The device on the desk – a sociomaterial analysis of how Snapchat adapts to and participates in the classroom

Valasmo, Verneri; Paakkari, Antti; Sahlström, Fritjof

Published in:
Learning, Media and Technology

DOI:
10.1080/17439884.2022.2067176

Published: 28/04/2022

Document Version
Accepted author manuscript

Document License
CC BY-NC

The Device on the Desk – a Sociomaterial Analysis of How Snapchat Adapts to and Participates in the Classroom

Verneri Valasmo[a], Antti Paakkari[b] & Fritjof Sahlström[c]

[a]*Faculty of Education and Welfare Studies, Åbo Akademi University, Finland*
verneri.valasmo@abo.fi
[b]*Faculty of Education and Culture, Tampere University, Finland*
[c] *Faculty of Education and Welfare Studies, Åbo Akademi University, Finland*

Abstract

This study analysed how students' mobile phones and Snapchat are adapted to and participate in the classroom. Insights from the actor network theory were used to discuss the interconnections between students, mobile phones, Snapchat, desks, and plenary teaching. We applied video analysis to examine the minute details of unfolding sociomaterial practices. The data, which was produced in a Finnish upper secondary school in 2015–2016, is a composition of ethnographic classroom video material and screen-capture video recordings from students' smartphones. In this study, we asked how the presence of mobile phones and Snapchat become possible in the relatively restricted pedagogical space of plenary teaching. The analysis yielded two important findings. First, students use effort to adapt Snapchat to the demands of the ongoing plenary teaching. Second, the analysis demonstrates the flexibility of the mobile phone–Snapchat entanglement that plays a crucial role in its adaptation.

Keywords: mobile phones, classroom, sociomateriality, plenary teaching, Snapchat

1. Introduction

In the long history of the intertwining of technology and education, technological solutions have often been introduced to schools in the hope of solving pedagogical problems (Selwyn 2011; Cuban 2001). In this paper, we examine the mobile phone as a particular technological device that has become an everyday part of many contemporary classrooms – even though this has mostly happened outside of pedagogical aims. We are interested in how students' personal mobile phones and the social media application Snapchat become part of and

contribute to classroom practices. To investigate this process, we analyse a lesson in a Finnish upper secondary school classroom.

The presence of students' mobile phones in schools has raised a heated public discussion on how these devices affect everyday school practices. On the one hand, mobile phones are presented as potential tools for teaching and learning (Gowans 2017; Ryder 2019); on the other hand, their presence is seen as a distraction for school practices (Johnson Hess 2019). In some countries, such as the UK (Hall 2021) and France (Rubin and Peltier 2018), there have been national-level discussions on whether the presence and use of mobile phones should be allowed in schools. In September of 2018, the French Minister of Education prohibited the use of smartphones in schools, except in cases where the use is led by the teacher (Rubin and Peltier 2018). In Finland, there have not been any national-level or other general policies to regulate smartphone use in schools, and schools have been able to institute their own policies.

Many previous studies on mobile phones in relation to schools have focused on issues such as their potential for teaching and learning, as well as on their negative effects on school practice and performance (see, for example, Batista and Teixeira 2014; McKinley 2019). Studies focusing on microlevel interactions and mobile phones in classrooms have discussed, for example, how use of mobile phones in classrooms enables students to construct multilingual identities (Rusk 2019) and how the presence of phones changes participation patterns in whole-class interaction (Sahlström, Tanner, and Valasmo 2019).
Critical studies have shown how mobile phones have potential to alter the power relations in educational settings. Richardson (2014) discussed how smartphones disrupt the power relations within the theatre and classroom settings. Paakkari's (2020) study scrutinised how technology companies gain a foothold in classrooms through mobile phones and applications, further connecting students with platform capitalism and digital labour. Kelly (2018) discussed how black female students resist oppression by using Snapchat to speak out against injustice and to enhance the racial awareness in their school community.

In addition to the aforementioned field of study, there is a need for research that challenges the human-centric perspective and scrutinises classrooms as emerging in sociomaterial practices. From this perspective, mobile phones and other technologies are seen to have agency in educational settings. Although there is still a limited number of studies taking this

approach, Alirezabeigi, Masschelein, and Decuypere's (2020) sociomaterial ethnography research conducted in a 'bring your own device school' shows how mobile phones instigate new rhythms in the school, automating activities such as constant checking of feeds, e-mails, and messages. Another study pointing to the agency of mobile phones in school settings is that of Hohti, Paakkari, and Stenberg (2019) on human–smartphone–classroom entanglements. With a 'thing approach', they problematise the usual human-centric questioning, and instead of asking just 'how do/should children use their smartphones', they also ask 'how do smartphones use kids?' This approach stresses the multidirectionality between humans and digital technologies (Hohti, Paakkari, and Stenberg 2019).

It is important to consider critically what the presence of mobile devices and commercial applications means for educational practices and everyday life in classrooms. To investigate this, we begin from a sociomaterial standpoint. From this perspective, we see how technologies can have an active role in influencing and changing educational practices, even if their presence might originally not be related to pedagogical aims (Sørensen 2009). We use the insights from actor–network theory (ANT) to discuss the interconnections between students, mobile phones, Snapchat, desks, and plenary teaching.[1] To address these topics, we start by applying microlevel video analysis to examine the minute details of unfolding sociomaterial practices, and later, we discuss how the studied local practice connects to the broader discussion on the role of mobile phones and commercial applications in classrooms. We ask how the presence of the mobile phone and Snapchat become possible in the relatively restricted pedagogical space of plenary teaching. The analysis yields two important findings. First, it demonstrates how students actively use effort to adapt Snapchat to the demands of the ongoing plenary teaching. Second, it demonstrates the flexibility of the mobile phone–Snapchat entanglement that plays a crucial role in its adaptation.

[1] With plenary teaching, we refer to a pedagogical arrangement that leans on teacher-led instructions and teacher-led whole-class discussions (see, for example, Sahlström, Tanner, and Valasmo 2019)

2. Technology in schools from the perspective of ANT

As John Law (2007, 2) describes, 'Actor-network theory is a disparate family of material-semiotic tools sensibilities and methods of analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located.' Despite its name, ANT is not a theory. It is not trying to explain why things happen (Law 2007) or seeking to cumulatively build a body of theoretical conceptions about how the sociomaterial practices should be understood (Decuypere 2019, 137). Instead, it can be described as a *sensitising device* that allows researchers to focus on relational features of the studied setting and to scrutinise how various practices are being made (Decuypere 2019). Instead of providing direct methods for researchers, it merely advises one to turn their gaze to practices formed by heterogenous actors, human and non-human, and to investigate these practices as material and relational. From this perspective, classrooms are seen as emergent and always in the process of becoming and as spaces that are enacted by a network of actors, both animate and inanimate (McGregor 2004).

In ANT studies on education, materiality is shown to have a crucial role in shaping everyday schooling practices (Fenwick, Edwards, and Sawchuk 2011; McGregor 2004; Mifsud 2014; Roth 1996; Sørensen 2009). The tradition of educational studies has been dominated by a focus on language, culture, subjectivity, discourse, norms, values, and social constructions as being separated and different from the material (Gorur, Hamilton, Lundahl and Sundström Sjödin 2019). ANT emphasises the significance of materiality, and the focus on materiality is one of the important contributions that ANT has made to educational analyses (Fenwick, Edwards, and Sawchuk 2011).

When school life is investigated from an ANT perspective, it is not enough to ask how human actors such as teachers, students, and parents uphold or challenge school practices. We must equally consider the role of non-humans such as desks, classroom walls, books, computers, and mobile phones in the constant enactment of these lived realities. Agency is not considered an exclusive characteristic of human beings and is instead seen as relational and distributed between multiple actants that formulate an assemblage. Our study is anchored on the activity of one student, his mobile phone, and Snapchat. However, the focus is not on separate entities but an enactment in which everything plays its part relationally (Law 2007). The proposition that non-human and human entities play an equivalent role in educational

practices can be considered provocative in anthropocentric educational sciences, where the agency of things has seldom been in focus (Fenwick, Edwards, and Sawchuk 2011). From an ANT perspective, the definition of an actor is relatively open. As Bruno Latour (2005, 71) writes, anything that changes the state of affairs can be considered an actor. Therefore, when considering the actorship of any given entity, be it a student, mobile phone, or application, we should ask, *'Does it make a difference in the course of some other agent's actions or not? Is there some trial that allows someone to detect this difference?'* (Latour 2005, 71). Whereas the agency of 'things' is often overlooked in educational research, ANT aims to take it seriously. This approach can bring new understandings of how power relations and politics are distributed through 'things' and make visible how power operates when human, non-human, and discursive actors are entangled in the social (Gorur et al. 2019).

The centrality of non-human actors in research is emphasised by the principle of generalised symmetry. This means that humans and non-humans are treated similarly, neither being given priority over the other (Sørensen 2009). Although the idea of symmetry is pivotal, it does not follow that there would be no differences between humans and non-humans. It is primarily a question of the fact that the two cannot be separated from each other (Nespor 2012). In other words, actors are not viewed as separate entities. It is crucial to note that ANT resists a priori assumptions about capacities of actors, as these gain their qualities from the assemblage. Capacities are relational and not possessed by any individual entity. Therefore, different arrangements generate different capacities (Latour 2005). As new actors engage with the network of the classroom, new and sometimes surprising properties can emerge. The concept of translation is used to describe how, to form connections, entities change each other when coming together (Fenwick and Edwards 2012). Following these ideas, it is crucial to investigate how actors such as mobile phones and applications change classrooms.

Actor–networks are in constant motion and can be surprisingly extensive. Researchers using ANT approaches view attempts at simplifying complex and multiple worlds back to networked totalities with suspicion (Fenwick, Edwards, and Sawchuk 2011). The world is seen as messy and complicated, and research should not sugar-coat or oversimplify this complexity in its attempts at understanding and clarifying things (Fenwick and Edwards 2010).

3. Materials and methods

The data was produced during 2015–2016 in two Finnish upper secondary schools as a part of *Textmöten* research project. One of the schools was situated in a small town in Western Finland and the other in the Helsinki metropolitan area. *Textmöten* was a research project focused on digitalisation and changing textual practices in Swedish-speaking schools in Finland. The project searched for volunteer schools and chose one from the metropolitan area and one from a smaller town. After the schools had expressed interest in participating, we visited them and introduced the project to the staff and the students.

The data consists of 113 hours of classroom video material from 15 subjects and 16 teachers. The video data is a composition of two video feeds: traditional ethnographic classroom video material on the focus students and screen-capture video recordings from students' mobile phones. Central to the data are seven 15- to 17-year-old focus students, all of whom volunteered for the study and were followed by applying a participant-centred data gathering approach (Rusk et al. 2015). We followed each student for half of a school day at a time, participating in all the lessons they had. The choice of observed school subjects was based on each student's timetable. Because *Textmöten* was focused on textual practices, the amount of first-language lessons is slightly emphasised in the data.

When entering the field, researchers must make choices regarding the equipment used for data collection, including cameras, microphones, and screen-recording software. Following a sociomaterial ontology, this equipment is considered part of the assemblage of the classroom and its analysis (Bhatt and de Roock 2013). Research equipment both enables and constrains the analysis (Hindmarsh and Llewellyn 2018). The focus students' video recordings were shot with a standing video camera. At the beginning of each lesson, the camera was adjusted to include the focus student, their work area, and other equipment (books, pens, computers, and mobile phones), as well as the students next to them. Because a standing camera has limited movement, the actions of all significant actors could not always be recorded. The most important excluded actors, in the excerpt analysed in this article, were the teacher and the student's laptop screen. In light of this, analysis of the teacher's actions is limited to their speech and ethnographic observations on their classroom position. The contents on the laptop screen remain unanalysed. To record screen content, a mirroring application was installed on the focus students' smartphones. With the help of a Wi-Fi network and the mirroring

application *Mirror Beta*,[2] the students were able to cast their screens onto the laptop of the researcher sitting outside the classroom.

3.1. Ethical considerations

Recording and analysing mobile phone use present an ethical challenge. Screen content is often intimate, and it is not always possible to predict what will appear on the screen. From an ethical point of view, it is necessary that participants have adequate power to determine their role in the research. Central to this is that participants are aware of their right to withdraw if anything causes them concerns, or unexpected events occur. (Iphofen 2013). Because of this, following policies were applied to improve the participants' control over data production and their power to determine what parts of the data they would like to share. The mirroring application was student-controlled, and the researchers emphasised that the students could close the program whenever they did not want to share content with the researchers. To accommodate the risk of incidental findings, students were also reminded that they could ask the researchers to delete any recorded material during any research phase. No such instances occurred in the screen-recorded material. Furthermore, they were given the opportunity to view and approve the use of each recording used in our research.

Students were well aware that their screen content was recorded during the research, often joking about the researchers' presence and their participation in the project and the way their everyday messaging became part of a scientific study. From an ethical point of view, it was paramount that the students knew what they were participating in. This evidently affected how they used their phones, but despite the circumstances, phones and applications were used extensively. Discussions and interviews with students supported the view that the ways in which phones were present during the research were reasonably similar to the observed students' regular school days.

3.2 Methods to analyse sociomaterial details of classroom practice

This article investigates a classroom practice in which mobile phones and Snapchat both participate in the enactment of the lesson. Classrooms bring together a wide range of actors

[2] https://play.google.com/store/apps/details?id=com.koushikdutta.mirror&hl=en&gl=US

whose connections and entanglements can reach far beyond the room itself. Despite this multiplicity, analysis must start from somewhere. One possibility is to focus on a 'tracer', an object that appears to possess power to affect the activities around it (Fenwick, Edwards, and Sawchuk 2011; Roth 1996). The smartphone clearly seems to be such an object. Its capacity to affect surrounding activity has been investigated in earlier research (Hohti, Paakkari, and Stenberg 2019; Kelly 2018; Richardson 2014). However, smartphones are not independent objects but entangled with applications, among other things. Applications themselves differ from each other in many ways, demanding and enabling different activities. For this reason, it is worthwhile to focus on applications and their agency while investigating smartphones in classrooms. In this article, we have chosen the entanglement of the smartphone and Snapchat as a tracer. Because the application cannot be separated from the device, we are talking about mobile phone–Snapchat entanglement. Snapchat is a multimedia messaging application. At the time of the data production, users could choose between sending a photo, sending a video, or having a text conversation with other users. It is worth considering that applications update and change at a fast pace, so the Snapchat used today differs in many ways from the Snapchat version used when compiling the data.

Before choosing Snapchat–mobile phone entanglement as our tracer, we systematically mapped the applications with which the focus students were engaged during lessons. We went through the video data and listed the applications each of the students used in classrooms and their use times in relation to each other. Snapchat was one of the most used applications, and every research participant used it (for statistics, see Paakkari, Rautio, and Valasmo 2019). Its significant role in the classroom was the reason we chose it as our tracer.

After choosing the tracer, we started mapping events during which Snapchat participates in the lesson. We paid special attention to events where 'snaps' arrive in classrooms during a lesson and cause activity around them. It is worth noting that these situations never caused disturbance to the ongoing teaching, and teachers never intervened in Snapchat use. Students received and answered snaps almost unnoticeably. To better understand Snapchat's presence in the classroom, we decided to focus on the sociomaterial details that made its presence possible. Focusing on the details helps to bring out the 'silent' activity of the devices that can otherwise go unnoticed. The approach shows how brief moments can contain a multitude of 'small activities'. In the following, we look at one of the students, Joakim, and his relationship with mobile phone–Snapchat entanglement during a moment in one history

lesson. This particular event was chosen from the body of data because the short moment highlights the flexibility of mobile phone–Snapchat entanglement and the work done by the student to integrate it into unfolding plenary teaching.

We started the analysis of the event by applying methods of multimodal interaction analysis (Goodwin 2000). This approach enabled a detailed analysis of the moment-by-moment unfolding interactions in classroom and the material factors that they contain (Goodwin 2000). By acknowledging both the students' corporeality and artefacts' materiality, we accounted for the significance of materiality in classroom actions. We looked at how phone was placed, moved, paid attention to, and touched, and we reflected on the implications this had on classroom participation (Hindmarsh and Llewellyn 2018). Similarly, we observed how the phone acted, how the surface of the screens changed, and the actions that it required from the student. By paying attention to the materiality of device and the applications, the physical interactions that they engendered were made visible (Light, Burgess, and Duguay 2018). Based on the findings of the microlevel analysis, we further discussed the relationships between the actors by applying ANT insights.

Transcription was used to record teacher talk and the student gaze orientations in relation to the teaching process and his mobile phone interactions. Different symbols represented changes in student gaze orientation, ongoing screen activity, writing, and tapping on the phone (see Appendix A at the end of the article). The transcript was prepared in Swedish and translated prior to publication.

4. Results

4.1 Overview of phone use in the studied classrooms

In the studied schools, the use of mobile phones was allowed in classrooms, and devices belonging to students were visibly present during lessons. For a researcher standing beside a camera or sitting in a chair, it was easy to spot smartphones on desks and being fiddled with. A typical place for the phones was on the desk among other artefacts such as notebooks, pens, and laptops. At least a couple of phones were always visible, but some students kept their mobile phones in their pockets or backpacks. Generally, phone use during lessons was

silent. Focus students typically had their devices muted or on vibrate. The devices were mostly used alone. Occasionally, the focus students shared WhatsApp conversations and Instagram pictures with students sitting next to them by showing their screen (see Sahlström, Tanner, and Valasmo 2019). In all of the video material (113 hours), teachers seldom intervened in phone use. If this happened, it typically took place when sounds emanating from the devices were audible for others or there was peer discussion around the screen content. In general, it was rare for phone use to be problematised in teacher or student interactions.

Although the focus students used their devices for many activities, the most common use was to access multimedia messaging and social media applications such as Snapchat, WhatsApp, Instagram, and Facebook (see Paakkari, Rautio, and Valasmo 2019). Most phone use was not related to teaching content. During the lessons we observed, Joakim used his device during 10 per cent of the total classroom time, with Snapchat being the most popular application, followed by WhatsApp (see Fig. 1). Both applications participated in the analysed lesson. This article focuses on Snapchat but also discusses how the applications gain different roles as actors in Joakim's classroom network.

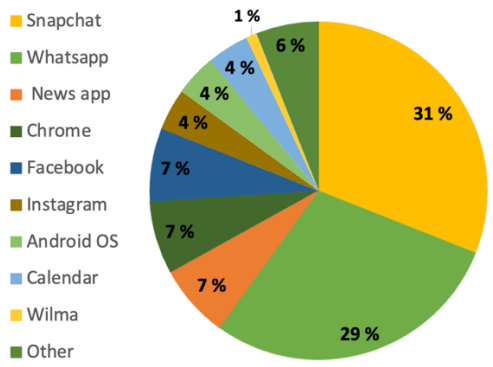

Figure 1. An overview of the applications Joakim used in the classroom (110 minutes).

4.2 Receiving, opening, reading, and sending snapchat messages in the classroom

In the following analysis, we take a closer look at an everyday classroom sequence in which Joakim receives a snap during plenary teaching. For the purpose of our analysis, we break this event into six sequential steps: the arrival of the snap, change of orientation, required interface actions and on-screen transitions, purple square and muting, viewing, and replying. After a detailed description of the event, we analyse how Snapchat becomes a part of the composition of the unfolding classroom and what kind of role different actors take in this process.

Excerpt 1**.** A snap arrives during plenary teaching.

Figure 2. Joakim operating the screen in parallel to teacher talk (line 6).

1. T: the Soviet- or the USA wanted to put a stop to (1.5)
2. and here you see this map (1.5)
3. we[have [(1.0)
4. *J:* [*(snap arrives)* [↘ *(reach for the smartphone)*
5. T: Soviet Union [here [(2.0)
6. *J:* ----------#[*xx* [*Opens screen lock* ↗
7. T: [and for example Estonia, Latvia, Li[thuania Baltic it became an
8. *J:* [↘————————————————————[*adjust volume*
9. T: integra[ted part of (.) the Soviet Union (.)
10. *J:* ------ [*x*//////////////////////////////////
11. T: and here are those areas
12. *J:* ////////////////////////////
13. T: that(.) were occupied (0.5)and these independent
14. *J:* //
15. T: countries Poland and Czechoslovakia and[Hungary Bulgaria
16. *J:* /-----------------------------------[xx--------------
17. T: Ro[mania (.) beca[me then [little by little [communist
18. *J:* --[x-------------[x [↗ [↘
19. T: (5.0)
20. *J:* (typing the message during break in teacher talk)
21. T: and there [you see (.) [another [map (1.5)
22. *J:* ///////////[x-----------[↗ [x
23. T: integrated part (.) and then we have these communist
24. countries (.) here then

Arrival of the snap

The analysed sequence begins with a break in the seemingly traditional classroom arrangement. While Joakim is following the teaching and taking notes on his laptop, he is interrupted by the phone placed in front of him on the desk. As the teacher says, 'we have' (lines 3–4), the phone emits a short and barely audible vibration, accompanied by the screen lighting up and displaying a pop-up notification, indicating that a snap has arrived. As applications have different notification settings, the specific character of vibration and screen illumination likely informs Joakim that the arriving content is a snap. Joakim has placed the

device close enough to notice the vibration and possibly the illuminated screen when the snap arrives. Despite the overlap with teacher talk, the snap does not disturb the ongoing plenary teaching and does not appear to be noticed by anyone else. Due to the relatively small screen size and specific placement of Joakim's phone, only the student sitting to his right can possibly see his screen (see Sahlström, Tanner, and Valasmo 2019). However, when the snap arrives, this student appears to pay no attention to it.

The change of orientation

Almost immediately after the snap arrives, Joakim shifts his gaze towards the device and reaches for it. Being placed on the desk, the mobile phone is easy to reach and look at. The changes in Joakim's orientation take place simultaneously with a one-second break in the teacher talk. This indicates that in addition to the arriving snap, his actions are adjusted to pedagogical interaction. As shown in conversation analytical studies, most directly in Goodwin (1987), these kinds of small breaks in talk are relevant places for orientation changes. Moreover, they are important for understanding classroom interactions. Sahlström (2002) showed their relevance to hand-raising in classrooms. In our case, both the ongoing pedagogical interaction and the activity of the device seem to affect student participation. In this particular moment, we can see how the plenary teaching and Snapchat intertwine in unpredictable ways and how the student is placed between them, working to be able to move between the two.

Required interface actions and on-screen transition

While Joakim's gaze is directed towards the screen, he can see a pop-up notification from Snapchat. In addition, there is a notification from the screen mirroring application with the text 'Screen cast in progress' reminding him of the research technology involved (see Fig. 3).

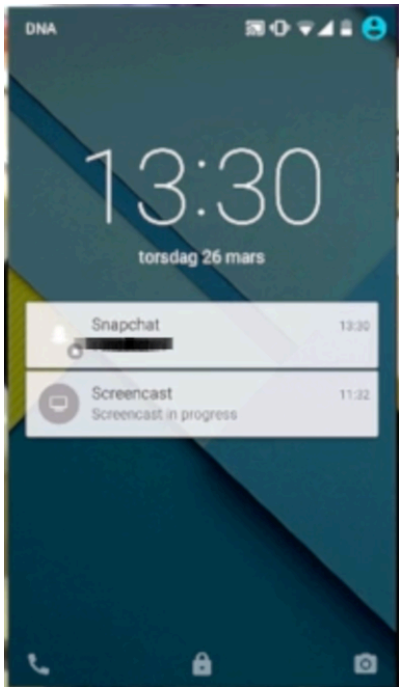

Figure 3. A screenshot from Joakim's smartphone screen.

The pop-up notification from Snapchat consists of the text 'Snapchat' and an application icon. The username of the sender is visible below the text. The content of the snap cannot yet be seen, and the operating system and application both require certain embodied actions to access it. Joakim first moves the device on the desk slightly, then double taps the notification with his index finger. These actions take place simultaneously with the teacher presenting a map on the whiteboard and saying, 'Soviet Union here' (lines 5–6). After the double tap, a screen lock emerges, and the operating system requires the user to draw a pattern on the screen. Joakim does this during a two-second break in the teacher talk. Following the correct sequence of movements, Snapchat starts to open, and a transition from home screen to Snapchat takes place on screen. During the transition, Joakim lifts his gaze and directs it towards the front of the classroom.

During these on-screen transitions, the device cannot be operated, and there is no relevant content on the screen. Consequently, this lag time can be relevant for changing orientation from the screen to the teacher. Moreover, Joakim's activity seems related to the ongoing pedagogical interaction. The teacher is presenting a map on the whiteboard, and by looking at the front of classroom, Joakim receives teaching-related information and displays his participation in the ongoing pedagogical interaction. Hence, the change in Joakim's

orientation appears to be related to both the events taking place on the screen and the ongoing teaching, showing once again how Joakim adapts his activities to the requirements of two different participation frameworks with independent rhythms.

Purple square and muting

After the aforementioned glance, Joakim takes another look at the screen (lines 8–9) and focuses on it for a period of 14 seconds, during which the teacher continues talking on the lesson subject. A so-called Snapchat 'friend screen' has opened on the screen. It displays information about recent communications and received messages. There is a list of usernames with different symbols before them. At the top of the list is the name of the sender of the received snap. A purple square is in front of the sender's username, which differentiates snaps that include sound from those that do not, marked by a red square. The purple square plays an important role in Joakim's next action. Before viewing the snap, he mutes his phone by pressing the sound adjustment button located on its side, and he keeps the device on his desk during this action. Simultaneously, the teacher lists countries that were part of the Soviet Union (lines 7–8).

By muting the device, Joakim ensures that the message's audio will not mix with the ongoing teacher talk and cause a potential conflict. In addition to separating the snap from teacher talk, muting allows Joakim to ensure that the audio content does not reach others in the same physical space. Therefore, the space enacted in the relations between Joakim, the device, Snapchat, and his friend-in-distance stays private in relation to the classroom. The price of privacy here is the loss of a semiotic resource. However, if audio is crucial for understanding the snap, it can still be replayed later, as Snapchat allows users to replay any message once. This option reduces Joakim's risk of not understanding the content.

Viewing the snap

The viewing of the snap takes place in parallel with the teacher talk. Immediately after the sound adjustment, Joakim places his finger on the username to view the message (line 10).

The opened snap is a seven-second video that also includes text. The length of the video is visible in the top-right screen corner. The snap is from a friend attending a lesson in a different classroom, and it presents this friend's schoolwork in a humorous way. Joakim sets his index finger on the screen and then slides it to the bottom edge of the screen so that the back of his hand will not block the view. He holds his finger on the screen while viewing.[3] While viewing the message, Joakim makes no effort to hide the screen from the student sitting next to him. However, the student is entirely focused on the lesson and pays no attention to the screen.

While viewing the snap, nothing about Joakim's appearance hints at the humorous content he is engaging with, which helps to keep the snap private. With one second of the video remaining, Joakim lifts his finger (line 16) to stop playback. After this, the friend screen appears again. Under the sender's username, there is the following text: 'Press and hold to replay'. It would now be possible to replay the snap. However, Joakim chooses to reply.

Replying

Before replying, Joakim slightly adjusts the position of the device on the desk. Then, he double taps the username, after which the camera opens (line 16). He taps the symbol of the shutter release button on the bottom of the screen to take a picture. Because the lens of the camera is facing the desk, the screen appears black. The picture Joakim takes by letting the device lay flat on the desk can be seen as a way of minimising the necessary embodied actions.

To add text to the picture, Joakim taps the screen, bringing up a keyboard and an empty text field. After the tap, Joakim glances briefly towards the teacher, who is now saying, 'became then little by little communist' (lines 17–18). Once again, the glance is timed in relation to a transition taking place on screen (the emerging of the keyboard), and simultaneously, it can be interpreted as both a public show of participation in ongoing teaching and a way of checking the content on the whiteboard.

[3] At the time of the data production in 2015, Snapchat required the user to hold their finger on the screen to view a snap. After an application update later in 2015, users could view a snap with a single tap. This exemplifies how the embodied actions required by the application can change overnight, also affecting the embodied actions taking place in classrooms.

After the glance, at the same time as the teacher comes to the end of a sentence that precedes a five-second break in her speech (line 17), Joakim looks back at the screen and begins to type. Typing takes place during the aforementioned five seconds. To compose text, he uses his index finger while the device remains on the desk. Typing is easily distinguished from other embodied actions Snapchat requires from Joakim and might be recognised as such by other students and the teacher, but our data will not allow us to see if this happens. Notably, none of the students in view pay any attention to the typing. The text Joakim composes expresses that he thought the snap was funny. Again, there are no significant changes in his presence implicating the content with which he is engaged.

To send the snap, Joakim taps the arrow icon (line 22). He then slightly moves the device and turns off the screen by pressing the button on the right side of the device while lifting his gaze towards the teacher. Joakim then follows the lesson and takes notes on his laptop until the next snap arrives 55 seconds later calling for his attention and resulting in a subsequent parallel interaction.

4.3 How Snapchat adapts to the classroom

We will now further analyse how device–Snapchat entanglement becomes a part of the classroom network. It is interesting that the age-old pedagogical form of plenary teaching manages to hold its characteristics despite the new actors such as mobile phones and applications within it. Based on the microlevel analysis, we propose that the event highlights two central aspects of the entanglement of mobile technology and plenary teaching. First, the data shows how active effort from the student is needed to accommodate Snapchat to the demands of plenary teaching. Second, the analysis shows how the flexibility of Snapchat–mobile phone entanglement facilitates its adaptation to the classroom.

Before a further discussion on the flexibility of the device and the student effort required to accommodate it to the classroom, it is worth briefly turning our attention to the desk, which acts as a material support for both the participation in plenary teaching and Snapchat activity. This highlights the fact that everyday schooling practices are made up by not only new but also old and established school technologies (McGregor 2004). From an ANT perspective,

capacities are relational, and different arrangements generate different capacities (Latour 2005). In line with this, we see that the agency Snapchat acquires in the classroom depends on the coming together of many human and non-human actors. In the analysed event, the unfolding plenary teaching, the placement of the phone and device, and the application settings all have significant sway over how Snapchat's agency as a part of Joakim's classroom network is played out. Of all the actors, *the desk* is particularly interesting because its position supports both plenary teaching and mobile device use. For plenary teaching, desks are central elements in classroom organisation. They mark student positions and provide support for reading, writing, and drawing. The desk seems to be more durable than many other classroom technologies. Its durability reflects the persistence and stability of certain power relations typical of classroom settings (McGregor 2004). From a Foucauldian perspective, desk rows are a symbol of the disciplinary power mechanisms of the classroom (Foucault 1995). Our analysis demonstrates how desks also act as material supports for mobile phones. A desk is an opportune place for setting down a phone so that it can be quietly monitored and touched. On the desk, the phone is simultaneously distanced from plenary teaching and closely tied to a student. Joakim shifts his orientation between the teacher and the device with little effort. As the desk becomes a base for mobile phone use, it also becomes a stage for new kinds of power relations that emerge from the relationships between students and IT enterprises such as Snapchat.

The flexibility of mobile phone–Snapchat entanglement and the student work required to adapt it to the demands of plenary teaching

The analysis shows that Snapchat can be integrated into Joakim's classroom network and that recurring snap messages do not cause disturbances to the enactment of plenary teaching. However, the adaptation does not happen without active effort from Joakim, who must manage the application settings. The devices are not automatically compatible with classrooms but demand an operator that is able to consider the norms of the ongoing pedagogical interaction. If the phone and applications are carried into the classroom, it is the student that is in the position to define and manage the space given to devices and applications, allowing or excluding the actors tied to them. In classrooms that permit phone

use, the task of defining the space given to devices and applications falls on the student, albeit within the confines of teaching.

The data shows how remarkably well Snapchat can call on Joakim's attention. During the observation period of teacher-led instruction, Joakim receives three snaps, two of which succeed in commanding his attention almost immediately. Through application preferences, Joakim has allowed Snapchat to inform him of arriving messages with the combination of three semiotic resources: screen illumination, a pop-up notification, and vibration. With the phone placed on the desk next to the laptop, Joakim becomes available for all these signals. However, Joakim seems to allow only Snapchat to call his attention in this way. He also uses WhatsApp to communicate with his friends during the lesson but has disabled vibration and display illumination and therefore does not notice the incoming messages without turning on the display. In other words, WhatsApp is more tamed; it has less ability to command Joakim's attention. We suggest that the notification settings can be thought of as the student's way of controlling the participation of different applications and the actors tied to these. The presence of the device and the applications thus translate the role of the student as new practices of including and excluding become necessary.

The analysed event helps to understand how Snapchat can be adapted to the audio-spatial requirements of teacher-led instruction. In-app settings not only enable Joakim to control the space given to different applications but also make it possible for the device and the applications to be adapted to the requirements of plenary teaching. This ability to adapt points towards the flexibility of device–Snapchat entanglement. By muting the notifications, Joakim adapts Snapchat to the audio norms of the classroom. Incoming messages with their sudden sounds would most likely appear problematic from a teaching perspective. Adapting the settings to the norms of pedagogical interaction creates a possibility for the snaps to materialise in the classroom without alerting others.

Joakim's work to make Snapchat compatible with the unfolding plenary teaching, and the flexibility of Snapchat enabling this work, also extends to the content of the incoming snap. The purple square of Snapchat is central in enabling the adaptation of incoming audio messages to the requirements of the classroom. The purple square informs users that the message contains audio and thus gives Joakim a chance to preemptively mute his phone before opening and viewing it. Additionally, the option to replay the snap enhances the

flexibility of Snapchat, as the risk of missing the meaning of the content by muting it is reduced.

One aspect that expresses both the flexibility of device–Snapchat entanglement and the work done by Joakim is the way the reply snap is composed. Even though the photo feature is characteristic of Snapchat, Joakim is able to compose the reply without lifting the device from the desk. By letting the lens face the desk, he takes a black picture that works as a background for the text he composes. Joakim's embodied actions are minimised, and the device stays as inconspicuous as possible. In general, Joakim's embodied actions in relation to the phone and Snapchat are minimal and do not differ radically from the body gestures that the participation in plenary teaching demands. This minimising of embodied actions is possible to interpret as work done by the student to adapt Snapchat to the demands of pedagogical interaction. It also demonstrates how plenary teaching affects how Snapchat is enacted. A different classroom arrangement would have allowed for different embodied relationships between the student and Snapchat.

5. Discussion: New classroom entanglements

In the analysis, we have shown how Snapchat gets entangled with the student and becomes part of the local classroom practice. By focusing on the sociomaterial details of classroom activity, we have investigated how the student–Snapchat relationship is shaped simultaneously by the ongoing pedagogical interaction, the materiality of the classroom, the adaptive work of the student, and the flexibility of both the mobile phone and the Snapchat application. The way in which the student and application become entangled is dependent on all the above factors.

We would like to conclude by pointing out how student–smartphone entanglements connect local classroom practices to global economy and material data infrastructures in new, intensive ways, diluting the traditional divisions between local and global. Through these entanglements, applications such as Snapchat and WhatsApp, created by global IT enterprises, gain a foothold in classrooms and affect the practices therein. In addition to local classroom practices, the presence of these actors is fundamentally dependent on a material internet infrastructure that enables the movement of data and the functionality of the

applications. In the observed classroom, global entanglements refer concretely to the incoming and outgoing smartphone data transmitted through electromagnetic waves. This data moves through a Wi-Fi network, onwards to broadband base stations, and through core networks to servers and large data centres. In data centres, the information generated from the relationship between a single user and their device is stored as part of big data. In turn, this kind of big data acts as a primary source of cognitive capital and political power (Pasquinelli 2018).

The classroom presence of mobile phones and applications brings together the intentions of students and enterprises. The applications enhance the students' agency by enabling participation in a classroom space that constrains it in many ways (Sahlström et al. 2019). At the same time, entanglements with devices bring about new kinds of relationships. When entangled with their devices and applications, student interactions are translated into resources for the companies providing these platforms. It is in the interests of these companies to create as much user engagement as possible (Zuboff 2019); the more users there are on the platform, the more valuable they become (Srnicek 2017). Therefore, the fact that Snapchat becomes a part of everyday school life and a new medium for peer talk is beneficial to the company. This built-in logic of the mobile phone ecosystem has given rise to critical discussion on who is actually using whom – are the users using their devices, or are the enterprises using the users through their devices and applications (Couldry and Mejias 2019)?

To conclude, our analysis will inevitably fail to capture the full complexity of the sociomaterial assemblage of the classroom. Despite this, we are convinced that through a microlevel analysis, we have managed to make visible certain 'silent' sociomaterial practices that often go unnoticed in research on contemporary technology-intensive learning environments. The entanglements of classrooms, students, mobile phones, and applications are made and remade in 'tiny' practices much like the one we have analysed.

Acknowledgement

This research has been funded by the Swedish Cultural Foundation in Finland.

Disclosure statement

There are no potential conflicts of interest.

References

Alirezabeigi, S., J. Masschelein, and M. Decuypere. 2020. "Investigating Digital Doings through Breakdowns: A Sociomaterial Ethnography of a Bring Your Own Device School." *Learning, Media and Technology* 45 (2): 193–207. doi:10.1080/17439884.2020.1727501

Batista, S., and G. Teixeira. 2014. "Considerations on the Use of Mobile Phones in Educational Context." *International Journal on Education New Trends in Education and Their Implications* 5 (1)

Bhatt, I., and R. de Roock. 2013. "Capturing the Sociomateriality of Digital Literacy Events." *Research in Learning Technology* 21: 21281.

Couldry, N., and U. A. Mejias. 2019. *The Costs of Connection. How Data Is Colonizing Human Life and Appropriating It for Capitalism.* Stanford: Stanford University Press.

Cuban, L. 2001. *Oversold and Underused: Computers in Classroom*. Cambridge, MA: Harvard University Press.

Decuypere, M. 2019. "STS in/as education: where do we stand and what is there (still) to gain? Some outlines for a future research agenda." *Discourse: Studies in the Cultural Politics of Education*, 40:1, 136-145.

Fenwick, T., and R. Edwards. 2010. *Actor-Network Theory in Education.* Abingdon: Routledge.

Fenwick, T., and R. Edwards. 2012. *Researching Education Through Actor-Network Theory.* West Sussex: Wiley–Blackwell.

Fenwick, T., R. Edwards, and P. Sawchuk. 2011. *Emerging Approaches to Educational Research*. Oxon: Routledge.

Foucault, M. 1995. *Discipline and Punish. The Birth of the Prison.* Translated by Alan Sheridan. New York: Vintage Books.

Goodwin, C. 2000. “Action and Embodiment Within Situated Human Interaction.” *Journal of Pragmatics* 32: 1489–1522.

Goodwin, C. 1987. “Forgetfulness as an Interactive Resource.” *Social Psychology Quarterly* 50 (2): 115.

Gorur, R., M. Hamilton, C. Lundahl, and E. Sundström Sjödin. 2019. “Politics by Other Means? STS and Research in Education.” *Discourse: Studies in the Cultural Politics of Education* 40 (1):1–15.

Gowans, E. 2017. “How mobile technology can benefit learning.” *Education technology,* July 25. https://edtechnology.co.uk/comments/how-mobile-technology-can-benefit-learning/

Hall, R. 2021. “Plan to ban phones from classrooms is out of touch, say UK school leaders.” *The Guardian,* August 16. https://www.theguardian.com/politics/2021/aug/16/plan-to-ban-phones-from-classrooms-is-out-of-touch-say-uk-school-leaders

Hess Johnson, A. 2019. “Research continually shows how distracting cell phones are – so some schools want to ban them.” *CNBC,* January 19. https://www.cnbc.com/2019/01/18/research-shows-that-cell-phones-distract-students--so-france-banned-them-in-school--.html

Hindmarsh, J., and N. Llewellyn. 2018. “Video in Sociomaterial Investigations: A Solution to the Problem of Relevance for Organizational Research.” *Organizational Research Methods* 21 (2): 412–437.

Hohti, R., A. Paakkari, and K. Stenberg. 2019. “Smartphones. Leaping and Dancing with Digitality: Exploring Human-Smartphone-entanglements in Classrooms.” In *Social, Material and Political Constructs of Arctic Childhoods. Children: Global Posthumanist Perspectives and Materialist Theories,* edited by P. Rautio and E. Stenvall, 85–102. Singapore: Springer.

Iphofen, R. 2013. *Research Ethics in Ethnography/Anthropology*. European Commission, DG Research and Innovation.

Kelly, L. L. 2018. "A Snapchat Story: How Black Girls Develop Strategies for Critical Resistance in School." *Learning, Media and Technology* 43: 374–389.

Latour, B. 2005. *Reassembling the Social*. Oxford: Oxford University Press.

Law, J. 2007. "Actor Network Theory and Material Semiotics." April 25. Accessed 13 March 2019. http://www.heterogeneities.net/publications/Law2007ANTandMaterialSemiotics.pdf

Light, B., J. Burgess, and S. Duguay. 2018. "The Walkthrough Method: An Approach to the Study of Apps." *New Media & Society* 20 (3): 881–900.

McGregor, J. 2004. "Spatiality and the Place of the Material in Schools." *Pedagogy, Culture and Society* 12 (3): 347–372.

McKinley, G. 2019. "Smartphones, Distraction Narratives, and Flexible Pedagogies: Students' Mobile Technology Practices in Networked Writing Classrooms." *Computers and Composition* 52: 91–106

Mifsud, L. 2014. "Mobile Learning and the Socio-Materiality of Classroom Practices." *Learning, Media and Technology* 39 (1): 142–149. doi:10.1080/17439884.2013.817420

Nespor, J. 2012. "Devices and Educational Change." In *Researching Education Through Actor-Network Theory,* edited by T. Fenwick and R. Edwards, 1–22. West Sussex: Wiley–Blackwell.

Paakkari, A. 2020. *Entangled Devices: An Ethnographic Study of Students, Mobile Phones and Capitalism.* Helsinki: University of Helsinki

Paakkari, A., P. Rautio, and V. Valasmo. 2019. “Digital Labour in School: Smartphones and Their Consequences in Classrooms.” *Learning, Culture and Social Interaction* 21: 161–169. doi:10.1016/j.lcsi.2019.03.004

Pasquinelli, M. 2018. “Metadata Society.” In *Posthuman Glossary,* edited by R. Braidotti and M. Hlavajova, 253–256. London: Bloomsbury Academic.

Richardson, J. 2014. “Powerful Devices: How Teens’ Smartphones Disrupt Power in the Theatre, Classroom and Beyond.” *Learning, Media and Technology* 39 (3): 368–385.

Roth, W-M. 1996. “Knowledge Diffusion in a Grade 4-5 Classroom During a Unit on Civil Engineering: An Analysis of a Classroom Community in Terms of Its Changing Resources and Practices.” *Cognition and Instruction* 14 (2): 179–220. doi:10.1207/s1532690xci1402_2

Rubin, A. J., and E. Peltier. 2018. “France Bans Smartphones in Schools Through 9th Grade. Will It Help Students?” *New York Times.* September 20. https://www.nytimes.com/2018/09/20/world/europe/france-smartphones-schools.html

Rusk, F. 2019. “Digitally mediated interaction as a resource for co-constructing multilingual identities in classrooms.” *Learning, Culture and Social Interaction* 21: 179–193. https://doi.org/10.1016/j.lcsi.2019.03.005

Rusk, F., M. Pörn, F. Sahlström, and A. Slotte-Lüttge. 2015. “Perspectives on Using Video Recordings in Conversational Analytical Studies on Learning in Interaction.” *International Journal of Research & Method in Education* 38: 39–55.

Ryder, S. 2019. “Smartphones in school: ban, restrict or allow.” *BBC,* February 3. https://www.bbc.com/news/education-47101875

Sahlström, F. 2002. “The International Organization of Hand Raising in Classroom Interaction.” *Journal of Classroom Interaction* 37 (2): 47–57.

Sahlström, F., M. Tanner, and V. Valasmo. 2019. “Connected Youth, Connected Classrooms: Smartphone Use and Student and Teacher Participation During Plenary Teaching.” *Learning, Culture and Social Interaction* 21: 311–331. doi:10.1016/j.lcsi.2019.03.008

Selwyn, N. 2011. *Education and Technology: Key Issues and Debates.* London: Continuum.

Sørensen, E. 2009. *The Materiality of Learning: Technology and Knowledge in Educational Practice (Learning in Doing: Social, Cognitive and Computational Perspectives)*. Cambridge: Cambridge University Press.

Srnicek, N. 2017. *Platform Capitalism.* London: Polity.

Zuboff, S. 2019. *The Age of Surveillance Capitalism. The Fight for a Human Future at the New Frontier of Power.* New York: PublicAffairs.

Appendix A

Transcription symbols:

T:	Teacher.
S:	Student screen activity and gaze orientations.
(1.0) (.)	Numbers in parentheses indicate silence. A dot indicates a micropause shorter than 4/10 of a second.
[ ]	Overlapping talk or co-occurring actions.
↗ ↘	Change in gaze orientation.
---	Continuing screen activity.
///	Typing/holding a finger on the screen.
x	Tapping on the screen.
#	Screenshot from the situation.