see personal decorations in the form of stickers, printed pictures with friends, or colorful cases. Personal devices are thus further personalized – both on their front sides (the screen, which regularly contains personal content) and on their backsides (because of the stickers and other personal decoration).

In the remainder of this chapter, we proceed by first taking into account the physical *arrangement* of desks and whiteboards, which vary based on the size of the class and the decision of the teacher. We will describe the main classroom arrangements of the school under investigation and highlight the *spatial relations* that actors establish within each arrangement. Second, we focus on the *physical features* of digital devices, such as horizontality and verticality of the screens, and their size and shape. Finally, we combine both perspectives in order to discuss the spatial relations that are enacted in the BYOD classroom. In investigating these spatial relations, attention is paid to the various relations between different actors, namely between digital devices, body formations and specific positioning and movements of actors. In this study, the topological lens helps us to scrutinize the spatial enactments in their multiplicity. Concepts such as *zones* and *regions* will aid us in identifying these differences. We adopt the notion of *zone* to demarcate the areas that have no strict and clear-cut borders. *Regions*, however, are homogenous areas with divided boundaries (Sørensen, 2009).

Before describing these classroom arrangements, it is important to note that we refrain from an in-depth analysis of specific digital actors (e.g., WhatsApp messages, personal pictures or emails) (see, e.g., Stevens 2017) and limit ourselves

to highlighting the relations that come about between the arrangements and the physical features in the formation of space.

Classroom arrangements

In this section, we analyze how different classrooms are physically arranged and how the *physical* space of the classroom is filled with chairs, desks, whiteboards, students, and teacher. Additionally, we identify the spatial relations enacted in each arrangement. The term arrangement refers to the interconnected order of things and humans in the classroom. Among the observed classes, three different arrangements can be distinguished. The first arrangement (see Figure 6) is what we

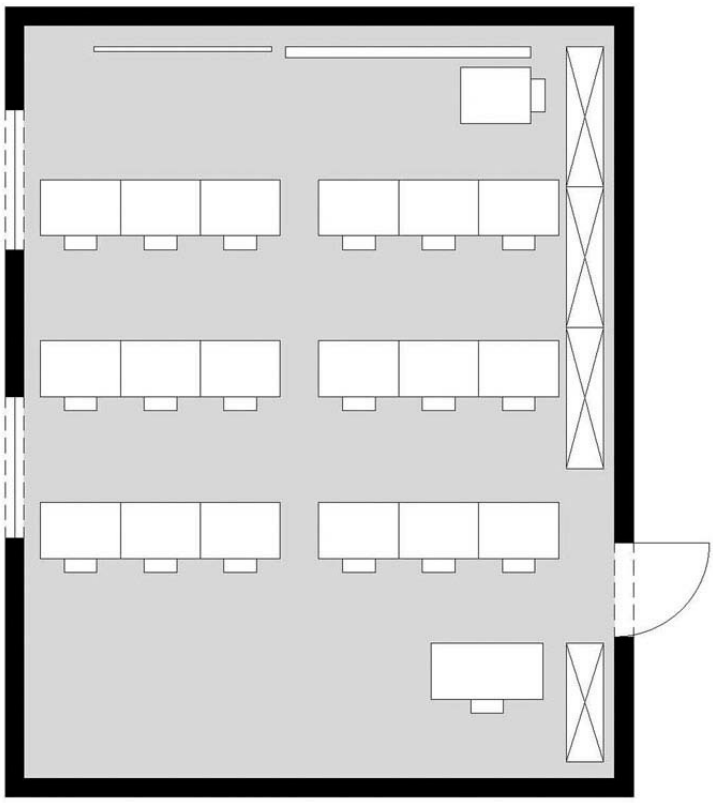

Figure 6: traditional (in so-called western view) classroom arrangement

could call the 'traditional' classroom setting. In this arrangement, the whiteboard and the interactive whiteboard (smart board) are placed next to one another. The teacher's desk is right in front of the interactive board and all the desks and chairs form rows that face both boards. Thus, the arrangement of desks and boards constitutes *a very specific spatialization of the classroom*: a directional space that has a front and a back, in which the wall that holds the board is considered as being 'up front,' at which all (pupils') gazes are directed. The teacher's laptop sits on the

desk in front of the board and it is mainly used when the interactive board *together* with the teacher present something to the students. These are the moments when a text, an image or a PowerPoint presentation is displayed on the board. In these situations, the teacher sits and/or stands next to the board, for what is being displayed on the board requires explanation, or instruction.

An additional desk is situated at the opposite side of the classroom, where the teacher's paperwork and a desktop computer are to be found. This double positioning of desks, one empty at the front and one full of papers and office accessories at the back, stabilizes the spatial regions where the teacher can and is allowed to operate. The teacher is sitting at the back during those moments that the interactive board is operating while presenting content to the students *by itself*, e.g., a YouTube video about the degree of freedom in biology class, or a documentary about different oceanic planes in geography class.

While standing or sitting in the front, the teacher is either the *starter* of computer programs (pushing the start button of the video, displaying images), when the device is presenting something itself, or the *assistant* of the interactive board. In the last case, (s)he annotates (commenting on the text, adding a few sentences to the slides, or giving instructions) what is being displayed on the board. Hence, when the teacher is in front of the board, and is not explaining something herself, it can be said that (s)he acts as the *spokesperson* of the screen. As soon as her assistance is no longer required, the teacher can move to the back, where all of her *stu*ff is placed. The next scene (scene 3) is typical for this arrangement: the teacher is sitting in *front* of the class to *play a video*. She moves then to the back of the class a couple of minutes after the start of the video.

[*scene 3] The interactive whiteboard presents the definition of innovation on a PowerPoint slide. 'Don't bother with writing, the slides are shared with you on Managebac'*[1] *the teacher says, moving away from his desk. Immediately, the students open the file on their devices. The teacher reads the definition out loud, when Olon, a pupil sitting at the back of the class raises his voice to Gabi who is sitting in front of him: 'You are texting, Gabi!'*

The pupils' personal screens in this arrangement have the same orientation as the interactive board: towards the front of the physical classroom. This signifies that looking at the board or the teacher requires the same body posture as looking at the

laptop screen. The direction of the blackboard and the screens creates the possibility for the students to simultaneously perform multiple actions, such as typing a message on the laptop, searching on Google, looking at the board, and listening to the teacher, without shifting their body. Moreover, in this arrangement, *the position of each student in relation to the rest of the class* becomes important, for rows of students make the screen content visible for those who are positioned behind others. Scene 3 demonstrates how one student can notice what is happening on the other pupil's screen, while this is not apparent at all for the teacher, since the teacher's movement is restricted to go from the front to the back and not in between the rows.

The second arrangement is the most common one in this school (see Figure 7). In this arrangement, the whiteboard and the interactive board are placed on opposite sides of the classroom. The desks are grouped together and spread out over the room. Unlike the previous arrangement, no desks are facing any of the boards. Instead, desks face each other, which implies that the pupils' gazes can meet. Hence, in this arrangement, the orientation of individual laptop screens and both whiteboards are not the same. This necessitates *a shifting of the gaze and the body* to attend to any of the boards when they are active. This is in contrast with the first setting, in which pupils could gaze at each other's' screens while looking at the big boards.

This characteristic, together with the positioning of the two boards on different sides, does not afford a singular orientation for the class, in terms of front and back. Instead, the personal screen and the boards are interlacing, which implies that *one can only attend to one of them at a time*. Although in this arrangement the teacher can better notice when the personal device is active and the pupil's body is tuned to it compared to the first arrangement, the pupils can perform multiple actions on the screen (e.g., texting and annotating a poem) at the same time. The teacher's access is still limited, however, and requires his/her constant mobility. Nevertheless, the possibilities for the teacher's mobility is increased: the teacher can walk between the pupils' seats and in several directions in the classroom. This possibility allows her/him to observe some personal screens, even when he/she is seated at her desk.

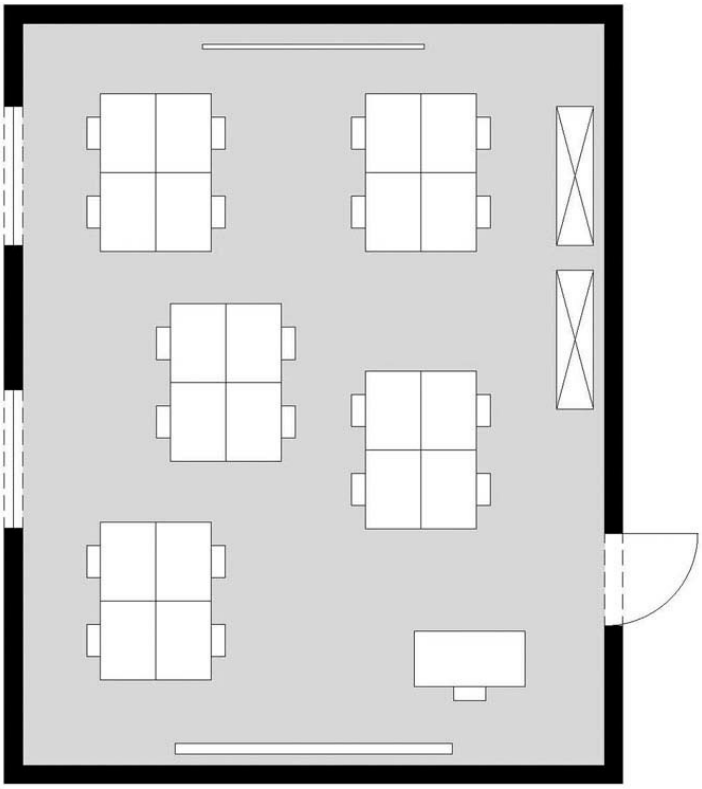

Figure 7: the second arrangement (collaborative)

The third arrangement is an uncommon setup that was only implemented towards the end of our ethnographic observations. This setup was proposed by one of the teachers as a response to the previous arrangements. Whereas in the two abovementioned arrangements the teacher's space of mobility was limited to different degrees, in this arrangement, the empty center of the room provides a space for the teacher to reach any of the students' desks. The desks here are placed in two main rows that all face the wall.

The two boards at the two sides of the room are behind the students. As shown in Figure 8, two desks are designed for the teacher: one close to the interactive board and the other close to the whiteboard. In this arrangement, when something is presented on any of the boards, both bodies and chairs need to be (fully) turned and change direction. The classroom does not have a collectively pre-defined back or front. Moreover, sitting at the desk, the gaze of the students is only directed towards the personal screen and the wall. Establishing any relation (with regard to the physical space) other than towards the screen requires the movement of the body, which means that, in and through this arrangement, *only one thing can be done at any given time*. This could be working on individual tasks (where everyone is facing their screens), giving presentations (where all the chairs are turned towards the screen), or having class discussions (where all the chairs are turned and create a big circle). Unique for this circular setting is that the content of each

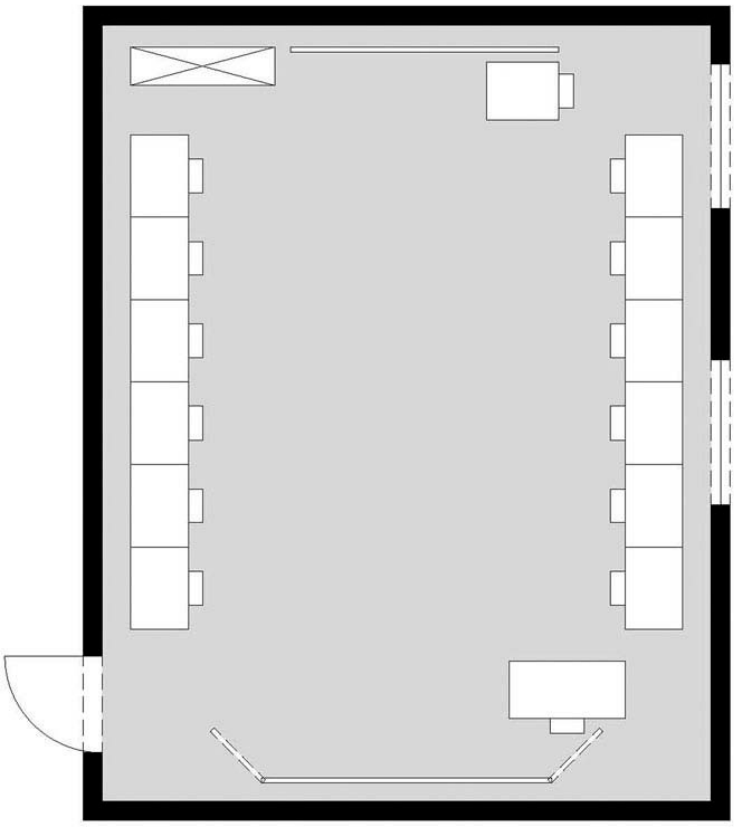

Figure 8: the third arrangement (similar to known computer lab arrangements)

pupil's individual screen is (very explicitly) rendered visible for the teacher (and not for other pupils, as was the case in the second arrangement), who can move around the room and observe what everyone is doing.

Tracing the vertical and horizontal screens

In this section, we take a closer look at the features of the physical surfaces in the classroom (traditional 'surfaces' such as blackboards and notebooks, as well as digital surfaces such as screens) and categorize these surfaces in terms of their verticality and horizontality.

Verticality

In traditional classroom arrangements, the blackboard is a flat surface hung vertically on the wall that engages with the gaze at the eye level. The blackboard, thus, is a public *vertical* surface positioned to capture attention, to demonstrate knowledge and to claim authority (Röhl, 2012b; Sørensen, 2009). Hence, body gestures are formed for the public encounter between knowledge and students. In contrast to the black- board, paper notebooks are *horizontal* surfaces situated on desks to engage with privately displayed knowledge through an individual, horizontal, and active engagement. As such, when engaging with knowledge, for instance, to solve mathematic equations, bodily gestured are closed. In the case of digital surfaces, however, smaller devices such as tablets and smartphones can be positioned both vertically *and* horizontally, depending on the situation. Laptop screens and the interactive board, in turn, are necessarily always positioned vertically. The verticality *and* horizontality of digital screens establish specific relations with other actors, such as course materials, gaming platforms, and pupils' bodies. Consequently, they enact – as we will argue – different sorts of space in the classroom. This is clear from the next scene.

[scene 4] A word document is open on Kevin's laptop and the words appear hesitantly. The interactive board displays a world map divided into different regions indicated by different colors. The teacher is standing in front of the interactive board and is pointing to the legend of the map. "Can you look at the key [legend], what does it say?" he asks. All the laptops are open on the small group desks and the sound of typing fills the class occasionally. Only three laptop screens are visible to the teacher. He walks to the other side of the class, where he can notice some other laptop screens. One pupil moves her laptop to the opposite corner, bends its screen and covers the screen with her body, thereby foreclosing the teacher's gaze. While the map is displayed on the interactive board, Rory

touches the keypad and scrolls through a PDF document, of which the map is one component. Jolie's desktop shifts as her finger slides on the touchpad. WhatsApp messages, PowerPoint slides, a photo album, and Spotify are rapidly shifting with a stroke. With slow steps, the teacher walks to other side of the class and takes a look at other screens as he talks. 'Global hectares,' he says as he draws a square on the whiteboard. 'It is the area,' he adds. The teacher, the slide on the board and the laptop screen are the three main actors that are presenting something and therefore the gazes switch mainly between them.

Although the laptop screen is a vertical plane, just as the blackboard, it does not enact similar relations. The vertical surface of the interactive and whiteboard is mostly static and non-personal. Things appear and disappear depending on what the teacher does, but there is no constant motion of things. The interactive board that projects the screen of the teacher's laptop is put on *freeze* mode (the freeze button on the remote controller), when the teacher is working individually.
On personal laptop screens, however, things are constantly moving. On each laptop screen, there are multiple *desktops* that can be switched with a finger swipe to the left or right (horizontal movement). Moreover, on each desktop, webpages and documents are scrolled up and down rapidly, allowing another dimension of movement (vertical movement).

As argued by Sørensen (2009), the blackboard materializes the centrality of knowledge, by demonstrating it publicly, whereas the one-to-one engagement with the personal screen decentralizes knowledge and enables a more fluid relation. The vertical laptop screen does demonstrate the knowledge in the way the blackboard does, but not publicly. The verticality of the laptop screen in the setting of a formal lesson enables a personal and private interaction with the laptop. However, through the verticality of the screen, the content on the screen is potentially exposed. As indicated in the first and the fourth scenes, the body aligns itself occasionally with the edges of the device *to screen the screen*. The body as such is enacted as a component that is devised by and through the device. The spatial effect of the one-to-one interaction with the vertical screen, and the protecting of the screen with the body, configures a semi-private space in the classroom. This stands opposed to the whiteboard as a space where the centralized knowledge appears on a public screen. Additionally, not only the body acts as an actor that screens the screen, but the laptop itself equally acts as a *vertical wall*. On one side, the laptop screen on the front emits light and captures the attention through what appears on it. Yet, nothing

can pass through its other (personalized and decorated back) side. Hence, the back of the screen operates as a wall here, which separates and creates different types of actor, i.e., actor(s) in front of the laptop vs. the teacher and other pupils on the backside, to whom the screen is not visible.

Through the verticality of the personal screen, the described class arrangements enact specific spatial relations. In the first classroom arrangement discussed earlier, the laptop screen acts as a wall between the teacher and the students. As long as the teacher is in front, she finds herself in what could be called a *zone of exclusion*: she is excluded from the flow of content on the pupils' personal screens. This is to be distinguished from pupils, who are in a *zone of glancing*, which includes both their own screens and that of other pupils. As the first scene shows, the worm game contagiously spreads in the class.

In the second arrangement, however, the direction of attention is clearly signaled. As discussed, this arrangement requires redirections of the gaze and the body between the personal screen and the interactive board. The third arrangement enacts opposite relations between the devices, teacher and students. Here, the teacher is the one who is operating in the zone of glancing, whereas the students are restricted to the walls and thus operating in a zone of exclusion themselves.

Horizontality

[scene 5] The smartphone is in Thomas' pocket, and his gaze is on the Padlet document that is open on his laptop. The Padlet document of all the laptops is shared on the interactive board. In this way, the words that appear on each Padlet are communally displayed on the board. Thomas takes his phone out and moves closer to the laptop screen. His finger moves on the screen until it goes back to his pocket after three minutes and goes back to typing words on the Padlet.

Adams and Thompson (2016) argue that the size of digital devices is a decisive factor in using them in public spaces. Similarly, during a lesson in a classroom, the size of the device, next to the horizontality and verticality of the screen, plays an important role. The smartphone screen flickers under the desk or is used while being protected by the laptop screen. Irrespective of whether or not smartphones are an active part of the classroom (meaning that they are being used as part of the

lesson plan), they can be detected here and there. Likewise, smartwatches silently vibrate on wrists and attract the (individual) gaze.

Now, although smartphones, tablets and smartwatches can be positioned both horizontally and vertically in the classroom, these devices are mainly positioned horizontally. Unlike the eye-level gaze characteristic for working on a laptop, the top-down gaze on the horizontal screen cancels out the immediate environment. While interacting with the laptop screen, pupils can still notice their immediate environment, whereas the horizontal screen of the smartphone significantly limits the visible physical space. The effect of this relation is the stronger coupling of the body with the device, and, more particularly, with the content displayed on the screen.

One of the other distinctions between horizontal and vertical screen surfaces is that the horizontal screen does not expose the content the way the vertical screen does. The horizontality of the screen diminishes the possibility of exposure, and hence renders the space around the device a more enclosed and private one as compared to the verticality of laptops. In sum, the horizontal surfaces enact a more intimate and private surrounding space. Here, the student can enter an *immersive space*.

The space of the classroom

In this section, we will draw on the abovementioned class arrangements to trace the relational spaces of vertical and horizontal screens with regard to the classroom setting. In the first arrangement, the class has a spatial direction towards the large boards. This physical feature of this arrangement enacts a space that is *multifunctional* (Decuypere & Simons, 2016c), meaning that several functions can take place in this arrangement while maintaining the same body posture, e.g., looking at the board, playing the worm game, messaging on WhatsApp and taking notes.

The teacher populates the frontal *region* of the class and, hence, is confronted with many vertical walls (the backs of the open laptops). This means that each personal laptop enacts two regions: a ‘behind’ and a ‘front’ of the screen. On the one hand, the region of the front of the screen is where the content is exposed to the actors, and it equally enacts the zone of glancing. The ‘front’ region is equally where the body itself is being enacted as a ‘screen’ (i.e., as a wall that screens off). This happens when the content should be protected (from e.g., the teacher’s gaze). On

the other hand, the ‘back’ region of the laptop is enacted when the screen acts as a wall, preventing any interaction with the content that appears on the screen, hence situating the teacher in a zone of exclusion.

If the teacher continues to keep the front of the class as her/his ‘home region’, her/his interaction with personal screens and pupils remains limited, as (s)he is then dwelling in the zone of exclusion. Yet, it can very often be noted that vertical walls *mobilize* the teacher to the back of the class, where (s)he can have a better access to the screens. In doing so, the teacher leaves the zone of exclusion in order to be able to enter the spatial zone of glancing that is enacted by these vertical walls.

In the second arrangement, there is no fixed spatial center to the class. Rather, the class is decentralized: there is no front to the class, since the two boards are placed in two opposite sides of classroom. Additionally, bodies are not directed to any of the boards when seated at the desks. Instead, the laptop screens and the boards enact an *interlacing* space. In the second arrangement, the mentioned activities (chatting, looking at a presentation displayed on the board, note taking, glancing at others’ screens) cannot take place in the same space and with the same body posture. Each of these activities necessitates an embodied *tuning in* to space by the pupils. Through this specific arrangement, the teacher is never totally in the zone of exclusion: she can always tune in or out as well. Likewise, there are always some laptop screens that are in the zone of glancing in this arrangement. This implies that, in this arrangement, the space of the classroom endows the teacher with a substantial amount of authority: the arrangement makes that s/he can very easily tune in or out (especially when compared with the first arrangement). The third arrangement has been created to maximize the teacher’s presence (and hence her authority) in the zone of glancing. In this arrangement, all the laptop screens are rendered visible to the teacher, as (s)he is mostly in the region *in front* of the laptops. Equally, all pupils’ bodies face the wall, which indicates other students to be mostly in the zone of exclusion. This arrangement enacts a space of *mutual exclusivity* for the pupils: this arrangement configures the classroom space in such a way that all activities are completely separated spatially. Precisely through the minimization of the zone of exclusion for the teacher, the screen is constantly exposed to the teacher, and therefore actions such as chatting or gaming are not likely to happen on the laptop screen.

The space of mutual exclusivity for pupils specifies the physical configurations of the class in relation to different class performances. For instance, an independent work with devices such as annotating a poem, or making a presentation is performed in a *space of isolation*: all pupils are faced to the wall, with their vertical screen visible to the teacher. This way, the students are detached from the here and now of the classroom, and other actors present in the class. Yet, at the same time, they are *drawn into* the space enacted by their personal screen. In contrast to this space of isolation, where bodies face the wall, and students are situated in one another's zone of exclusion, collective activities require a different physical reconfiguration. In the third arrangement, a collective space is *only* enacted when all the chairs and bodies turn, and all gazes intersect. Whenever the voice is given to the board (i.e., when the big screen starts to 'speak' through the audiovisual displaying of information), or when a discussion that addresses the group as a collective start, the chairs and the bodies turn and form a circle, leaving the laptop screens on the background.

With regard to the horizontal screens, the first arrangement contributes to the creation of *private* spaces that can easily be uncoupled from the immediate environment. These horizontal screens create *in-visible* spaces that are only visible for the individual looking at them. These spaces exist parallel to the collective space of the lesson. In the third arrangement, however, these private spaces are flagged easily, as the individual, private space in front of each desk is exposed to the teacher.

Fenwick et al. (2011) argue that with the presence of mobile technologies in the classroom, the authoritative role of the teacher as the only bearer of meaning is blurred, since meanings are not in possession of the teacher. Instead, meanings are negotiated by participants through collaboration. Hence, cyber- spaces can spatially reconfigure the forms of knowing, sociality and subjectivity enacted through educational encounters (pp. 156–157).

As demonstrated throughout this chapter, the notion of authority is constantly enacted through different spatial configurations. The third arrangement, in this regard, was a willful intervention of a teacher being confronted with how she constantly had to compete with personal devices to maintain authority. The device as such exerts authority, not only on the physical space, but equally on other spatialities, enacted by embodied practices (pupils being constantly tuned in with

different device programs) and by the actors' movements through this classroom space (e.g., the teacher's movements). Therefore, different enactments of space, as being in constant emergence, are intimately related to issues of authority and to the question who can (and is allowed to) perform particular activities.

Concluding thoughts

Advocates of the presence of digital devices at schools argue that these devices encourage individualized learning, i.e., that learning is increasingly personalized, based on the pace and interests of students. Accordingly, it is often argued that this would help them to be autonomous, self-imposed, and self-monitored learners (Fenwick et al., 2011). Personalized and individualized learning is argued to allow students to regulate their own learning rhythm, and style. However, as illustrated in this chapter, different spatial configurations enacted in BYOD classrooms are not unambiguous and are furthermore often in conflict with one another. This has important consequences for how we can consider 'personalization' and 'individualization' in digitally saturated classrooms.

On the one hand, the student is in a certain sense *given responsibility* to *navigate* these different spaces smoothly. However, navigating through the *in-visible, private*, and *collective* spaces, and, at the same time, being in the zone of *glancing* can be a difficult task to handle during a lesson. Personal learning, hence, is a matter of being able to smoothly navigate the different sorts of space that are enacted in a collective classroom setting, which are often in conflict and/or in tension with each another. On the other hand, this chapter equally shows that individualization and personalization only stretch so far and are always co-dependent on the figure of the teacher and the other pupils present in the classroom. As such, the teacher acts as the *monitor* of spaces, who has to mobilize herself in order to keep track of the class practices. However, as it is also noted by Mifsud (2014), through these variously enacted spatial configurations, the teacher's authority is sometimes equally challenged through the enactment of zones of exclusion.

Whereas the regular discourses of personalization mainly focus on customized (online) learning processes, this chapter sheds a light on how personalization and individualization concretely 'take place' at BYOD schools.

This chapter showed how the spatial aspects of classroom activities reveal hybrid patterns and relations between heterogeneous actors. It furthermore showed the importance of understanding to what extent contemporary class- room spatialities are tied to digital devices, sociomaterial networks and the infrastructure that make these technologies work. It seems that the strengths of these elements are so forceful that imagining the disappearing of one of these ties will completely change the spatiality of the classroom.

CHAPTER V

Investigating digital doings through breakdowns:

A sociomaterial ethnography of a Bring Your Own Device school[11]

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Introduction

The presence of digital devices at schools has been increasing globally over the last decade, initially through school-provided devices in computer labs and more recently through individually owned technologies brought to school by students (Selwyn et al., 2017). Reducing schools' financial costs was one of the notable drives for schools in several countries including the United States and Australia to begin incorporating personal devices within schools. Beginning in 2011, the "Bring Your Own Device (BYOD)" model, which was originally implemented in corporate sectors allowing employees to use their personal devices for business and personal purposes at work, became one of the common school approaches towards technology presence and usage (Hung, 2017; Maher & Twining, 2017; Song, 2014).

These personal devices are most often laptops, but depending on school policy, smartphones and smartwatches may also be allowed. This integration has triggered heated debates on the positive and negative impacts of device use in schools, and the question of banning or allowing devices remains disputed. For instance, in September 2018, the French Minister of Education prohibited the use of smartphones and any other communication devices such as tablets and smartwatches in schools and colleges of France. Exceptions include educational usages, extracurricular activities, and supporting practices for students with disabilities (Blanquer, 2018). Other countries such as Ireland (Mcguire, 2018) and Australia (Singhal, 2019), are currently debating whether to ban or allow the use of smartphones in schools. These existing tensions point to the vital and ambiguous role that personal devices play in relation to school activities.

The presence of personal devices in the classroom has opened a new avenue for private firms to develop educational applications dedicated to interactive and gamified learning (e.g. Desmos, Quizlet) and class management (e.g. Classdojo, Google Classroom) (Williamson, 2016, 2018). As a result, current critical qualitative studies regarding digital technologies in schools primarily focus on the analysis of these applications for schooling in relation to policy, governance, and evaluation (for instance see Ratner et al. 2018; Thompson, 2017; Williamson, 2016). However, how digital devices are present at school on a daily basis and what their presence implies for day-to-day school activities is only addressed by a

limited number of studies. For instance, Selwyn et al. (2017) illustrate how device use impacts not only teaching and learning patterns but all aspects of school time-space. The daily school material arrangements, including design renovation, power sockets installations, and the emergence of micro politics and policy negotiations in the classroom regarding device use are some of the mundane and silent examples of this impact. Similarly, observing the continual redesigning of classroom practices with digital devices, Dussel (2018b) points out the more silent arrangements of classrooms, such as the screen which is presented as a synthesizing surface replacing the historical artifacts and pedagogical devices of classrooms like windows, blackboards, and field trips.

These studies suggest that there is a more silent aspect to what digital devices do, an aspect that configures school activities in a specific way and that at present has not been fully investigated. What digital devices do in daily school activities can easily slip into the background, and as a result, tends to be taken for granted. As such, various scholars have called for developing new methods that can provide tools for identifying how actors (namely, digital actors) come about and what specifically they do in (and to) educational settings (Decuypere, 2019; Enriquez, 2013).

Given the prevalence of digital devices in schools, the ongoing debate regarding their use, and the lack of research on their role in school space-time organization, this study aims to tackle the pressing and complex issue of understanding the doings of digital devices at school on a day-to-day and concrete basis. In this respect, the general research interest of this chapter is the silent doings of digital devices at school, and how these doings can be closely scrutinized. In order to pursue this interest, a sociomaterial ethnographic observation of an international school in Belgium was conducted for a period of five months. The school provides a K12 education program and offers international diplomas by adopting an inquiry-based paradigm for learning, focusing on STEM (Science, Technology, Engineering and Mathematics) skills. The observed school implements a BYOD technology model in secondary level where our observations were made. The BYOD model allows personal laptops, smartphones and tablets to be incorporated for lesson activities. Accordingly, G Suite platforms, a particular Learning Management System (LMS) and tailored applications such as Quizlet, Desmos and Kahoot are among software that teachers implement in their lessons. During the ethnographic observation, different lessons such as biology, mathematics,

geography, literature and history were closely studied as well as snack breaks and study slots in the cafeteria and the library.

As a large number of students possess at least two devices (a smartphone and a laptop), the presence of multiple personal devices in a classroom indicated methodological challenges for scrutinizing classroom activities. As such, after the ethnographic observation, our attention was drawn to different *breakdowns* that unexpectedly occurred during the ethnography. As the general interest of the overall ethnographic study was geared towards different ways in which digital devices configure BYOD schools, we came to notice that the analysis of these breakdowns can bring the seamless doings of devices to the fore. Thus, we focused on breakdowns as a heuristic methodological device to provide an entrance point to understand these 'silent' doings at school. In a time that connected devices are increasingly becoming mundane actors in educational settings, breakdowns, by pulling out an actor or series of actors from their ordinary constellation, provide an opportunity to highlight the doings of digital devices. Examples include a device that stops operating, a network connection that gets lost, or routine operations of school that suddenly get interrupted and ordinary patterns and relations that get thereby disrupted.

Overall, then, this chapter argues that breakdowns are rich sources for researchers to unveil the flow of BYOD school practices, by firstly analyzing how relations are reconfigured in the wake of these breakdowns to keep specific practices working, secondly by scrutinizing which practices are perturbed and how and thirdly, by analyzing how new practices are assembled because of these breakdowns. In the following sections of this chapter, we will firstly elaborate on our ethnographic approach. Secondly, we will articulate the significance of breakdowns for studying digital doings in the classroom. The chapter then proceeds to present four different breakdowns that occurred during the ethnographic observation and an analysis of how on that basis the silent doings of digital devices in the classroom can be scrutinized. Finally, the chapter concludes with an overarching analysis of all breakdowns that brings forward a distinct mode of digital doings in BYOD schools. This mode coined as digital pedagogics, sets up the condition for creating a techno-scholastic milieu that is heavily intertwined with digital and infrastructural actors.

Sociomaterial Ethnography *of* school practices

Scrutinizing the relationship between digital objects in general and what they make other actors do necessitates specific sensibilities in ethnographic observation, which are not fully elaborated and explicitly emphasized in traditional school ethnographies. As Vanden Buverie and Simons (2017) note, traditional school ethnographies (see for example Hammersley & Woods 1984; McFadden & Walker, 1997) seek after dimensions of a life *in* school, since they approach school as a static container, in which teachers and students (as active agents) are surrounded by passive objects. These ethnographies place an emphasis on the interactions of humans and the way meaning is constructed through these interactions by humans in an exclusively human world (Röhl, 2012; Vanden Buverie & Simons, 2017).

In contrast to these ethnographies, sociomaterial school ethnographies scrutinize how school is constantly being made through concrete practices that are not *exclusively* organized by and around human actors. In these ethnographies the attention is drawn to identifying particular interplays between human and non-human actors and the effect these relations have. This focus on ethnographic observation attempts to understand different facets of a life *of* school in which school is "a result of the continuous fabrication of things, time(s) and space(s)" (Vanden Buverie & Simons, 2017, p. 117). This approach to ethnography of school practices implies attending to the specific roles of school objects and materials.

For instance, ethnographic observation of classrooms through adopting a sociomaterial approach reveals different significant roles that the blackboard plays in such a setting. Röhl (2012a) argues that the blackboard "temporarily preserves and signifies relevant knowledge and presents it as collectively visible. It thus demands to be written on, looked at and copied from" (p. 116). Additionally, Sørensen (2009) notes how in contrast to the blackboard, working with a digital screen enables students to constantly add and edit what appears on the screen. This possibility challenges the static and authoritative form of knowledge that is presented on the blackboard, and therefore creates a more fluid form of knowledge. In another study, we show how a personal laptop screen comes into being as a vertical surface and is enacted as a shield that separates the space between the student and the teacher (Alirezabeigi & Decuypere, 2019). These studies illustrate how adopting a sensibility to artifacts and their relational embeddedness can shed

a light on the specificities of embodied and online presences, and time-space constellations of learning assemblages (for other examples, see (Adams & Thompson, 2016; Sheail, 2017).

However, as mentioned earlier, scrutinizing the doings of digital devices in daily school activities is a challenging ethnographic issue. Schubert & Röhl (2017) argue that "Technology, even though it is manifestly materialized, fades away from observation and analysis" (p.7). Digital devices establish silent relations, and are often transparent in use, only becoming visible again in moments of breakdown (ibid.). Nevertheless, a study cannot claim *a priori* to approach school activities by observing breakdowns, simply for the reason that breakdowns are radically contingent and unexpected. In this regard, the ethnographer can only bear a sensitivity and readiness towards their happening, and only approach them as a heuristic methodological device *posteriori*. In the following section, the sociomaterial understanding of technological breakdowns is elaborated.

Breaking down breakdowns

The importance of breakdowns, whether unintended, imagined or induced, manifests itself in different realms of research, such as phenomenology[12], post-phenomenology, STS and sociomaterial studies - to name only a few (see Adams and Thompson, 2016). In this chapter, we focus on how sociomaterial scholars have recently started to empirically approach breakdowns.

As digital objects become more embedded in daily routine life, observing what they (don't) do becomes more challenging. Similar to Schubert & Röhl, Akrich (1992) has pointed to the methodological difficulty that lies in describing technical objects by stating "the methodological problem is that […] we have to find circumstances in which the inside and the outside of objects are not well matched. We need to find disagreement, negotiation, and the potential for breakdown" (p.207). This attentiveness towards breakdowns has also been adopted in Latour's

[12] In philosophical phenomenology breakdowns are essential in identifying the unique characteristics of a phenomenon. The well-known example of Heidegger's broken hammer and his analysis on two modes of ready-to-hand where our relation with an object becomes primordial as the tool affords its expected functions, versus the mode of present-at-hand, in which the tool itself comes to light as 'an object separate from us' in moments of malfunction, absence or breakdown (see Harman, 2002). Accordingly, the methods of imaginative variation or eidetic reduction in phenomenology benefit from analyzing the situations where a phenomenon is obliterated from its apparent everyday context.

(1996) explorations of a failed newly designed transportation system in France called Aramis. Similarly, the Challenger Launch Decision by Vaughan (1996) explores the explosion disaster of the NASA space shuttle.

Whereas these studies elaborate on complexities of sociotechnical failures, understanding breakdowns is not *only* limited to and accompanied by grand losses as in the mentioned examples. In this regard, Latour (2005) argues that in general "objects, by the very nature of their connections with humans, quickly shift from being mediators to being intermediaries, counting for one or nothing, no matter how internally complicated they might be" (p.79). Accordingly, he writes about the necessity of *inventing specific tricks* to make objects talk and addresses moments of accidents and breakdown as occasions when silent objects suddenly become loud and quickly "flip-flop their mode of existence" (p.81). By breakdowns and accidents, Latour points to occasions of sudden *absence* of objects from the settings they are embedded in. He denotes the methodological importance of absence through the faculty of imagination for researchers studying specific and concrete doings of human or non-human actors: "every time you want to know what a non-human does, simply imagine what other humans or other non-humans would have to do were this character not present" (1992, p. 229). In this regard, moments of breakdown gain high significance for sociomaterial researchers, not only because they accentuate doings of those objects which are pivotal to the study, but also because they reveal the constant re-orderings and negotiations in order to keep practices working (Adams & Thompson, 2016).

Following this line of thought in educational studies, Adams and Thompson (2016) point to the importance of studying breakdowns, anomalies, and accidents as heuristic devices that make the seamless and uninterrupted flow of practices with digital devices visible. They show how in relation to work-learning practices a broken wireless network confines the user to just one place. Thompson (2018) clarifies how learning on the move has specific confinements that makes certain devices absent (e.g. laptops) in certain public spaces and some others present (smaller devices like a smartphone, or e-reader). By focusing on these so-called 'anomalies', Thompson argues that the presence of digital devices is not only related to what appears on the screen, but also to the screen itself. Hence, she argues that the proliferation of screens and navigating between multiple devices generates invisible practices that reveal, in this case, the absence of the laptop. Similarly, but considering non-digital actors, Sturm and Turner (2018) point to the

significance of researching accidents (e.g. an earthquake) in a university setting. They suggest to approach university as a place in which accidents are accommodated, and not a place where humans are the only actants.

As the above cases demonstrate, occasions to scrutinize silent digital doings are not only confined to moments of technical and infrastructural malfunctions or failures. For instance, on a related plane, Adams (2016) phenomenologically investigates how her broken hand allows her to reveal the gestures of digital writing practices through a heuristic method of breakdown. In her study, instead of a device, a hand is broken. The analysis of this breakdown illuminates the characteristics of writing with keyboard on a digital screen.

In accordance with these studies, this chapter contributes to the current discussions with respect to how digital doings can be made visible. For that matter, we elaborate on the notion of the breakdown as situations in which the routine relational interplay between actors is *interrupted abruptly*. More precisely, in this study, the discussed breakdowns are not imagined or deliberately induced, nor are they merely induced in direct connection with digital devices at schools. Rather, the four breakdowns we present in the form of four scenarios, arose from different unintended accidents during the observation period, each of them breaking a routine of (actor-)networks (either inside or outside of school) and intervening in routine school practices. The first breakdown breaks the routine smartphone policy of the school and introduces a new policy into the classroom that engenders a collective absence of mobile devices. A worldly breakdown is the second scenario, in which a global breakdown outside school walls enters the classroom silently through personal devices. The third scenario points to a 'school time-table' breakdown, in which classes are suspended for an emergency gathering, and the last breakdown is an infrastructural breakdown, where the materiality of the online space is unfolded in the wake of mistaken cable cuttings. We will analyze these breakdowns by elaborating on the invisible relations that surface in their wake and delineate how re-ordering and negotiations try to keep school practices working. Accordingly, the guiding questions of this study include: How do digital *doings* become visible through a breakdown in relation to school activities? What do these breakdowns showcase in terms of the relations among the actors that populate the classroom?

The Orderly Breakdown

There is a basket on the table in the middle of the class, and with the entrance of each student the teacher points to the basket, repeating "phones in the basket". "What is this basket for?" One student asks. "A cyberbullying case happened yesterday. That's why this morning, we have all been given a basket to collect smartphones" the teacher replies. With this new policy, a new responsibility is assigned to teachers: collecting phones into the basket before the lesson starts. Shocked and unhappy to hear the consequence of the case, students mumble quietly and place their phones in the basket. By the end of the lesson, one student cracks the silence about the new school policy. "But I don't understand this rule! What is the difference between a laptop and a phone? We can do the same things with both. You can even get pop-up notifications on your laptop through any app", one student argues. "What do others think about it?" the teacher asks, and a discussion is initiated. The students and the teacher reflect and address their own relation with the device as the discussion evolves. One student states: I feel like I've grown a habit of checking my phone at least six or seven times in the class. I have this brain signal to check my phone, and now I realize that it's not there. It doesn't stress me, but it makes me restless, it makes me want to leave the class.

Students' attempt to articulate their relation with their personal devices merely happens in the wake of the unannounced *absence* of their devices. Throughout the discussion, it becomes clear that the phones and laptops are personal objects which summon the students and thus captivate their gazes. What keeps the gaze captured is the *private and personal stuff* that appears on the screen and enters the physical space of school. "I quitted my social media accounts because I found high incentives to check them regularly and the adrenaline I got for each notification made me very nervous," the teacher adds. Through the rapid flow of these materials, the device instigates a *rhythm* that *automates* some actions. These actions include constantly checking feeds, emails, and messages, or simply turning on the phone's home screen where all the new notifications appear, without taking any further action.

Alhaddef-Jones (2016) identifies three criteria for a rhythmic phenomenon: pattern, periodicity and movement. The criterion of pattern refers to "the organization of the phenomenon as a combination of *stresses* [accents] that stand out in an unstressed background" (p.159). The acts of holding the phone, touching

the unlock button, keeping the laptop's screen light on, and playing with the headphones are distinct patterns of this rhythm. As it is observable in the aforementioned examples, the device pattern encompasses subtle and muted corporeal components. Focusing on this corporeality, personal devices appear to be an extension of the hand, carried and thus present everywhere. The bodily gesture of holding the phone in one hand while doing other activities, either during lessons or snack breaks is a scene that is repeatedly observed at school. "Sometimes I think the phones are glued to your hands" a teacher notes while collecting the phones in another class. This leads us to the second criterion of a rhythmic phenomenon, which is *periodicity*. This criterion points to a rhythm's cyclic repetition and frequency (ibid. 162). Phones which are usually placed on tables or in pockets, draw students' attention whenever new pieces of information flash on the screen, or haptic and audio intrusions such as vibrations and sudden beeps interrupt students' attention flow. Similarly, the computer screen allows for new pieces of information to pop-up on the screen in the midst of other activities. These pop-ups and notifications are the primary indicators of the periodicity of this rhythmic phenomenon. However, the recurring pattern of turning on the phone screen, or surfing on different social media on laptop does not only depend on receiving notifications, and it is also repeated without these external invocations during lessons. As mentioned by one student, the cycle of checking the phone recurs very often during a lesson, which denotes the frequency of the rhythm. This frequency is another dimension of periodicity that determines the intensity and pace in which a pattern is being repeated.

The last criterion of rhythm denotes the movement as a particular way of flowing which *transforms* the pattern into something more than a mere repetition. This movement can be perceived negatively in terms of inconsistency and inconstancy, or positively in terms of renewal or exchange (p.165). This last criterion indicates that although the rhythmic phenomenon has a specific structure that is repeated periodically, it has an unforeseeable dimension as well. The particular ways of engaging with the device and the internet are peculiar for each student and build a sense of freedom that points to this movement. The high frequency of checking the personal device, turning it on for new notifications and touching the screen to swipe and update new feeds in different social media platforms, demonstrates that this rhythm occurs incessantly without students' deep involvement, yet the corporeal dimension of the rhythm entails keeping the personal device *close at hand*. On the one hand, the hand is occupied by holding the device, while the gaze

periodically shifts towards it, becoming engaged with the personal material which constitutes the foreseeable aspect of the rhythm. On the other hand, the flow of constantly changing content on the screen is particular to individuals and is not predictable, which indicates the movement of the rhythm.

This rhythm is highlighted for the students and staff when the basket separates students' hands from their devices. The basket materializes a new policy that encompasses the collective abandonment of digital devices from the classroom during formal lessons. It intervenes in the classroom through the involvement of actors of order (the school head), and points to the suspension of this rhythm.

The worldly breakdown

- Taxis are free in *CityName* now.
- All the other schools in *CityName* are closed.
- Facebook has activated their safety button!
- 26 deaths and injured already.

These are a few sentences that are exchanged between students immediately after the teacher announced a five-minute break to prepare an experiment. Early in the morning right before the start of the school, a terroristic attack was announced in the news headlines. The first class in the morning starts with the teacher's expression of regret about the terrifying incident that shook the country. As the incident just happened few minutes before the start of the lesson, there is no exact information about the scale of the incident and the regular lesson is followed. During the lesson, on the smartboard, the voice of a man on a YouTube video explains through PPT slides how to count degrees of freedom. The numbers and formula appear and disappear on slides with a blackboard layout, while the voice explains the reasoning behind those numbers. At the same time on the individual screens, students are receiving real-time notifications of the worldly breakdown through different news feeds and social media platforms. This breakdown does not happen inside the school walls but is *brought to* the school through personal laptops during the biology class.

In investigating the implementation of technical objects in different contexts Akrich (1992) argues that "technical objects participate in building heterogeneous networks that bring together actants of all types and size" (p.206). According to

her, it is not enough to remain in the realm of technics to comprehensively describe the specific role of these networks. Rather, it is essential to make a constant move between the *technical* and *social*; namely the move between the mechanisms inside the object and how it is designed, and the surrounding context in which it is implemented. To do so, she attends to the way designers *inscribe* different functions into a new technical object based on their own predictions about how these functions will operate in the object's environment. By the act of inscription, designers anticipate the role of new technical objects in different settings. She calls the end product of this work a *script.*

For these inscriptions to be realized in the actual displacement of technical objects, each actor needs to perform according to the script or put differently, *subscribe* to the script. However, the roles of each actor in the context is varied and not necessarily aligned with designers' inscription. Accordingly, *de-scription* is the constant move "between the designer and the user, between the designer's projected user and the real user, between the world inscribed by the object and the world described by its displacement" (p. 209).

In a similar vein, this breakdown allows us to de-scribe two distinct scripts in the classroom: the script of the lesson inscribed by the teacher, and the script of different software features of students' laptops. These scripts "define[s] a framework of action, together with the actors and the space in which they are supposed to act" (p. 208). In this regard, the teacher scripts the class in two ways: First, she designs a *sequence* of different activities that students need to follow; starting by watching a Youtube video, then taking a break and finally, doing an experiment. Second, she assigns the necessary resources for carrying out each sequence. For instance, explaining degrees of freedom is delegated to a YouTuber in Australia, and the experiment is performed by using candy bags and plastic cups to count the degrees of freedom for different candy colors.

As mentioned above, for the script to be realized in the same way as the teacher has designed it, *both* students and devices need to subscribe (i.e. look at the video, take notes, display word processor, etc.) to the inscription of the teacher. In the teacher's script, the student's laptop is present as an educational object, hence it performs in line with the use assigned to it; a means for note taking. The device however is designed in such a way that it can equally function as a *window* to the world, that extends presences, and brings the ongoing news to the lesson

(Decuypere & Simons, 2016c). Latour (1992) emphasizes that "nothing in a given scene can prevent the inscribed user or reader from behaving differently from what was expected" (p.237). In the same manner, in this scenario the worldly breakdown is able to silently enter the lesson through the program of the device. By entering between the instructions of the YouTuber, the news does not disrupt the *sequence* of the teacher's script, but the resources that were assigned to this specific sequence. Moreover, on the one hand students subscribe to the sequence by being silent while they watch the video, and only start addressing what appears on their personal screens when the teacher announces a five-minute break. On the other hand, and at the same time, students subscribe to the script of the device, which allows news actors to metaphorically enter the lesson. By subscribing to the script of the device, the students are ascribed not only as students, but also as citizens and news-readers who are up-to-date with the events of the world at the very moment of happening. The five-minute break is the moment when the device script comes to the surface, and students speak about what they have been receiving during the lesson to each other.

The Timetable Breakdown

An email from the IT manager and teacher was received in the morning before leaving to school:

> […] I had to cancel my Grade 2 lesson today as there was a case of cyberbullying in grade 7 and 8, where I had to do an emergency assembly. I just want you know that it might not be a very productive day.

The routine timetable of the school gets interrupted when all students are asked to gather in the assembly hall. The school head, who is accompanied by the IT teacher starts his talk by questioning about the number of students who use smartphones and more specifically instant messaging applications such as Whatsapp. Almost all hands go up. After explaining the code of conduct at school, he continues: "We will need to read your personal messages in individual cases if problems get bigger. We need then to get involved and act harshly if you don't respect the limits". Afterwards, he asks the IT teacher to carry on with his PowerPoint presentation. He starts his presentation with comparing offline and online spaces as sites of different kinds of action:

Whatever you do online has offline consequences, and everything once done on the internet is traceable and can be recovered. You are not likely to share everything offline. But, your phone screen makes you feel protected, and when you capture a picture on your phone, you are more likely to share it online with others. You do many of these actions without thinking about them and their consequences. In his presentation, online spaces appear to be protected and distant by means of the screen's mediation. According to the IT teacher, the immediacy of online communication leaves no space for hesitation and reflection before conducting an action. The teacher continues that offline spaces are perceived as non-protected spaces that directly involve the immediate environment.

The embodied presence of the other evokes hesitation and reflection, where some actions of sharing and verbalizing are deferred. After this comparison, the teacher demonstrates some best and worst exemplars in relation with online space usage. With these examples, he stresses offline consequences of online actions that are regularly concealed by the screen. Then, he displays some quotes from well-known and successful technology entrepreneurs. These quotes highlight the necessity of device use restrictions for students. Finally, he ends the presentation with the worst cases of internet usage, namely the last shared videos of students who committed suicide as a consequence of damaging online interactions. Displaying the videos of teenage students in front of their device camera right before suicide, and the distinction that is portrayed between the online and offline space, presents the personal device (with all its features such as cameras, messaging applications, and network connections) as a potential threat that can threaten and damage students' lives.

During lessons and connected to the internet, the real time *circulation* of personal and private data among students who are present in one classroom is equally made possible parallel to lesson activities. This casts a light on a significant silent yet seamless aspect of networked devices at school, that is *communicability*. The device in this scenario is presented by the school staff as an apparatus of communication which relates to the concept of communicability as discussed by Lewis and Alirezabeigi (2018) .They elaborate this concept by pointing to the plurality of overlapping windows, emoticons and icons and argue that in these moments of communications "nothing at all is communicated except the simple message that communication is possible" (p.563). As this scenario shows, the private messages between two students could be captured in screenshot format and

transmitted silently among students who were physically present at school during the lesson time. In this constellation, the emergence of the assembly points to the conflicting relations between the communicability of the device on the one hand, and the school's code of conduct on the other hand that firstly turns the device from an educational device to a threatening device that endangers lives. Secondly, these conflicting relations are significant to the extent that they can disrupt the formal schedule and lesson time of the school.

The infrastructural Breakdown

The IT manager is informed about the network loss caused by a mistake during the recent construction works at school. While digging underground, workers discovered the central network fibers and mistook them as remainders of the building's old electricity system. The workers cut the wires, resulting in the school's internet connection being lost. The outage is estimated to last a week, and the IT staff immediately sets up an alternative arrangement to make the network temporarily accessible in one part of the building. In the wake of this breakdown it becomes evident that school activities in this school are fundamentally dependent on the network connection. As Röhl (2019) argues, infrastructural breakdowns are entry points for surfacing what is *infra* in the infrastructure, as infrastructures are not only literally beneath other structures, but they are also mostly beneath the immediate attention. As such, through this breakdown digital doings can be scrutinized and classified as locating the classroom, shaping types of the lesson material and sculpting lesson activities.

Locating the classroom

The immediate implication of network absence is constant location alternations. Through the network disruption, the physical place of the class comes to the foreground as a networked space is required to hold lesson activities. In this new condition, students and teachers have to move in search of another room where internet connection is granted, and the lesson can *take place*. Some classes are moved to the library, where there are no individual desks, blackboard, nor is there a distinct place for the teacher as there is in usual classrooms. Equally, the IT teacher's office without any student desks and chairs turns into a temporary classroom and holds the lessons since it is located in a part of the building that can

provide the internet access (Figure 1). These new physical arrangements do not pertain to the usual setting of the classroom, and they highlight how network access *locates* the classroom and the lesson.

Shaping types of lesson material

"What can we do now?" the teacher asks students with a concerned look. "The weather is quite nice, why don't we just go out and have a class there", a student replies. Since it is not possible for all classes to switch their locations, certain adaptations should be designed in the lesson to hold the activities in a setting that has no network connection. What renders the lessons inoperative in the first place, is the sudden absence of lesson material. The lesson material majorly consists of articles on news websites, YouTube videos, PowerPoint presentations, and gaming platforms produced by parties other than school teachers in this school. The French teacher, for example, makes use of YouTube videos that integrate visualizations and animations to introduce a new set of vocabularies. The geography teacher distributes different websites and newspaper articles for conducting an assignment on the topic of circular economy. The mathematics teacher makes use of an online platform which allows tracking students' performance on solving equations. Connected to the network space, different external actors that contribute to the construction of the lesson material are made present in the class (e.g. teachers from across the world who share their material online, YouTubers, online maps, news websites, and quiz platforms).

In addition to the external material, most of the self-produced material such as word documents are equally created and stored on the cloud and therefore rendered inaccessible without a network connection. The online materials form the lesson in such a way that lesson activities are largely disrupted in its absence. This is the reminiscent of Selwyn's (2017) argument, where he discusses how some teachers use their personal smartphones and private data in times of infrastructural breakdowns, precisely because nothing can be achieved without access to the networked space.

Sculpting lesson activities

Online space does not only provide a huge cloud space for archiving and retrieving the material, thus giving shape to particular types of lesson material, but it also provides a space where online lesson interactions and collective work takes place configuring specific sorts of gatherings. For example, not being able to share the material with students online, the science teacher distributes large sheets of paper to enable group members to work collectively on one shared document. Students gather around the sheet of paper and compare and complete their experimental measurements with those written on the whiteboard. In this way, all group members work on one surface (the A3 paper sheet). The paper sheet materializes students' gathering around a single surface. In groups of three, students sit around the paper, where one member writes down the instructions and measurements which are being read by another member and the final member keeps an eye on writings and verifies them.

The gathering of a group requires that certain tasks are distributed to individual members through written or verbal means. This form of gathering is different from a typical day in this school, when the material displayed on personal screens allows every student to work on the same document at the same time, thus creating a physically separated gathering. Screen-based forms of gathering vary from in-person gatherings in that tasks are distributed among the members differently. The task on the screen is divided into smaller tasks and assigned to each member in a way that each student has to complete the cycle of reading, writing, and verifying individually, without being engaged with the whole task.

In another instance during a history lesson, a text file that is the topic of that day's lesson could not be distributed to students due to the network loss. Instead, the teacher made printed copies of the text for everyone. On a normal day, the text is enlarged and displayed on the smartboard as well as on personal laptop screens. Through the specific spatial display of the text on the smartboard, the teacher uses the scrolling function, explaining the text as she scans it. In this configuration the text is not read, but rather scrolled and scanned for predetermined words. Without the digital copy, the practice is configured in a different way. The teacher asks students to read the text out loud, randomly picking one student after the other to continue reading. In this situation, the printed text enacts an oral form of gathering in which the text is being read collectively. These two examples precisely show

how lesson activities are sculpted in a specific way through the access to the networked space, as well as the features of the device which gives rise to specific practices (e.g. scrolling and scanning) while replacing others (e.g. out loud reading).

In sum, in this breakdown the doings of digital actors come to the fore as devices play a crucial role in locating the classroom, giving specific form to lesson materials and equally curating activities in such a way that lessons encounter serious disruptions in the absence of these actors. This breakdown reveals how the infrastructure goes beyond a set of cables and wires and comes to fore as a fundamental element that renders the lesson (im)possible. This leads us to a general discussion about the embeddedness of digital actors and their crucial doings for contemporary school.

Concluding thoughts

The analysis of the four discussed breakdowns portrays *a specific mode of digital doings* which configures school activities and their time-space organization in a particular way. The term 'mode' refers to specific ways in which digital actors *do* things. In *The Making of Law*, Latour (2010) stresses the importance of characterizing the particular mode through which law holds the social. By pointing to this mode, he argues that although law does not have its specific domain or territory, it is autonomous for producing and arranging the social in its own mode. Likewise, based on our analysis of breakdowns, we argue that digital actors hold school activities in their own very particular mode, that we call *digital pedagogics*. In the remainder of this chapter we will elaborate the characteristics of this mode.

First of all, digital pedagogics denotes the establishment of a specific rhythm which constantly summons students and captures their gaze and attention. This summoning characteristic allows hybrid spatio-temporal organizations to be present during a lesson. Hence, the school time can be characterized as a poly-synchronous time that does not *only* follow the school time-table and the script of the teacher, but it equally follows the *global time* which is synchronized with the happenings of the world out of school (cf. Sheail, 2017).

Secondly, the local boundary of the classroom is highly influenced by digital actors to the extent that physical classroom locations are altered repeatedly by means of

digital doings (as outlined in the breakdowns, e.g. to the assembly hall or the IT office). This characterizes the classroom's physical space as *plastic* (cf. Jones, 2005; Sturm & Turner, 2018). Characterizing the classroom's space as plastic means that the classroom arrangements are not fixed and can be deformed by interventions of digital devices. On a related plane, Selwyn et al. (2017) discuss that the presence of digital devices influences all aspects of school and not only moments when actors are engaged with learning. They rebuke the transformative rhetoric of deploying personal devices at school and conclude that device use is ordered and patterned through already established organization of school, such as rulemaking policies, existing school hierarchies and material arrangements of classrooms. However, this chapter shows that these established and seemingly stable patterns are at times equally disrupted and consequently entirely rearranged through digital pedagogics.

Next hereto, digital school materials follow what could be called a 'data format' in the way they are intertwined with the school's infrastructure and have become inseparable from it. With the term data format, we denote that on the one hand – and in the same way that Jones and Mccoy (2019) argue that students are being made into data through their interaction with digital artifacts – school material is equally *being made into* data. In doing so, many of the cultural, social and political complexities within which these materials are constructed are concealed. On the other hand, digital data are ephemeral, in the sense that they are heavily bound to and dependent on the school's infrastructural compositions.

In the above analysis, the data format of school material was revealed through an infrastructural breakdown, which rendered these materials inaccessible. In that respect, Berry (2016) challenges the common definition of infrastructure as "the basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise" by pointing to the complex of clouds, files, algorithms and codes which are equally a constitutive part of the infrastructure of contemporary organizations. The term *infrasomatization* is introduced by Berry to capture "the capacity for framing or creating the conditions of possibility for a particular knowledge milieu" (n.p), and hence, the conditions for changing existing institutions.

In a similar vein, what digital actors and the network of their relations silently do is heavily tied to the school's infrastructure, which as we discussed, enacts specific spatio-temporal configurations, forms particular lesson material, and creates digital activities that consequently give shape to *infra-schoolization* as a chief characteristic of digital pedagogics. Infra-schoolization is the capacity for concretizing a particular *techno-scholastic* milieu. Developing the idea of associated milieu, Simondon (2017) argued how a technical object creates a distinct milieu around itself in which "the geographical world and the world of already existing technical objects enter into a relation in which concretization is organic" (p.59). Similarly, the ensemble of infrastructure with inextricably interwoven relations that exist between apparent bundles of cords, cables and servers, as well as clouds, algorithms, screens and consequently digital materials and digital interactions are so heavily entrenched in school's daily functioning that a new techno-scholastic milieu is created as an effect.

As such, the infra-schoolization characteristic highlights that the techno-scholastic milieu is composed in such a way that digital actors are indispensable elements of the *schoolish* milieu. Put differently, in this techno-scholastic milieu, the digital and scholastic are not only intertwined with each other, but they are also taken as indiscernible from one another. As the breakdowns forcefully show, in this techno-scholastic milieu, digital pedagogics and the characteristics we elaborated above set the conditions for contemporary schooling and make it possible (e.g. the infrastructural breakdown) but also impossible (e.g. the orderly breakdown) at the same time.

In sum, by investigating different breakdowns, this chapter brought the silent doings of digital devices to the fore. As a concluding methodological remark, it is important to note that a study cannot *initially* claim or aim to approach educational sites through breakdowns, for breakdowns are contingent events that disrupt the seamless pattern of relations. Scrutinizing breakdowns in screen-saturated settings points to another dimension of ethnographic presence in addition to more traditional conceptualizations such as the ethnographer's embodied, mobile and distributed presence (e.g. Landri, 2013). This new dimension is a *distracted* presence which requires a readiness for shifting the ethnographer's gaze from routine practices and instead placing a centrality on interruptions (in case there are any) and relations that emerge in their wake. In this regard, this chapter suggests an approach towards *minor ethnography* in which the redirections of the gaze can

provide a novel lens for ethnographic research. This is in line with what Heimans et al. (2017) point to as a mode of research that is done in a minor key which ultimately involves the researcher's acceptance of uncertainty.

CHAPTER VI

Disentangling Fast School Policy at a Slow Pace[13]

[13] This chapter will be published in an edited volume: *The practice of method: intimate accounts of researching education policy*

Introduction

- It seems to me that when presenting the analysis of your ethnographic fieldwork, you avoid taking normative stands with regards to what school is or should be. As if your research is reduced to descriptions of what happens at school without any critical and normative analytical angle towards what you're observing.

- I can easily detect the exact same practices you describe, such as 'online searching', to take place in a work setting or a family environment. What is then specific about practices that you describe here or their significance when they emerge in an educational institution like school?

- In a way, the only reason that this research is educational or relevant for education is the mere fact that it happened inside a school building. In what way can one claim that this research makes an 'educational' contribution?

These questions capture the heart of the critical comments I (Samira) received when presenting the analysis of our (Samira, Jan and Mathias) research project in different settings such as forums in our department or at international conferences. However, these questions are not only specific to our project; in fact, they constitute parts of the common critique towards studies that adopt sociomaterial approaches[14]. Law and Singleton (2013) note that these approaches are often criticized for having loose methodological lines, as they *resist* strict delineations that could turn them into bullet-point recipes to be followed in textbooks. Furthermore, other critiques warn that sociomaterial studies end up being merely descriptive and empirical, without taking into account the political dimensions of what is being studied (see for example the critiques mentioned in Gorur, et al., 2019). Particularly in the field of education, these approaches are sometimes denigrated to be devoid of normative and political agendas; agendas that nevertheless purportedly constitute what education is about (e.g. see Friesen, 2018).

[14] In this chapter, by 'sociomaterial approaches' we mean the strand of approaches that embraces science and technology studies (STS), Actor-Network-Theory (ANT) and assemblage studies and use sociomaterial as a unifying term to emphasize on their general shared point of view

Sociomaterial approaches in educational studies gained momentum in the last decade, as they brought light to both the social *and* the material dimensions of education, and more particularly to the distributed agency among humans and non-humans in educational settings. These approaches allow researchers to tell stories about the mundane, invisible and often overlooked matters of education. Hence, as sociomaterial scholars have articulated, doing research with these approaches means establishing a *sensibility* or a conceptual toolkit for scrutinizing these social and material relations (Gorur, 2015; Law, 2009). In this light, rich and meticulous *descriptions* that show how particular practices come into being and thrive to hold together temporarily and how they are unmade and remade, gain a critical significance. As Latour (2005) states, "good inquiries always produce a lot of new descriptions" (p.146). However, and reminiscent of some of the critical remarks introduced above, this at times can create a tendency for these approaches to be used in ways that merely map bits and pieces of policy practices without offering solid conceptualizations or normative arguments (Savage, 2019).

Although scholars have been engaged with questions of politics and normativity of sociomaterial research in general, as well as in educational studies[15], we seek to address these pressing questions somewhat differently. That is, through shedding light on the 'hinterland' of our ethnographic research project and associated processes of methodological decision making, we engage with these questions *from the inside.* By showing how a bring your own device (BYOD) policy is performed through the local and slow presence of the researcher(s), we discuss how our sociomaterial approach understands and relates to the questions of normativity in education. The approach from the inside in this chapter lies in adopting a retrospective and reflexive look, while disentangling questions of normativity in our sociomaterial approach and portraying the co-constitutive entanglements between researchers and the field[16]. We look back and scrutinize moments that explicitly highlight how the field and researchers unfolded in the process of research. As such, 'hinterland research' is adopted as a heuristic device to navigate our reflections of method. This is slightly different than engaging with these questions from the outside and with a distance from processes of

[15] see for example Special Issue: A Turn to Ontology in Science and Technology Studies? in *Social Studies of Science* (Woolgar & Lezaun, 2013) and Special Issue: Politics by Other Means: STS and Research in Education in *Discourse: Studies in cultural politics of education* (Gorur & Colleagues, 2019)

[16] We need to note that, the conventional language might suggest clear cut boundaries between entities namely, researchers and the field, whereas as our approach problematizes boundaries with distinct borders.

methodological decision making in which the research itself is constantly taking shape. Even though this approach is theoretically enriching, it might perhaps miss an empirical 'density'. With density, we mean being closely engaged with concrete and daily processes of research*ing* in a way that a posteriori reflection illustrates how concretely real-time and on-site realities are made possible. As such, it is precisely by reflecting on the hinterland of our research that we can respond the critical questions outlined at the beginning of the chapter[17].

In order to do so, we follow Latour's metaphor (2005), in which he suggests that a sociomaterial approach is more like a travel guide than a discourse on method. Like a travel guide, it can be put to use or forgotten. It can be stained with grease and coffee, scribbled all over or torn apart to light fire under a barbecue (p.17). As researchers who stepped on a journey of policy research with this travel guide, in this chapter we will scroll on our travel guide (that is, our methodology) through reflecting and annotating on the unfolding relations between the researcher(s) and the field during the ethnographic observation.

Observing school practices in an international school that implements a BYOD policy constituted the essential part of my (i.e. Samira's) PhD research project, in which Mathias and Jan are supervising. BYOD at schools is a policy that obliges students to bring at least one personal digital device (such as a tablet or laptop) to school for learning purposes. In order to scrutinize classroom practices, Samira did five months of ethnographic observation in one international school that implemented this policy. Rather than reporting on the findings of the project, in this chapter we attempt to bring backstage stories of our research to the front.

Before we start, a final note on our specific understanding of 'policy', and more specifically how we have tried to disentangle the BYOD policy of this specific school. The integration of digital devices at schools through the implementation of BYOD policy has introduced new actors such as devices, platforms and Ed-tech businesses into classrooms. These actors that can directly reach into classrooms, without necessarily being impeded by governmental policy processes, create new policy relationalities, and give birth to a policy condition that is increasingly being termed as 'fast policy' (Peck & Theodore, 2015). This condition explains that policy work is no longer confined to predefined traditional policy actors such as

[17] Even though our reflections might not offer full-fledged and definite answers to these questions, they illuminate tentatively how in practice, these questions are unfolding with and in the field.

governments and ministries on a macro level, or school boards and school directors on a more micro level. This condition enables temporally compressed decision-making processes and fast movement of allegedly 'best' practices of policy between sites that otherwise are not connected nor are they directly related to policy work. More specifically in relation to school policy, fast policy enables us to see how digital technologies that are increasingly implemented at schools are not only related to policy work, but they precisely *do* policy on the ground and in the classrooms (Williamson, 2019a; Williamson et al., 2019).

Within this condition, schools become one of the sites of fast policy work and our ethnographic observation in one international school that implements BYOD policy in classrooms explores micro processes of doing school policy including negotiations between actors or adaptations of regulations with regards to device use. We follow Ball (2000), who notes that "policies do not normally tell you what to do; they create circumstances in which the range of options available in deciding what to do are narrowed or changed" (1834). In what follows we will open up five cases that each portray a distinct relation between the researchers and the field. We discuss how policy and research is being performed through these relations and we wrap up each case by scribbling on our methodology. Finally, we argue how a slow and local attitude can be a rich way of disentangling fast policies at school.

Enacting policies

Mathias: I think you should make a decision in how you're going to research with students. Something like this cannot be just said like that, you need to show how what you choose to do is actually co-researching.
Jan: That is true, and there are different ways to do that. I remember once we asked students to keep a diary of what they did with their phones. But here, in your research, you will probably have the problem of time.
Samira: I'm thinking of asking students to maybe do an encapsulated version of this only during their lesson.
Mathias: Don't forget that what you decide to do should be in line with your framework. Like, how can these descriptions turn students into co-researchers? Isn't what you propose rather a means of extracting data from students?
Samira: No, I don't mean to just ask them to fill in a form or a questionnaire about their activities. I will talk with them about their descriptions and maybe find a way to do something with the overview of actors they write about.
Jan: That might just not work. As you mentioned before, students are really fast in opening new tabs and doing several things at the same time, which is difficult to keep track of while writing down fieldnotes. Also, they probably won't want to write all those things for you.
Samira: Yes, I thought about this as well. Perhaps it would be better if I ask some concrete questions, like what tabs and apps they used.
Mathias: And that turns them into co-researchers? I'm not so sure. In what way does this differ from having a focus group with students?
Samira: No, it's different. I'm not going to ask about their experiences or reactions. I will always try to relate them to an anchor concept, maybe something like different enacted spaces or times on their screens during a lesson?

Fenwick and Edwards (2010) argue that traditionally, research methods are designed to smooth away the uncertain, vague and constantly changing phenomena of interest without always recognizing how methods themselves enact the thing that is being researched. In a way, traditional accounts dismiss how methods decide on what is important to be scrutinized on the one hand, and how this is concealed while findings are presented in the end (like in conferences or paper journals). Moreover, this concealing also happens with regards to the role of what we tentatively called the 'researcher assemblage'. Here, assemblage points to the gathering of heterogenous actors like the faculty of psychology and education,

funding bodies, Ph.D. student and promoters to name a few, that are interconnected and hold together in a temporal and contingent way (Gorur, 2011; Savage, 2019).

As one of us has argued elsewhere in another researcher assemblage (Decuypere & Simons, 2016a), adopting sociomaterial approaches implies that the researcher no longer casts an external gaze on the natural world in order to construct a neutral report that illuminates an objectified account. Rather, researcher assemblages take up a mediating role. That is, they transform, modify, translate and even distort the meaning of what they carry in the process of research (Latour, 2005). Although sociomaterial approaches are more known for directing the attention to the *material* dimensions of the educational settings, *social* dimensions of the researcher assemblage and their interferences in the field should not remain overlooked.

Here, the above dialogue demonstrates how what is rendered important and possible to be investigated, is constantly *negotiated* between different networks. That is, firstly, where we as researchers are situated academically as a doctoral student, co-supervisor and supervisor co-conducting research at the Department of Methodology of Educational Sciences with specific expectations such as the format of a dissertation, the academic orientation and interest of each actor. Secondly, it is equally negotiated through what our adopted methodologies afford us to do and how we can frame them within academic discourses like methodological as well as ontological differences between extracting data *from* the field or co-researching *with* the field. Lastly, empirical and ethical conditions that are surfaced in relation with the field (such as describing individual screen activities) are also negotiated. In sum, although I (Samira) embody the role of the researcher at school, on the backstage the department in which the research is conducted and negotiations and conciliations within the researcher assemblage frame what becomes of the field. In this respect, which relations the researcher assemblage will enter into once being in the field, is not fixed and a priori given, and it is subject to change in different moments and in relation to other actors in and out the field.

What can also be inferred from our dialogue, is that what we are tinkering with, namely how to research policy, in the end becomes the sort of policy that we will end up observing. That means that 'fast policy' as a concept is not a singular and universal concept and it constantly shifts – even though we do not address that when we traditionally fabricate our final accounts. For example, in our own research project, attending to breakdowns as a way of researching policy,

approaches fast policy more as a managerial concept (Alirezabeigi et al., 2020a) whereas in another account in which we attend to classroom practices, we examine 'fast policy' as a concept that enforces taskified practices (Alirezabeigiet al., 2020b).

Enacting data

I enter the classroom I intend to observe before students arrive. After chatting with the teacher about the lesson plan of the day, I choose a seat far from the teacher's desk to be able to observe the totality of the classroom. I don't want to get carried away by the teacher's activity nor do I want to draw students' attention to my pronounced presence. However, surprisingly, when students enter the class, I find my seat isolated from other students. This grabbed my attention and made me sensitive to my own presence and position in the classroom.

I begin to experiment with my seat and also the moment I enter the classroom, like entering when students have already been seated. While sitting at the back of the classroom, one or two students that sit in front of me turn around occasionally during the lesson to check and see where my gaze is focused. It happens a few times that a student changes their seat after a while, distancing themselves from me. Although I am introduced by teachers as a researcher independent of the school staff; that is, as someone with specific research aims who does not observe students' performance, and who equally does not investigate activities at individual level, it is clear that students are not at ease knowing that my seat could reveal their screens to me.

As we – now Samira and Mathias, another shifting researcher assemblage – discussed elsewhere (2019), students' interactions with their personal screens during lessons produce private and individual spaces in the classroom that are protected from the teacher (such as the protection through the back of the screen or swiftly swiping desktops when the teacher gets close to a screen). Even though in the above-mentioned situations, Samira's presence triggers actions that are analogous to actions in presence of the teacher, they are distinct in what they signify. Unlike the teacher, who is mobile in the class, Samira occupies a fixed seat position during the observation which, depending on the classroom arrangement can make a number of screens visible to her gaze. Protecting what happens on screens or changing seats as an effect, vociferously performs the policy of bringing one's *own* devices. That is, activities on the screen are private and devices are

individual properties, hence concealed from the research. But there is also something more than just protecting own activities that is highlighted here.

Students' activity of switching screens in teacher's proximity highlights a fabrication of what the screen *should* be filled with in the lesson's timespace; or, put differently, what the teacher *expects* to see, even though these expectations might not always be explicit. In this sense, the teacher's proximity interrupts some screen activities and manifests others, which directs our attention to how the device is constantly imbued with normativities and expectations. Accordingly, the practice of swiping grants an educational capacity to the device, even though temporarily. What we mean here, is that the device becomes stabilized as a school*ish* (Masschelein & Simons, 2013) object in moments when the teacher is around, whereas the same device is rendered as private and personal for Samira.

Juxtaposing the above activities with those of changing seats or protecting the screen, shows how activities are navigated on the screen according to the (expected) gazes that *might* have access to these activities, and so, these gazes enact the device differently: either as a schoolish device or a private one. What is also important to note is that the researcher's gaze does not interrupt screen activities (as teacher's gaze does); instead, it mobilizes students and screens so that activities can precisely be sustained. We see in these performances that objects are never alone and self-standing and, thus, that what they achieve to become can and will vary in different networks of relations. The multiple ontological status of devices as private or school*ish* objects, conveys that there is no 'device' separated from the specific and local practices that are performed: it is precisely those practices that bring multiple educational realities to life. The above descriptions forcefully show how devices become complex and multiple objects, in some cases even show seemingly mutually exclusive ontologies (private vs educational).

The description of these different navigations highlights that the very *local* presence of the researcher first performs the BYOD policy in a specific way, but it also modifies what *becomes of the data*. The local presence of the researcher indicates that there is no data as such waiting to be extracted, rather, data is being co-constructed through interactions between the researcher and the field.

Enacting hostility

Talking with the physics teacher before the lesson and introducing my research and its aims, I understand her frustrations with the use of personal devices during her lessons. "For my course, laptops help in faster notetaking, but apart from that they don't really serve my lessons. Well, yes, exercises are also mainly on-screen, but I know that when I am at the whiteboard, students are busy with personal occupations, and well, there's nothing I can do about it. I find myself having to circle around them". Right before starting the lesson, she introduces me as a researcher who's going to observe the classroom, check and control what students do on their screens and that she would be curious to hear about my observations. It is as if a glass of cold water is poured on my head together with an immediate feeling of discomfort. She introduced me differently than how I introduced my research purposes to her a few minutes ago. I don't want to interrupt the teacher and intervene. Instead, I take a seat, pondering if I can continue my observations in this class with this introduction. I feel that this mis-presentation is going to change things for the observation[18].

We found ourselves in the middle of a tension between devices, students, the BYOD policy and the teacher. In this tension, the teacher takes up the role of the research's spokesperson by introducing Samira and associating an act of monitoring and reporting as an element of the research. In this ordering, two distinct realities come into being. The first one is a reality 'of the field' and points to a hidden and implicit micro policy that the teacher enacts. That is, she defines and orders the encounter of students with Samira. In other words, she attempts to impose and stabilize the identity of Samira's work (cf. Callon, 1984). On the other hand, the assigned identity serves as an implicit inscription of students' activities before the observation starts, by underlining that what happens on personal screens will be monitored and reported. Relying on her frustration with device use, it seems that the teacher tries to pull the researcher out of the researcher assemblage and insert her into her own preoccupation with disciplinary work (ibid).

At the same time, this signifies a repression of the formal school policy that allows personal devices and hence, personal activities in the classroom. The teacher's micro policy that represses the formal policy is hidden and implicit, since she does

[18] In the end, after this first session, I decide to stop observing physics lessons.

not directly delineate what is (not)expected to appear on screens, and it equally showcases an indirect inscription of what Samira should (not) *see* during her lesson.

The second reality is a reality 'of the research', and it comes into being through identifying 'what research is' by delegating the roles of 'monitoring' and 'reporting' to Samira. This description of research is different from the one tinkered with in the department of research methodology of education by the researcher assemblage. Through this misalignment, it can be argued that 'what research is' is a contingent process that cannot be fully defined in advance in our department, independent of the field.

The above descriptions show how, similar to the research that interferes in the field, the field as such equally interferes in the research and establishes unpredictable relations that affect the direction of research, like the result of this encounter and our decision not to continue the observation of physics lessons since Samira's presence was undermined by the association with surveillance and monitoring.

In sum, this vignette shows how the field evolves in a specific way in relation to the presence of another entity that is research. The delicate encounter between the field and research is unexpected, everchanging and at times *hostile*. Ozga and Gewirtz (1994) point to this delicate encounter on the researchers' side; the encounter is a constant challenge between accessing data on the one hand and avoiding exploitation of any research subject on the other hand.

As a result of this very specific and local encounter, a network of actors (try to) conceal certain aspects of the BYOD policy enactment namely, what happens on personal screens. These concealing performances specify something silent and unspoken about school that is being realized constantly.

Enacting interests

S[19]1: So, you think the old system where we could have our phones is better?
T: Yes, Yes, I do, but I also do believe that a good school is where the staff works as a team, rather than an individual saying: "Nah, I'm not going to do that, you guys do whatever you want" and make other colleagues look like a bad person.
S2: So, what you are telling me is that a teacher should work like in a communist party? (Students burst into laughter and mumble things)
S3: Why would you compare it to a communist party?
S2: Well, a communist party asks for a hundred percent solidarity.
T: It's not a hundred percent, I know some teachers are much stricter on some issues than others. I think if a rule is established, it's established in a serious way, and It's my job to just support the school with that. But it works in business too. If you work for Google and you start doing something that doesn't fit their vision, you'll lose the job, right?
S2: I guess, but I don't know… I still think teachers should voice their opinion.
T: Believe me, I voice my opinion out of the classroom. You know voicing your opinion does not mean you bully your way in a situation where everyone does everything you say. It's democracy, and it's not a communist party. There is a forum for discussion, and I am one of the teachers that always voice my opinion very strongly. It doesn't mean that it happens the way I want it to. Personally, I think we are better persons without technology. I am not preaching my own preferences here but think about all the doors that will be opened to you once you get used to not having your phone around.
S4: Then we should get less homework, because our time at home will be more spent on catching up with our phone.

The discussion continues until the teacher abruptly turns to me and asks if I have anything to say as a PhD researcher focusing on digital technologies at school. He then asks specifically for my opinion on the device use in the classroom and if it is scientifically disadvantageous for learning. Surprised by an unpredictable expert role that I am assigned to, I respond: "I am curious to hear your thoughts on how this change would influence classroom activities?". I don't want to give any opinion and am not sure if I have any opinion at this point, which probably makes me look like an incompetent researcher.

[19] S: Student, T: Teacher

These dialogues are parts of a discussion during the literature class when school's BYOD policy faces some unexpected changes. In this policy adaptation, students are not allowed to have their smartphones at proximity during lessons. Thus, the presence of smartphones is problematized in light of this change in policy, and the discussion in these fieldnotes reflects how students, personal devices, homework, teachers, staff as well as the research relate to this policy adaptation. In this discussion, policy is talked about as a *rule* and in relation to the school staff as *rule makers*. Here, we can trace how policy making, and the way other actors get connected to it, is linked to the question of 'what school is'. School, in this discussion, is portrayed as an organization that embodies a particular political order such as communist or democratic, as well as corporation decision making processes.

In such portrayal, each actor negotiates his/her/its way to their own wishes through different discursive devices, such as the amount of homework or the doors that get open when one is not attached to their phone anymore. Here, the teacher invokes Samira to intervene and participate in the discussion by urging her to bring in scientific insights of her research. In doing so, he grants an authority to both the researcher and the research as entities that are capable of effectively disentangling normativities around the device.

As it unfolds in this anecdote, personal digital devices are positioned in a way that their presence needs to be decided about, both through the decision of the staff in keeping phones away during lessons, and also through the teacher's personal but general description: "we are better persons without technologies". It is within the similar positioning that the teacher's interpretation of Samira's work is generated as disentangling the normativities of digital devices at school, and hence is aligned with his own interests of knowing the (dis)advantages of personal device use during lessons. It can be argued that an interressement (Callon, 1984) is formed which translates the images and concerns of one world into another, in order to consolidate an alliance. In other words, the teacher and his concerns about digital technologies in general are translated into the images and concerns of another world, Samira's work and her interest in digital devices in the classroom (Piattoeva et al., 2019).

By asking questions about students' device use, the interessement is successful, but only to a certain extent. On the one hand, it constructs an alliance between Samira, the teacher and devices and by enrolling Samira to an expert academic position. On the other hand, it does bot achieves full success since Samira responds by asking questions instead of giving answers regarding the normativity of digital devices. This unexpected interference of Samira in the field performs BYOD policy as a sporadic and discontinuous entity that explicitly problematizes norms whereas in the previous cases these norms are rather unspoken and hidden.

Enacting mapping

"Okay, let's take a look at all digital spaces that you described on your screens the other day," I say pointing to the PowerPoint slide of different bubbles I made after reading student's descriptions of their screen activities. "The bubbles you see here are the digital stuff of your geography class. Some are bigger than others because more of you have worked with them, like Spotify. Let's look at their sizes and types and try to see how we can relate them to each other and to the task you had to do during that lesson" I continue and wait to see their responses. "Oh, I didn't think 9Gag would be a big one", one student reacts. We start to scan different bubbles and I support their statements by asking questions that can bring forward different dimensions (such as sequential) of the bubbles. "For example, the twitter bubble could say something about the complexity of the task. When tasks are short and the given time to finish them is more than what we need, checking twitter is a matter of waiting", one student says. "Also, listening to music distracts me from being distracted even if it has lyrics. It's a simultaneous act of music and doing a class task", another student adds. The map gets more complex as we draw connections and some bubbles converge, whereas others remain isolated.

The above fieldnote portrays parts of a discussion we had with students after their geography lesson. Prior to this discussion and in order to investigate screen activities with students during a lesson, Samira discloses her own screen activities to students. She screenshots her screen activities such as taking notes, emailing Jan and Mathias as well as occasionally checking social networks during a day of school observation. This way she shows how different times and spaces are enacted through her screen activities. The next step is an exercise conducted with students where they described their own screen activities anonymously on an online shared

document during a geography lesson. After this exercise, different actors are aggregated and assembled based on students' descriptions.

This anecdote brings us full circle and illustrates how our first anecdote is enacted in practice. Here, both BYOD policy and research are performed through a mapping exercise which reconfigures roles of actors, namely, digital devices, the researcher and students. As it is made clear by now, personal devices in their immediate presence at school engender personal activities and hence, private times and spaces. What appears on devices is generally undisclosed and the way they are talked about at school is positioned in an implicitly normative structure.

In this exercise however, personal and undisclosed activities are turned into impersonal and public matters[20] while being described anonymously on a shared file. Assembled screen activities that are positioned within a relational interplay and entangled with other actors, produce multiple times and spaces that are brought forward as a result of this exercise, such as waiting time (checking twitter) or focalizing time (listening to music). It can be argued that during the mapping discussion, devices are then enacted as a *gathering* (Sayes, 2014). In other words, devices are not separated and isolated entities; rather, they are made up of multiple entangled layers of different temporal and spatial orders. Here, focusing on multiple activities and relating them to other actors such as the task at hand allows us to see devices as gatherings of variable actors (such as 9Gag, twitter, Spotify, etc.) variable times and spaces.

Mapping is known as one of the tools of sociomaterial toolbox that helps to study different assemblages in the making. In school education, it is argued that mapping brings students into more immediate contact with contested issues (Elam, Solli, & Mäkitalo, 2019). As such, it *re*configures the role of actors temporarily. As mentioned, devices are opened up and enacted as a gathering, they are taken away from their immediate network of relations. Students take up the role of an observer of policy performances by describing what appears on their screens and mapping their activities with relation to other actors. Samira equally takes up a pedagogical role, though a marginal one, by implementing mapping as a pedagogical approach that allows for studying the BYOD policy performances with a distance from its

[20] Each student was associated with a number and they could read or comment on their activities. Samira could also write real-time questions for specification or communicate with students through the shared file. The teacher didn't have access to the file.

immediate effects. The ensemble of this exercise attempts to make a particular way of seeing and investigating visible, which is not otherwise present in the field.

In sum, by bringing screen activities to the foreground through describing and relating with students, BYOD policy is enacted within a different normative order which does not entail 'appropriate' vs 'inappropriate' or 'good' vs 'bad'. This brings us to the concluding part, which will inquire on the way policy can be studied through its specific performances.

Concluding Thoughts: Disentangling Fast School Policy at a Slow Pace

These ethnographic anecdotes illustrated *how the researcher(s) become(s) with the method and the field* in multiple ways. Through the presentation of the above cases, we argue that our research is not merely *about* policy, but the above cases precisely show how the research becomes *of* policy in a strictly *local*, *slow* and *surprising* manner. The discussed enactments of policy are all performed in a minor key; that is, they are very particular and avoid grandiose policy theories. As Heimans and colleagues (2017) articulate, minor key policy study is "interested in small concepts and limited heuristics and involves fewer findings and more uncertainty" (p.189). The anecdotes are thus concrete moments of methodological decision making that are reflected in retrospect as they slowly and delicately unfold.

This way of looking at policy gives full power to the situation and the way a policy is concretely practiced in situations that might not seem to be policy related at first sight. Researching policy in a minor key, then, contributes to methodological and conceptual challenges of 'fast' policy studies where non-human actors and Ed-tech businesses become a significant part of what happens in the classroom. In this situation, policy becomes very specific and almost none existing outside of its performances. What can be seen forcefully, as we scrabbled our 'methodology-in-practice' through these anecdotes, is how policy research becomes an irrevocable joint product of the researcher assemblage *and* the field in which the researcher assemblage *is both the author and the discoverer, simultaneously active and passive* (cf. Pickering, 2008).

Following the concept of fast policy, non-human actors (e.g. Spotify, 9Gag, smartphones, G suite, etc.) can directly reach into classrooms through BYOD school policy and hence, do policy on the ground. In this light, we argue that disentangling fast policy requires *local* presence and *slow* tracings of classroom practices. The performances of policy we traced here perhaps can only come to the surface once the research is sensitive to ethnographic surprises and once it stops taking the lead(cf. Law & Singleton, 2013). This is another way of giving voice to slow processes of policy, as these processes are *distractive*. That is, new things cannot be seen merely through the attentiveness towards what we researchers anticipate to see. This goes hand in hand with what Law and Singleton (ibid) argue; if one looks for normativity of devices in the field, they will find it. The danger of this approach might be that unexpected forms of normativity might be neglected or negated because they are not of interest or they are dismissed in the shadow of known structures of normativity in education. As such, sociomaterial approaches do not seek to build a body of theoretical concepts to explain how normativity needs to be understood, rather they seek to see how normativity is *done* (Decuypere, 2019).

With this last point, would like to circle back to the questions we started this chapter with. We hope to have shown that sociomaterial approaches address normative accounts not as universal and a priori statements about how school or devices should be, but to show that normativity is enacted in multiple ways through negotiations between actors and the simultaneous interplay of (a local, slow and distracted) research and policy. The state of distraction, however, cannot be planned for a priori. It is only after the processes of observation that it can be pinpointed through manifestations of passivity that does not attempt to take possession of an ongoing situation. As we saw in the case of the physics class (where Samira is introduced as a monitor) or the literature class (in which she is invited to intervene as a policy expert), there is a sort of passivity to be traced that does not aim to take control or possession over the situation (by intervening or contradicting the teachers) even though aligning with a priori research plans would necessitate that.

Reflecting on the hinterland of our sociomaterial study persistently sought to show (with relation to normative or political stands of devices, of school and of research) how we can do away with dualities that a priori norms carry. Dualities that define bad or good, appropriate or inappropriate categories that exist independent of

policy performances. Rather, what we showed is that reality is multiple, heterogenous, decentered and it is never already out there (Law, 2004). In this way, the abovementioned policy performances try to enact realities by attending to the hinterland of research where the researcher assemblage is constantly configured, both actively and passively. Similar to Rimpiläinen (2015), we argue that the process of research enacts multiple realities and participates in the new scientific realities-in-the-making (p.144). This means that our methods do not merely describe the world, but they actively participate in generating new worlds. In this regard, and as shown in our first anecdote, the researcher assemblage hugely contributes to the generation of these realities, and regarding its composition can describe *educational* realities (and not just societal or political realities). This view then leads us to conclude that there is no school separate from practices and relations that *do* school or policy (cf. Law & Lien, 2013). The educational order then, becomes very local, provisional, specific and as we see in our anecdotes also sometimes implicit.

This account showed that digital devices act in a variety of forms as they are enacted in policy performances, but they are never alone and all by themselves, what they are able to do inevitably depends on other connected matters that may do something with. As Woolgar and Lezaun (2013) argue, we need to keep in mind that the purpose of researching ontology is not to arrive at a better formulation of the reality of the world, or of the ways in which the world is real, but to interfere with the assumption of a singular, ordered world, and to do so by re-specifying hefty meta-physical questions in mundane settings and in relation to apparently stabilized objects (p.323). Here, we tried to show how the researcher assemblage is constantly – willingly or not – doing ontological politics (Mol, 2013), where the research performs the world (and not only 'extracts' data from the world), and that, at the same time, the world performs the research.

CONCLUSION

This dissertation aimed to understand how schools' integration with personal digital devices and technologies (re)configures classroom practices. In posing the empirical question of *what is going on at schools that implement BYOD policy*, which was the point of departure of this research, *methodological* insights that sociomaterial ethnographies provide to investigate screen saturated educational settings were equally developed. Moreover, this study conceptualizes how classroom practices in a BYOD setting, and more broadly, digitization of school education can be understood. In the following sections, firstly, these methodological insights will be elaborated. Secondly, the empirical and theoretical contribution of this study will be developed and lastly, the relevance of this study for the current 'emergency education' will be reflected.

Methodological contribution

Navigating sociomaterial ethnographies with heuristics

As elaborated in the introduction, even though sociomaterial approaches provide a powerful toolbox to sensitize our ethnographic gaze in tracing relations between actors, there is a danger of falling prey to what is called 'sociomaterial determinism' that explains educational practices in the same way over and over again (cf. Decuypere, 2015). Phrases like 'material objects actively contribute to the composition of classroom practices' can be reproduced generically and they tend to merely end up *telling that* this is the case, rather than *showing how* material objects become an active contributor. As Decuypere (2019) argues, most of the time, studies need to "transmute the conceptual repertoire" and develop new terms that enrich the already present conceptual repertoire (p.3).

In this respect, the term 'heuristic devices' was deployed as a concept to methodologically help this study to go beyond the mere explanation of classroom practices. Heuristic devices are methodological starting points that resonate with the study at hand. By bringing a sensitivity to an aspect of a setting, like space, time or breakdown, they help to further investigate the specificity of classroom practices. As much as heuristic devices are a starting point, they should not be considered as a strict and prescriptive approach to the investigation (cf. Adams & Thompson, 2016).

In this respect, the concept of fast policy as a heuristic device (first chapter) was a way of *contexting* (Piattoeva, Klutas, & Suominen, 2019) the study within the network of local and global actors. The concept enabled the ethnographic gaze to shed light on actors in the classroom who might literally be absent in the classroom, but they are strictly connected to it, and decide how in classroom practices look like. In this sense, the concept of fast policy sensitized this research to see the movement between the local and the global within the classroom practices. The heuristic of agencement (second chapter) as one of the sensitizing devices is mainly known in economic studies. This study sought to re-introduce the concept of agencement to the field of educational studies and it portrayed the significance of this concept by sheding light on the agential power of practices. That is, instead of emphasizing the distributed agencies of *actors*, agencement sensitizes researchers to the agential power of the assemblage, which points to the capacity of forming (Gherardi, 2016). In this sense, the re-introduction of the concept of agencement in the field of educational studies helps to specify educational *forms* and what they do. In this study, the deployment of this concept led to the conceptualization of a taskified form of schooling as one of the empirical contributions of this research.

As Decuypere (2019) argues, STS studies can make use of *other* repertoires to enhance our understanding of educational phenomena. In this respect, this study introduces the concept of timescape (third chapter) as a heuristic device to sensitize us about the temporal configuration of practices. Whereas sociomaterial studies are more engaged with the spatial configurations, timescape can offer a lens that is specific to temporal relations and allows researchers to capture different sorts of produced time. Moreover, social topology (fourth chapter) as an emerging discipline can enhance our understanding of spatial configurations of educational practices and forms. The heuristic of breakdown (chapter five) on the other hand, highlighted how these practices could be deformed but not nihilated. As such, it allowed to see how some actors are rendered central for keeping these practices stable. Finally, the hinterland gaze towards methodologies was the last heuristic device that sensitized this study to have a posteriori reflection on methods. The next point of this conclusion is more specifically directed at the challenge of observation in screen-mediated settings.

The distracted presence and researching posteriori

It's my first week of observation and practices are still ambiguous for me in classrooms. Sitting in the classroom does not reveal much of what is exactly happening. Even though some teachers write their lesson plan on the whiteboard, there is not so much talking going on about it. The classes are usually silent, especially when everyone works on their laptops and that consists of a great majority of the time. The teacher sometimes communicates with students through the LMS, for sending exercises, instructions and resources, but without being connected to the group's LMS space or the teacher's screen, I can hardly know what is happening and talking about it only reveals so little. Everything is passing through the screen, and I don't know yet how my embodied presence in the classroom can observe those interactions. Sometimes I thought a camera might do better observation or screen recorders on students' screens. But then, what am I doing there?

Parts of my train notes from the school back home during the pilot study

Sociomaterial approaches are strong theoretical and methodological frames to explore the *social* and *material* dimensions of contemporary educational settings, including the case of BYOD classrooms, which are hugely screen-mediated and produce distributed and decentralized times and spaces (which we elaborated upon in chapter three and four). The strength of sociomaterial ethnography lies in tracing meticulously the patterns of relations established between various actors of the classroom and elucidating activities they *make* other actors *do*. This was, however, a tremendously challenging task to observe ethnographically. Not only was observing the doings of approximately fifteen to twenty laptops and smartphones in one classroom an empirically impossible mission for the ethnographer's gaze, but also as Latour (2013) in his *An Inquiry into Modes of Existence* demarcates, "the technological object is opaque, and—to put it bluntly—incomprehensible" (p.222).

He continues by emphasizing that the technological object itself cannot show us how it re/arranges practices; hence other methodological strategies are needed. "[I]t is always necessary to look besides it: first, between the object itself and the enigmatic movement of which it is only the wake; then, within the object itself, between each of the components of which it is only the temporary assemblage"

(ibid). While Latour talks about technological objects (e.g. a complex engine), it can be argued that digital devices are similarly technological objects with multifaceted complexities to be observed ethnographically (Tummons & Beach, 2020). As such, scrutinizing how *relations around* digital devices as *physical objects* make other actors do specific actions or generate practices is only one of the points of focus in classroom observation.

Latour (2013) continues that "[t]echnology always entails folds upon folds, implications, complications, explanations. Its canonical representation, thoroughly studied by the sociology of technologies, sketches it in the form of a series, often a very long series, of nested translations, a labyrinth" (p. 228). The folding character of digital devices can especially be traced in contemporary discussions of ethnography about whether or not ethnography in its traditional interactionist sense can have the same relevance and significance in revealing how school digitization is being done by the work of algorithms, big data and online platforms (see for example Beuving, 2020; Seaver, 2017; Tummons & Beach, 2020). These aspects increasingly complicate the question of classroom ethnographic observation, especially when enactments and performances of each platform, app and other digital products are choreographed (cf. Decuypere & Simons, 2016c) simultaneously in classrooms.

My train note at the beginning of this section addresses this challenge and how this was manifested through the ethnographer's *presence* in classrooms. Decuypere (2015) concludes his dissertation by pointing out that talking about 'digital' (or socio-digital) actors in general terms is misleading. Instead, *specific* actors such as a particular LMS or a learning platform should be scrutinized independently, and their performances in the classroom should be observed. Whereas this is a valuable and significant point, I question how sociomaterial ethnographers can observe classroom practices as these specific actors are all gathered yet distributed on individual screens. In this situation —since the research questions were translated into identifying specific configurations of classroom spaces, times and practices *in their collectivity*— following the LMS of the school or specific platforms or individual students could not help. As such, developing methodological *tactics* and *tricks* that allow me to unfold the operations of (socio-)digital actors in shaping classroom practices (in a way that both the *collective space and time of the lesson*, as well as the individual space and time that *screen interactions* created, could be accounted for) was a challenge of this dissertation. These challenges can be traced

in chapters three and four. Whereas chapter three focuses on temporalities of personal *screens*, it loses the grasp of the interventions of the actors present in the immediate environment (e.g., fellow classmates, the teacher) and how they contribute to the production or prevention of the developed temporalities. Similarly, while exploring the spatial configurations of classroom practices, the attention is chiefly paid to the spaces produced in the immediate environment and the screen space is dismissed.

Landri (2013) engages with the problematics of the presence of the ethnographer in the field, as classroom practices become increasingly decentralized from the here and now of the local classroom towards distributed screens and online platforms. He redefines how the ethnographer's presence can be understood in terms of 'here and there' instead of the traditional and limiting understanding of 'here and now.' In this sense, digital locations and interactions become new terrains of inquiry for the ethnographer, in which she can mediate her presence as embodied, mobilized and distributed. In line with these tactics of distributed and mobilized presence, another aspect of ethnographer's presence in screen saturated settings was developed, which can help in bringing the incomprehensible and invisible of digital devices to the surface and that is a *distracted* presence. In the following section, we elaborate what a distracted presence entails and how its implications can serve as a tactic to unfold processes of digitization of classroom practices.

It is important to first delineate that by a distracted presence, we do not mean that the ethnographer is *not* attentive to what she observes. Here, distraction is not perceived as the opposite of attention or a mere diversion of thought or direction. Put differently, distraction is not understood as an absence of a quality (North, 2012). Rather, it is a state understood affirmatively in its own terms, in which the embodied presence of the ethnographer in the labyrinth of flickering personal screens encounters unexpected *shocks* that redirects the ethnographic gaze. The shock effect can be generated by accident, such as a terroristic attack in the country or disruption of a cable at school, as discussed in the fifth chapter. It can also be the result of designating an unexpected role to the ethnographer by a teacher, as discussed in the last chapter. Even though the direction of the shock in these examples are different, the first type does not address the ethnographer explicitly, whereas the second one is in direct relation with her, it is the reaction or the attitude of the ethnographer towards these shocks that makes a distracted presence another

characteristic next to the embodied, mobilized and distributed presences that can reveal the invisible and implicit relations that digital devices can establish in the classroom.

In reaction to the shock effect resulting from accidents and unexpected roles (as in the above examples) the ethnographer can, as a first reaction, ignore and cancel out the shock effect of this encounter, focusing on stabilized practices (in the case of a cable cut in chapter five). As a second reaction, she can also resist or reject by interfering in the field (talking to the teacher or talking to students for reclaiming her role as discussed in chapter six). However, as a third reaction, she can also embrace this incident of a shock to suspend what her a priori research goals are directing her and get ready to explore what this shock is opening in relation to the phenomenon of ethnography. That is where the distracted presence comes into play. Being sensitive to ethnographic 'shocks' is distractive, as they redirect the gaze from predetermined goals, but they equally make an openness. Distraction, here, is perceived as readiness and alertness towards the unexpected (of the field). A kind of yielding or not attempting to take control is at stake in this presence. This type of distractive shocks interrupts and suspends the *specific* focus to the stabilized practices of the classroom and stabilized plans of observation. Instead, it makes a *general openness* towards unexpected events and unplanned directions. In the last chapter, the policy performances in light of the researcher's presence at school were discussed and how the network of relations with the researcher as an active participator of the setting gives shapes to specific normativities about devices. These normativities would have remained invisible if the attention was only directed to predefined research goals.

However, distraction is a peculiar state as it cannot be steered, nor can it be planned ahead. As argued in the last chapter, the ethnographer's distracted presence does not aim to take control of the situation when she is asked to actively participate in the field or to accept a role that is assigned to her. As such, a sort of *passivity* that is an implication of a distracted presence comes to the foreground that can only be traced in a *hinterland* of the research and as *posteriori*. As argued in chapter five, it is through the distracted presence that a readiness towards accidents and breakdowns can be embraced by the ethnographer. In sum, this study suggests a nuanced approach to the understanding of ethnographies of digitized school where canonical ethnographies fall short in describing the manifold of relations.

Empirical contribution

Taskified schools; the schools of tomorrow?

The core of this dissertation was the empirical question of how classroom practices are assembled with personal digital devices and what is specific about these practices. In this respect, the second chapter gave an overview of the composition of common classroom practices. This chapter cast an all-inclusive gaze on the totality of the observed lessons, and it described how common practices between different subject matters are configured concretely and get stabilized as they are practiced on a day-to-day basis. As such, the chapter demonstrated that not only tasks are centralized as the core component of the classroom, but through task-agencement a form of taskified school is being enacted. The taskifeid form here conceptualizes how a type of continuity is being shaped and sustained. In putting forward this form, personal devices play a distinctive role as they configure specific times and spaces that the third and fourth chapters dealt with. Lastly, the fifth chapter surfaced the silent aspects of digital doings and demonstrated which actors can interrupt or deform these practices.

Tasks are assignments or exercises assigned to students by teachers, which can entail making a PowerPoint presentation on a topic, doing a set of math activities on a learning platform, annotating a poem or answering a set of questions. One of the elements that distinguishes tasks from more common terms, namely exercises and assignments, is the incorporation of digital devices and web technologies in how these tasks are both designed and conducted (Bhatt, 2017). Tasks divide and structure the lesson into two distinct parts. First, is a collective part of contextualizing and introducing a task and second, is a more extended part of conducting the task, which is mainly done individually.

The introductory part of the lesson is done in collaboration between the teacher and the interactive board on the collective space of the classroom. The teacher, who has selected a set of online resources among YouTube videos and online presentations, delegates the work of elaborating the topic of the task to online materials. She equally instructs students how to relate to the material. Fyfield and Henderson (2020) discuss how teachers' work is increasingly centered around finding reliable videos that can correspond to the topic of the lesson and delegate the introduction of the topic to these videos. The enactment of a 'just bring all

devices' (first chapter) enacted a somatic rhythm of checking smartphones and already logged-in social media accounts on personal laptops during the first introductory part of the lesson. The effect of this automatic rhythm is the production of a polysynchronous time, in which students are synchronized with happenings of the world, family and friends at the collective space of the lesson.

Entangled with the physical arrangement of the classroom, now that the lesson material is already fixed on the interactive board, the teacher is mobilized between different spatial zones. The movement of the teacher enables him to flow between the spatial zones that are discussed in the fourth chapter, namely from the zone of exclusion to a zone of glancing. These spatial characteristics are meticulously described in relation to the classroom arrangements and accounting for devices as one entity of physical objects.

The second part of the lesson is centered around individual tasks and the third chapter described how students' screen activities are shaped and the specific temporalities produced on the screen as a result. The focus of this chapter was on the screen space and how the collective of students goes around the task. Enveloping the time and space by listening to music on their headphones, students establish an immersive space and time, where they firstly synchronize and catch up with other spaces, namely social media platforms and emails. This chapter, secondly, sheds light on the central position of keywords in *a taskified form of schooling*. For students, keywords are the initial as well as essential elements of working on tasks. It is through translating the task into relevant keywords that they *search* for online resources ordered by algorithms of searching engines and platforms like Google and YouTube. Keywords equally play an important role in how taskified reading practices are shaped.

Localizing keywords in texts allows students to scroll through the excess of search results and arrive at the relevant material for the task. Knox and colleagues (2020) develop the idea of learning by nudging in which "students are increasingly being approached as irrational subjects whose behaviors can be nudged towards particular 'desirable' or 'preferable' outcomes" (p.39). They discuss how carefully designed persuasive computing technologies and machine learning algorithms integrated with social and emotional learning policies learn from human emotion and might be even enabled to reproduce them. Similarly, the centrality of keywords and online searching as a first and most essential way of relating with the task, as

well as standardization of imagination and creativity of students, shows that students' actions are getting closer to those of algorithmic computation processes, which work with tagging keywords, scrolling and categorizing the data.

Bhatt (2017) refers to the ensemble of students' screen activities as a curation practice, which is conceptualized as "the students' judicious and purposeful assimilation, aggregation, and harnessing of digital content in order to produce something new" (p.117). The verb to curate originated from the Latin root of curare, which means to 'take care' and to 'cure'. In contemporary digital media content, curation refers to the organization of content around a theme for a special purpose. Content curation is made distinct from content aggregation that highlights the work of algorithms in filtering and ordering content and content creation that involves the development of original material online (ibid). Chapter three developed online searching, browsing and *bricolageing* (also discussed in chapter 2) to further disentangle the term curation.

The concept of bricolage captures the productive part of tasks as a collaboration between students and algorithms, as it takes into account the work of algorithms in *preconfiguring* task resources. Here, the notion bricolage mainly focuses on making do with what is *at hand* and what is available (cf. Johri, 2011). Put differently, entangled with algorithmic processes of searching, the practice of bricolage stresses firstly the direction towards accomplishing a task rather than lingering with it or staying with it for a long time, and secondly, it emphasizes what is made available as resources. As such, these two elements specify how the productive part of the screen-based task is centered around completing the task, algorithmic work that is in place as well as, the tinkering element that is at the core of the French term 'bricoler'. The entanglement of searching, browsing and bricolageing that is the students' editorial, selective and filtering role next to the work of algorithms that already order students' range of available material makes the term curation distinct from aggregation, but also from a form of creation.

For specifying the temporality of screen mediated tasks, the third chapter demonstrated that taskified schools are characterized by algorhythmic patterns. Algorhythms, a combination of the two words rhythms and algorithms, point to the entanglement of symbolic and social rhythms, on the one hand with time-based processes of algorithmic computation that render time measurable and controllable on the other hand. The *algorhythmic patterns* of taskified schools highlight that

not only imagination and creativity is ritualized and standardized -students mostly do the same things for conducting a task and arrive at the few same pages- but as Webb and colleagues argue (2020), they also capture "students in specific habits; govern[s] subjects through provided memories; and (dis)-orient[s] subjects for calculable futures" (p.2). This is reflected in online searching activities that are ordered by suggestive algorithms. As such, in contrast to what personalized learning environment rhetoric in which everything is tuned in and customized for the student, students' ritualized activities puts forwards a generalized and standardized learning environment rather than a personalized one. Personalization rather is manifested when single activities of checking social network accounts such as Netflix or Instagram occur during the conduction of the task to materialize momentous boredom. In sum, these chapters build into creating a *techno-scholastic milieu* in which a sort of taskified schooling is at the center.

Finally, the fifth chapter can be seen as the tandem chapter to the second chapter. In a sense that, instead of observing how practic*ing* makes a specific agency towards taskification, the fifth chapter sheds light on accidents and breakdowns that interrupt the routine relations. These are rather silent aspects that are accentuated in breakdowns like the somatic rhythm of constantly checking smartphones, as mentioned earlier in conclusion. Through analyzing the infrastructural breakdown at school, not only classroom practices, but even the classroom location is tightly entrenched with the online space that in order to hold practices, either the place should be adapted, or practices take a completely different form. More importantly, the infrastructural breakdown demonstrated how the capacity for framing or creating the conditions of possibility for a new knowledge milieu is tied to the ensemble of algorithms, cables, online platforms and clouds that shape *infra-schoolization*. Infra-schoolization points to how the ensemble of the infrastructure of cords, algorithms and screens are so heavily entrenched in school's daily functioning that they put forward new scholastic milieu in a way that digital actors constitute its indispensable elements.

Infra-schoolization and pandemic schooling

The preface of this dissertation ends with the question of remembrance. Will schools remember the preceded form that existed before the pandemic or a completely new form has already started to take shape, forming new habits and practices, new workarounds that will remain once the crisis is sorted out? At the

moment of finalization of this dissertation, masks, lockdowns and social distancing have constituted a new normal state, in a way that it takes an effort to remember the 'ordinary life' without them. Trying to see the relevance of this dissertation to what we lived and still living during the pandemic situation, we can see how infra-schoolization is even more accentuated during the crisis. The schoolish milieu that is created, is not only indispensable of digital actors, but it precisely sets the conditions of possibility of keeping educational practices alive. As such, we can methodologically highlight a specific form of relation that resonates with the condition of the pandemic.

Sociomaterial approaches assemble and re-assemble practices relationally and they have described stability and fluidity as two distinct characteristics of networks when technological components are involved in the network. For instance, Law (1989) demonstrates the stability which is needed for networks to operate when technological artifacts are introduced to the setting. This implies that a failure in any component of the network threatens the stability of the network. As opposed to this traditional take, Sørensen (2009) conveys how this assumption falls short in relation to virtual environments. Different components can temporarily disappear or break down (e.g., technology glitches), but the practice remains stable. "The stability is not created through all the components staying in place" (Sørensen, 2009, p. 64). Rather, the technological process is stable precisely because of its *fluidity,* which allows components to be mobile and to float in and out. For Sørensen (2009), a temporary interruption of the components does not interrupt the practice, for the fluid patterns of relations allow the practice to sustain itself and consequently, the network to remain stable, leading to a 'fluid stability'.

However, this understanding equally implies that in constructing a network, one has intentionally rejected, avoided or dismissed observing what (relations) emerge as a consequence of these breakdowns (what happens when a device shows glitches even temporarily or what happens when during a presentation, the presenter's computer suddenly crashes for two minutes). This issue can especially be traced when a temporary absence of a component transforms the practice drastically, so much as to either disrupt the practice or drastically change its form. The fluid patterns of relations do not allow to analyze these situations, for they simply focus on the fluid stability (Sørensen, 2009). Poor network connections and computer crashes, the need for constant reparations are some components that might periodically stop parts of the educational practices, but they do not lead to the

failure of the practice. As such, these components create fluid patterns that can float in and out without disrupting the whole practice. But what about the temporal abandonment of the school building? Could we claim that there is a sort of stability achieved through the infrastructure that made infra-schoolization possible? Could we claim that the radical metamorphoses of school practices into fully digital and distance education has compensated the physical school presence? Even if our answer to this question is positive, that is, we have achieved a sort of stability through the entanglement of infrastructure with daily educational life, this stability is a plastique one. Plasticity that is a notion that was developed by Malabou (2008, 2012), refers to moments when a breakdown can radically shift the network of relations and thus, even nihilate a form. This is what we precisely see during the pandemic as well, when a global breakdown nihilated the form of the classroom as it was routinely known. The plastique relations are explosive, which means they nihilate the known forms. As such, what comes after the explosion cannot be simply considered as a fluidity that digital technologies grant. What comes after the explosion, here I refer to the distance and digital schools, perhaps offers a sort of stability, but this stability is a plastique one.

Even though the situation of the pandemic, at first sight, might not have so much to do with the classrooms I observed, as the physical gathering has been suspended during this period, the excess of personal or family screens, dealing with screen-mediated tasks and different ways selecting and of sharing the lesson material was among crucial elements of the constellation of this dissertation that came close to the way school was handled during the first wave of the pandemic. As such, our focus to screen activities in the third chapter might have been limiting us on the one hand, in a sense that, for example, we mainly focused on what happens on students' screens and singled out how the immediate environment of the classroom interferes in activities emerging on screens. But on the other hand, we took all screen activities seriously. This limitation was tried to be overcome in the fourth chapter, in which we scrutinized how these online and immediate environment spaces relate to each other.

However, beyond the abandoned school buildings, the physical absence of the teacher is one of the key issues through which I argue that pandemic education is of another form (unfamiliar to pre-pandemic forms). As such, the first chapter of this dissertation pointed out the deciding forces of the classroom, namely, learning platforms as well as policies coming from international organizations (e.g., IB) that

circumscribe classroom practices. We demonstrated how in this constellation, teachers become essential actors that *appropriate, manipulate, slowdown and resist* these fast policies. One of the important conditions that enables teachers to do so, is the physical gathering of students, materials and devices. The physical presence of the teacher, students and devices leaves the possibility of freeing relations from the platforms, the IB and school policies open. In the fourth chapter, the significance of the physical place and how the teacher plays with the arrangement of the classroom to engage different bodily postures to specific activities is demonstrated. Here, I am pointing to the third arrangement, in which the arrangement only allows one activity to be done at the same time. Students need to shift their bodies to look at the interactive board. They need to shift their bodies to do individual work and yet another arrangement if they are discussing in a group.

That is to highlight that all activities do not happen on the same surface, incorporating the same body posture. Within the third arrangement, the teacher also plays with his own presence in different spatial zones, bringing himself to the zone of glancing while students engage with individual tasks. This way, the teacher is a crucial actor in making the classroom a schoolish arrangement in the physical setting. In this sense, despite increasing studies that designate teaching roles to interactions suggested and made possible through online platforms and conclude if teachers will soon be replaced by platforms or Ed-tech businesses, this dissertation explicitly showed how teachers play an essential role in creating an alternative relation that cannot be conflated with the measures of learning offered through platforms. This point brings us back to the playful potential and liberating character of the physical space, in which practices do not necessarily have to comply with the policies of online platforms as we see on fully platformized classroom arrangement.

Closing thoughts

What makes a school, School? The School that in its Greek origins refers to ‘free time’ is conceptualized by Masschelein and Simons (2013) as a gathering of students, teachers and materials around a common thing. School time thus, is formulated as a free time liberated from familial relations (oikos) as well as the social relations (polis). This free time of the school creates an opportunity for the youth to be attentive to a common thing and make the world anew (ibid). Bringing

the finding of this study in discussion with this conception of school, the reader can easily realize that the digitized school doesn't grant such a free time, at least not gratuitously. As the findings of this research show, borders of family, leisure and labor time are increasingly blurred in digitized classrooms, and the school has found different diverging spatiotemporal characteristics. This study with its focus on the performances of practices, does not allow us to see what this blurring means for students and teachers or how they experience it. The limits of sociomaterial ethnographies in focusing on the entanglement of social and material actors dismiss the meaning-giving processes and lived-experiences of human actors.

Moreover, this study only points to the ways in which teachers' work is distributed differently between before the lesson while preparing the lesson and during the lesson while delivering the lesson. To a significant extent, the teacher's work is concerned with *finding* the relevant online material for students to watch or to read during the lesson. Respectively, the work of students is increasingly concerned with *re*-searching online material. An In-depth investigation of what these searching and finding processes theoretically mean for a digitized education is essential.

Additionally, investigating possible kinds of thinking and knowing that such a setting enables is an important question that needs further exploration. In this regard, if bricolageing and presenting through online and multimedia technologies has become one of the dominant school practices, it is worthwhile to examine possible critical sensitivities that arise from this digitized form of schooling. In relation to this issue, another line of further research could be the conditions that can make algorithmic patterns and platforms school*ish*. The last point that can be further developed is the role of bodies and embodied gatherings in creating specific times and spaces.

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