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Justice through participation: student engagement in Nordic classrooms

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ABSTRACT

In this article, we approach large questions regarding justice and equality in the Nordic classrooms. A substantial body of previous research emphasises the importance of student engagement in teaching and learning. Drawing on video data from Norway, Sweden and Finland, we focus on whole-class teaching, i.e. situations in which the teacher addresses the class from the front of the classroom, to investigate justice trough participation. We have approached our topic through two concerns: student participation in classroom discourse and student engagement as providing access to content. Our findings seem to pose some serious challenges for the Nordic welfare society vision of classrooms as core societal hubs for justice and equality. While whole-class teaching is one of the primary tools available for attempting to achieve justice and equality for all, this interaction format seems to contain inherent constraints that do not support equitable student engagement. Further, the way the Nordic classrooms have responded so far to the massive digitisation in their societies seems to pose serious questions rather than provide comforting answers.

Introduction

This paper considers rather large questions in education, such as justice and equality, analysed through the lenses of students' classroom engagement and participation. We set out to analyse these issues by synthesising previously reported research on classroom interaction and participation and combining this syntheses with updated empirical analyses drawing on video recordings of Nordic secondary classrooms. The underlying logic for addressing large issues with such data is that throughout classroom interaction and student engagement with content, critical steps towards equity are taken. In this article, we are particularly interested in the role of student engagement – in terms of classroom interaction, participation patterns and classroom discourse (Wells, 2007) and student engagement with and access to content (Hackman, 2005). We approach these issues via two relevant empirical cases: mathematics instruction in lower secondary

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classrooms and the introduction of digital devices (laptops and mobiles) across subjects in upper-secondary classrooms. Our interest was prompted by a substantial body of research that argues for the importance of student engagement in teaching and learning. To limit the scope of the article, we focus on whole-class teaching, i.e. situations in which the teacher addresses the class from the front of the classroom. Despite decades of criticism, whole-class teaching continues to have a strong hold in education (Carlgren, Klette, Myrdal, Schnack, & Simola, 2006; Cazden, 2001; Cuban, 1993), including in three Nordic countries (Klette & Ødegaard, 2015; Simola, 2005) – Norway, Sweden and Finland – the countries from which data have been gathered for use as empirical material in this article.

Classrooms in Norway, Sweden and Finland share a societal expectation that equal opportunities will be provided for all within the framework of comprehensive schooling. However, the countries also differ, for example, in student scores on tests such as PISA, on which Finland has performed at the very top. Sweden has had a long period of average and falling results, and Norway has for a long period showed a decline, although the trend has now turned in Norway, and student achievement scores are rising (OECD, 2010, 2016b). Another interesting feature of these Nordic classrooms is that they have been extensively and rapidly digitalized in recent years. Students are equipped with their own laptops or iPads, and the expectations for pedagogical practices in the classroom have changed, as articulated in the national curricula in all three countries (LK06, 2006; LP14, 2014; LP 15, 2015). Parallel with these policy-driven curricula and initiatives, classrooms have also become connected from within through students' own mobile devices, which have fundamentally altered the conditions for participation in whole-class interaction, particularly if students are allowed to use this technology. The cases reported in this article are limited to three countries, but with equity as an over-arching educational goal in many other countries, and with whole-class teaching having a continued widespread role in classrooms all over the word, we believe the paper is also relevant beyond the Nordic context.

This article begins with a theoretical section, outlining relevant features of student engagement in whole-class interaction and introducing the concepts of a participation economy and access to content. In the subsequent analysis, these concepts frame two illustrative cases, one focusing on teaching and interaction patterns in mathematics classrooms and the other focusing on implications for students' engagement following the introduction of digital screens and mobile phones in whole-class teaching in language arts classrooms. Both datasets are drawn from lower and upper-secondary classrooms.

Theoretical framing

Engagement as student participation

Opportunities to engage in meaningful discursive practices and learning activities are considered key factors in high-quality schooling and education around the world (National Research Council, 2000; OECD, 2016a, 2018; UNESCO, 2016). Such activities should promote students' communicative and reflective capacities, linked to the different subject domains (Hiebert & Grouws, 2007; Nystrand, 1997; Sfard, 2015) as well as to

their conceptual and discursive understanding of those subjects (Branden, 2000; Marton & Säljö, 1976; Smith & Stein, 2011). This interactive and discursive view of learning (Sfard, 1998, 2008) underscores the power of recurring face-to-face interaction and communication among peers, where language, conceptual familiarity and understanding are seen as critical tools for learning (Cazden, 2001; Mercer, Edwards, & Mercer, 1987; Nuthall, 2005; Wells, 2002).

As for opportunities for student participation in Nordic classrooms, previous research shows a mixed picture. Several studies (Aukrust, 2003; Bergem & Klette, 2010; Emanuelsson & Sahlström, 2008; Kääntä, 2010; Klette & Ødegaard, 2015) show that Nordic classrooms provide ample opportunities for students to speak out and influence classroom discourse, more so than in other countries (Alexander, 2008). However, while student engagement and student-active ways of working might be key features of Nordic classrooms, there are also differences within and across the Nordic countries. Simola (2005) and Simola, Kauko, Varjo, Kalalahti, and Sahlström (2017) describe Finnish classrooms as classrooms where a substantial amount of time is used on individual tasks, with few opportunities for students to talk. Klette and Ødegaard (2015) argue that Norwegian classrooms support student questioning and engagement; however, student utterances are often used for practical and procedural purposes rather than for cognitively demanding enquiries. Analysing Swedish mathematics classrooms, Emanuelsson and Sahlström (2008) use the term "the price of participation" (p. 205) to discuss the relationship between cognitive and communicative aspects of classroom learning that include a high degree of student involvement. They argue that student participation might come at the cost of engagement with cognitively demanding content, and thus it may be hard for teachers to keep control of the content while simultaneously facilitating a high degree of classroom participation.

Numerous studies have investigated discourse patterns and teacher–student talk in classrooms (see, for example, Bellack, 1966; Cazden, 2001; Mehan, 1979; Wells, 1999) and have shown (1) the persistence of teacher-led instruction (recitation) and teacher-led whole-class discussions (Cuban, 1993; Hoetker & Ahlbrand, 1969; Nystrand, 1997; Wells, 2007); (2) how teacher talk dominates classroom talk (Cazden, 2001; Juzwik, Nystrand, Kelly, & Sherry, 2011; Mehan, 1979), leaving limited space for student utterances and contributions; and (3) that when students do make contributions, their statements are most likely to be practical (Emanuelsson & Sahlström, 2008) and procedural (Klette & Ødegaard, 2015) and are seldom linked to the cognitive or thematic area at hand.

As for the terms of student engagement during whole-class teaching, classic studies (Cazden, 2001; Lemke, 1990; Mehan, 1979; Wells & Arauz, 2006) show how classroom interaction is organised around a set of basic interactional features. In particular, a discourse format consisting of three moves, commonly referred to as IRE (Mehan, 1979), has been shown to be pervasive in classrooms: this format typically features a pattern in which the teacher asks a closed question, which is basically information-seeking (the initiation) and requires a predetermined short answer (the response) and is usually pitched at the recall or lower-order cognitive level. The teacher then praises correct answers and corrects those that are wrong (evaluation), or alternatively the teacher follows up or gives feedback (Feedback), also described as "IRF" by Sinclair and Coulthard (1975). Wells (2007), for example, has discussed ways in which teachers may provide feedback by encouraging students to verbalise ideas and generate and test hypotheses.

The interactional pattern of IRE/IRF has been discussed in relation to opportunities for student participation in classroom discourse, which can be heavily constrained based on how turns at talk are distributed between the teacher (who generally gets every second turn) and the students (who have to divide the other half of the turns among themselves). Sahlström (1999, 2017) uses the term *participation economy* to describe this turn-allocation in the classroom. This results in an inherent, interactionally mediated differentiation in student classroom participation, where a small number of the students end up as active speakers, leaving few opportunities for inclusive participation for all.

The persistence of IRE/IRF patterns should not single-handedly be perceived as constraining student engagement. It also provides occasions for "follow-up" or "revoicing", which might be beneficial for student learning and conceptual understanding (Furtak & Shavelson, 2009; Wells, 2007). Likewise, Juzwik and colleagues (2011) argue how teacher-led, so-called monologic instruction might turn into dialogic communication, depending on a teacher's ability to build and expand on students' ideas and utterances. Margutti and Drew (2014) show how third-turn responses in IRE/IRF patterns have a role in constructing whole-class activities that provide students with interpretative resources for shared understandings of pedagogical goals and procedures. But even with the pedagogical potential of IRE/IRF to strengthen shared classroom discourse, from the perspective of a participation economy, this format places limitations on each student's active participation during whole-class interaction. Thus, interaction patterns that mediate student participation during whole-class teaching make it difficult to provide equal opportunities for all students to develop their conceptual, discursive and communicative skills. For classroom discourses and interaction, at least three elements seem to be barriers to student participation: (1) limited opportunities to talk, (2) uneven distribution of talk opportunities across the classroom and (3) limited access to high-quality discursive resources in the form of peers. We will return to these issues in our analyses; now, however, we concentrate on engagement as access to content and engagement through digital devices.

Engagement as access to content

According to Hackman (2005), content mastery is the fundamental component of social justice in education because information acquisition is an essential basis for learning. Without complex sources of information, students cannot possibly participate in meaningful interactions and exchanges. Content must therefore, following Hackman (2005), "not merely reproduce dominant, hegemonic ideologies but instead represent a range of ideas and information that go beyond those usually presented in mainstream media or educational materials" (p. 104). Hackman further underscores how the "facts" beneficial to promoting socially just education "must represent broad and deep levels of information so that students can not only critically examine content but also effectively dialogue about it with others" (p. 105). A recurring challenge for educators and teachers is thus ways to equip their students and expose them to content domain materials and supporting assignments and activities that stimulate their students' cognitive and critical reasoning within a specific content domain.

Access to content – the relative exposure that students of different backgrounds may have to specific classroom content – is thus a key component in international comparative research (see OECD, 2016a; Schmidt, Zoido, & Cogan, 2014). This access is mainly measured through variables such as the amount of instructional time school systems and teachers allocate to learning a particular subject or type of content. Based on the latest PISA scores, for example (OECD, 2016b), time spent on content and the way in which time is organised (e.g. opportunities to learn) are primary factors influencing student achievement. Research using PISA data suggests that up to one-third of the relationship between socio-economic status and student performance can be accounted for by opportunities to learn (Schmidt et al., 2014). The PISA 2015 scores (focusing on science education) from the Nordic countries show a strong relationship between above-average performance scores in science and above-average equity in education (OECD, 2016b, p. 216). In this article, we investigate the degree to which content is represented and made available to students in mathematics classrooms (e.g. how explicit and how it is elaborated, etc.) as a feature of justice in education rather than analysing the subject content per se.

Opportunities for authentic student contributions to classroom discourse have been strongly emphasised as an educational ideal in Nordic pedagogical research and schooling (Kovalainen & Kumpulainen, 2005; Postholm, 2005) in the past two decades. Yet the extent to which students in Finland, Norway and Sweden are invited to influence content-related talk with their own ideas or contribute substantially to classroom discourse in open dialogue has not yet been extensively researched. In addition, little is known about the ways in which teachers in Nordic classrooms balance a high degree of student participation with a focus on the relevant content. In this article, we use empirical examples from secondary school classrooms to discuss the possible relationships between student participation and access to content as two aspects of justice in education. A third aspect, engagement through digital devices – which encompasses both opportunities to participate *and* access to content – will be elaborated upon in the following section.

Engagement through digital devices

As stated in the introduction, classrooms today have been connected through extensive digitisation via laptops, tablets and smartphones, which also brings new and multi-faceted possibilities for gaining access to different kinds of content. The rapid and massive connection of classrooms have to a large part been achieved through students bringing in their own devices into classrooms. Mobile devices, in particular mobile phones, have become a crucial part of the everyday life of young people. In 2015, over 95% of young people in Finland between the ages of 16 and 24 had a smartphone (tilastokeskus.fi); in Norway, 91% of the population aged 9–16 have their own smartphone (Medietilsynet, 2016), while in Sweden the numbers are about 98%. Thus, almost everyone is connected to the Internet on a daily basis (Alexandersson & Davidsson, 2014). The other Nordic countries show similar numbers.

The use of social media applications such as Snapchat, Whatsapp, Instagram and Facebook is a common activity for most of today's students, both in the classrooms and outside them (Blikstad-Balas, 2012; Brandtzæg, 2016; Westlund & Bjur, 2014).

Participation in social media has changed from a subcultural practice to a normative one and can be compared with everyday activities such as watching television or making telephone calls (Boyd, 2014, p. 8). Mobile devices have opened new possibilities for youth to form more self-controlled social spaces, and a great deal of their mobile phone use is connected with identity work (Boyd, 2014). In the Digital Youth project, Mizuko Ito and her colleagues (see Ito et al., 2008; Jenkins, Ito, & Boyd, 2015) have described the participatory culture of social media as either friendship-driven genres of participation, characterised by hanging out and messing around, or interest-driven genres, distinguished by engagement with specialised activities, interests or niche and marginalised identities, what the authors call "geeking out". Through digital devices, students have access to both alternative content and alternative discourses, which may in turn impact their access to shared classroom content and discourse. Participating in social media today is part of the way students engage in classrooms. However, there is still limited research on the specific ways that smartphone use in classrooms alters student participation and engagement in these classrooms.

Student engagement with content and participation structures in Nordic classrooms: two empirical cases

In the following section, we present and discuss contemporary empirical examples that have investigated student engagement and participation in three Nordic countries – Finland, Norway and Sweden. The studies relied on video data as their primary data sources. Video has been found to be particularly relevant for studies of interaction and engagement with content in classroom teaching and learning, as it enables detailed analyses of the different complex activity structures, which often take place simultaneously, in classrooms (Blikstad-Balas & Sørvik, 2015; Clarke, Keitel, & Shimizu, 2006; Fischer & Neumann, 2012; Klette, 2009). Video data allow us to look at both what teachers do and what students do and analyse the intersection of these activities from different perspectives (teacher activities, student activities) and at different levels of granularity (class level, individual student level etc.) (Blikstad-Balas, 2017; Klette & Blikstad-Balas, 2018; Snell, 2011). In the first case, drawing on mathematics classrooms, we shed light on activity structures and interaction patterns in Nordic lower secondary classrooms by examining teaching patterns and participation structured during classroom discourse with a special emphasis on what teachers do in whole-class situations to provide access to content and classroom discourse. In the second case, we show how access to technology affects student engagement and access to content areas in upper-secondary classrooms.

Case I: features of whole-class interaction in Nordic mathematics classrooms: participation and access to content

As outlined above, features of classroom interaction and discussions and students' opportunities to access high-quality content are acknowledged as two elements of student engagement and are critical for equality and justice in the classroom. In this section, empirical examples from a comparative classroom study of Finnish, Norwegian and Swedish secondary classrooms are used to explore these two elements. The data are

drawn from an ongoing comparative classroom video study in which three to four consecutive classes in mathematics (and language arts; data not used here) are video-taped and analysed to shed light on instructional strategies and students opportunities to engage (e.g. classroom discourse and access to content) in Nordic classrooms.

The overall study from which the data are drawn is an ongoing large-scale Research Council of Norway-funded video study, "Linking Instruction and Student Achievement (LISA)", whose goal is to analyse how different aspects of classroom instruction and interaction contribute to student learning (for more on the research design of the LISA project, see Klette, Blikstad-Balas, & Roe, 2017). Two elements of classroom instruction and interaction are of special interest for the current analyses: features of *classroom discourse* and teachers' way of *representing the content* (see Grossman, Loeb, Cohen, & Wyckoff, 2013).

Classroom discourse here focuses on the opportunities provided during instruction for extended content-related talk and the extent to which students' ideas are picked up on and elaborated upon by teacher and peers. We are interested in the degree to which students engage such high-level classroom discourse. Analyses of classroom discourse also reveal whether the teacher does most of the talking and how often the teacher responds to student ideas (e.g. following the traditional IRE/IRF pattern, a low level of classroom discourse). When analysing the *representation of content* (Grossman et al., 2013) we focus upon both the instructional clarity and conceptual richness of instructional explanations, as well as the extent to which instruction is aimed at deeper-level understanding of concepts rather than superficial rules and labels. An example of high-level representation of content would, for example, be classroom activities that demonstrate the consistent presence of rich and accurate instructional explanations, while low-end representation of content would be instructions at the surface level with less focus on deeper conceptual understanding.

Data sources and methods of analyses

The following discussion on teachers' use of these two aspects of classroom instruction and interaction draws on video data from eight mathematics classrooms in each country (Finland, Norway and Sweden, $n = 24$). Three to four consecutive lessons were recorded in each classroom ($n = 85$ mathematics lessons). All videotaped teachers were experienced mathematics educators, and all had formal teacher preparation in mathematics relevant for their grade (13- to14-year-old students). Each lesson was divided into segments of 15 min and coded systematically for the two categories classroom discourse and representation of content (Grossman et al., 2013; for more details on the coding process, see Klette et al., 2017).

Student participation and engagement with content in Nordic mathematics classrooms

A general trend in our data is that Norwegian and Swedish classrooms seem to be more open to student participation, including both content-related collective meaning-making and social negotiation, than Finnish classrooms, and including both content-related talk, and talk between students carried out in parallel to the teacher's teaching. However, classroom sequences in which extended opportunities for participation become detrimental to adequate representation of content are found in all three countries.

Below, we discuss these patterns, starting with features of classroom discourse, followed by patterns of representing and engaging with content in the classrooms. To provide contextual framing, we first give an overview of how common whole-class discussions are across the different contexts.

In Norway, whole-class discussions were the most common activity format, accounting for approximately 62% of the activities in the analysed mathematics lessons. Group work accounted for approximately an additional 13% and individual seatwork for 24% in Norway. In Finland, whole-class discussions dominate 34% of the segments, while individual seatwork accounts for the activities in 62% of the segments.

Classroom discourse

Classroom discourse in Norwegian and Swedish schools is characterised by teacher encouragement of students to participate in whole-class discussions. However, few of these whole-class sessions demonstrate uptake, whereby teachers or students elaborate extensively on students' ideas. Only 29% of the coded whole-class sessions in the Norwegian sample and 23% in the Finnish sample scored highly on teachers' uptake (see Luoto, Klette, & Blikstad-Balas, 2018). Students' opportunities to participate and raise their voices either through peer learning or joint discourse or through teacher-led classroom discussions account for 27% of the coded segments from Norwegian classrooms. In Finnish mathematics classrooms, on the other hand, only 9% of the segments coded as whole-class instruction show any evidence of opportunity for students to answer open-ended questions and elaborate on their mathematical thinking during whole-class discussions. This indicates that teachers in the Finnish context do occasionally elaborate on student answers through uptake; however, our observations showed that student utterances on which teachers elaborate are largely short and mostly in IRE/F format.

The IRE/IRF format is commonly observed across all classroom contexts. A typical example of such whole-class interaction is the teacher asking how students would solve a problem, a student (or students) volunteering an answer and the teacher evaluating whether the answer is correct or not. In contrast, there are also occasions on which a teacher uses uptake and follows up on a student's ideas during whole-class instruction. In the following example, a Norwegian teacher introducing fractions gives the class the task of determining how much of a figure consisting of multiple squares is coloured.

T: I wonder what you were thinking in this one.
S1: I counted how many pieces there were, and then came to 18.
T: One way of doing this is to count how many pieces there are: 1, 2, 3, 4, 5, 6, 18; was anyone doing it in an easier way? How did you do it?
S2: I took three times three and then I multiplied it by two, since they are divided by two.
T: So you managed to see that there are small squares here, three here and three here, so you had nine and since each of them is divided in two, you saw that it makes 18 parts. Can anyone tell me another way of coming to this answer?

This example illustrates a whole-class discussion in which the teacher restates and elaborates on the students' strategies. Thus, all the students have access to content through uptake of their own and their peers' ideas. However, across all the classrooms analysed, even when students are encouraged to make utterances, teachers seldom draw on students' ideas; thus, whole-class discussions are not used to their full potential.

Representation of content

Interesting similarities and differences emerged with regard to representation of content across the classrooms. Classrooms in all three countries exhibit similar patterns of *clarity* of explanations, as teachers across all three settings accurately present mathematical content and provide multiple examples of content-related procedures. The explanations in the Finnish classrooms, however, are largely focused on rules and procedures; conceptual richness is addressed by connecting new and old mathematical content and mathematical ideas. In the Norwegian and Swedish classrooms, in contrast, conceptual understanding is often addressed in the form of connecting the mathematical content at hand with everyday examples. For instance, a Norwegian teacher practising division with her students asks them what kinds of situations they would use division in. She elicits an example of "loaning money for kebabs during lunch break". Division is necessary to answer the question, she argues: "To how many friends can you loan money if you have 200 Norwegian kroner?"

Overall, our analysis of mathematics classrooms in the three contexts indicates that mathematics instructional practices in Norwegian and Swedish classrooms are more similar to each other, in terms of both classroom discourse (more frequent and with higher levels of uptake) and representation of content (connections to daily activities), than to the instruction in Finnish classrooms, which exhibits a somewhat different pattern, especially regarding classroom discourse (fewer open-ended questions) but also with regard to representation (more focus on connecting mathematical concepts). This comparative analysis signals that, because whole-class discussion is common across these Nordic mathematics lessons, there is a need to further investigate how opportunities to participate in whole-class interactions and access to high-quality content are interrelated. How differences in participation patterns impact social justice and equity in classrooms needs further investigation. However, we might see these differences as possibly reflecting contextual and cultural differences between countries. In that regard, our proposed patterns match well with similar patterns found in analyses of the overall national curricula in the respective countries (Klette, 2018; Mølstad & Karseth, 2016).

Case II: connected classrooms and student engagement

From the point of view of both teachers and students, the digitisation of classrooms means a major change in opportunities to participate in different kinds of communicative spaces as well as opportunities to gain access to content and information. Our second case highlights students' use of personal computers and other mobile devices and explores some of the interactional consequences this use has for students and

teachers in Nordic classrooms. Our analysis for case II is based on data drawn from two video-ethnographic studies of Finland, Norway and Sweden that document in detail students' use of digital devices. The examples are used as a basis for analysing students' use of digital devices in relation to aspects of participation and access to content. Both examples focus on instances of whole-class teaching in which a teacher leads open classroom talk. In the first example, we focus on student participation in relation to the use of laptops, while in the second example we focus on students' phone use during frontal teaching.

Example 1: participation and content in a classroom with one-to-one technology access

The first example stems from a Norwegian study of literacy practices in upper-secondary schools (see Blikstad-Balas, 2012, 2014; Blikstad-Balas & Davies, 2017). This study gathered data from a class of upper-secondary school students (grade 13, students 18–19 years old). This particular school has rigorous entrance requirements, so the students have grades that are above the national average. Furthermore, it is a school in which the students have access to personal laptops provided by the school in addition to having their own personal devices, such as smartphones and e-readers. Four focus students in one class were simultaneously recorded by means of small head-mounted cameras during 16 lessons in history (4 lessons), Norwegian language arts (8 lessons) and religion and ethics (4 lessons) over a period of 3 weeks. Head-mounted video cameras have been found to be particularly valuable in studies intending to capture a student perspective and detailed insight into social practices (Blikstad-Balas & Sørvik, 2015). In the case presented here, the cameras were used to obtain a detailed overview of the activities in which each student participated during lessons. Because the cameras also record sound, they provide useful data on oral discourses in which the students engaged.

The data in this case study consisted of traditional lectures during which teachers took the role of "presenters of information". Teaching sequences using digital support were a frequent activity in the 16 recorded lessons, and in four of those lessons it was the *only* activity performed by the teacher. This teaching was very monologic, with a minimum of student utterances. The teachers took few if any measures to prompt student verbal participation during whole-class instruction. A key finding in this study is that, throughout the lessons, the students used digital technology to access alternative content rather than the content the teacher was presenting; in effect, the content with which students engaged during the class was chosen by each student rather than imposed by the school or the teacher (Blikstad-Balas, 2012, 2014). As an illustrative example, we highlight how the four focus students, given the pseudonyms Stine, Andreas, Thomas and Hedda, used their laptops during a history class while the teacher was giving a lecture. This is a 45 min lesson, and the variation between students' activities is typical of whole-class teaching situations:

As shown in Figure 1, these four students engaged in highly individualised activities. They did not participate in a shared verbal discourse in class; rather, they all chose different digital texts with which to engage. While Stine wrote notes in Word, Andreas spent most of his time reading newspapers and social media. Thomas and Hedda played different online games. These patterns were stable throughout the lessons during the 3 weeks of data collection.
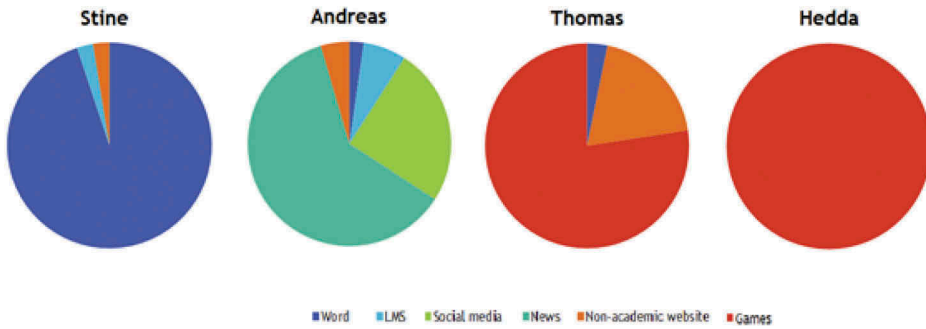
Figure 1. Stine, Andreas, Thomas and Hedda's use of the Internet during a 45 min class during which the teacher is lecturing. LMS refers to a learning management system, such as Fronter or itslearning

This study also included interviews with students about the patterns of participation and discourse documented via the video data. When asked about how they chose what digital technology to use in class, the students all provided answers rooted in a primary discourse (Gee, 2005), whereby what the students "feel like doing at that time" is the main predictor of how technology is used. The four students all explained that how they *feel* and what they *want* are essential in deciding what to engage with during the class. As Hedda explained, students' preferences determine their technological repertoire in class:

Hedda: It depends entirely on what I feel like doing. … If we want to take notes, we take notes during class; we pay attention, for instance in "history and philosophy" [an optional subject, not to be confused with the mandatory subject history]. I always take notes, because it's so hard, but if we feel like not paying attention during Norwegian, we are on VG [a newspaper site] or Facebook or whatever (…) I don't know, it's just so natural to log onto Facebook, it's like a habit, in a way. If you go on the Internet, you just go to Facebook, kind of, you just check if something has happened.

The relevant question for us is what these findings indicate in terms of participation. The students in this case are engaging in something, but very often it is not related to the lesson content. It could be argued that the students opt out of access to the content that is being made available through classroom discourse. As shown in previous publications (Blikstad-Balas, 2012, 2014), these students portray a transmissive understanding of school knowledge and a passive relationship to accessing content. In addition, because all PowerPoint presentations used by teachers in their classes are made available, students are not afraid of "missing out" on the information being conveyed in class, which in turn limits or even eradicates a common oral discourse.

Example 2: interactional consequences of mobile phone use in classrooms during whole-class teaching

The second example focuses on students' use of mobile phones during whole-class teaching in Swedish and Finnish upper-secondary classrooms. Mobile phones are

common and frequently used devices during school classes, and for many students, they offer new and more extensive opportunities to participate in interactions with others compared with their opportunities for talk turns during the official classroom discourse. Even though phone use in classrooms in general has been much discussed in the media and has been the subject of political debates, which particularly in Sweden has led to demands to ban phones in classrooms, there are few studies of mobile phone practices from the perspective of classroom participation and access to content. However, the following example is based on an analysis (Sahlström, Tanner, & Valasmo, in press) of the interactional organisation of participation, as students use mobile phones during instances of whole-class teaching, which feature organisational patterns of IRE/IRF.

As described in the theoretical framing, previous research on student participation during whole-class teaching has been described in terms of a participation economy, in which turns at talking are distributed between teachers and students, with the teacher holding most of the turns and dominating the official classroom conversation (Sahlström, 1999, 2017). The new possibilities for classroom participation introduced by the frequent use of mobile phones raises new questions about the extent to which classic patterns of participation established before the extensive digitisation of classrooms are still valid. Recent analyses show that there is reason to believe that the use of phones and other digital devices leads to fundamental changes in terms of participation possibilities for the individual student. The aim of the study from which this example is drawn was to understand whether, and if so how, mobile phone use in classrooms leads to changed participation frameworks in frontal teaching.

The empirical data consist of video recordings from multiple sources, described below, during classes in the students' mother tongue and in social, historical and cultural studies in Swedish and Finnish upper-secondary classrooms. Wi-Fi techniques were used to mirror the screens of the focus students' mobile phones, which were recorded as video files. The videos from the mobile screens were compiled with two additional simultaneous recordings from cameras in the classroom, one focusing on the students' desks and their surrounding peers and one focusing on the students' laptop screens and/or paper-based resources (see Figure 4). The empirical material overall consists of data from hundreds of lessons in Finnish and Swedish classrooms, from which a collection of examples of students' use of mobile phones during lecture based or frontal teaching have been selected. The relationship between classroom participation and mobile phone use has been carefully investigated. Here, we give a brief overview of the results, which is then used as the basis of further discussion. The results are early but of considerable relevance for investigating participation in classroom interaction, and hence for equity and justice in participation in classrooms.

An example of overall insights provided by the material is found in Figure 2, where the time spent on mobile phones in classrooms is shown for three students in the Finnish material (marked Fi) and one in a Swedish classroom (Sw).

Figure 2 illustrates the considerable phone use in the recorded material. In the approximately 25 h of recordings, the focused students use their phone for 3 h and 9 min, varying from from 4% to 21% of the student's time in class. Extrapolating to the larger body of students, in a class with 25 students, between three and four students would actively use their phone at any given time during a lesson. This is a considerable
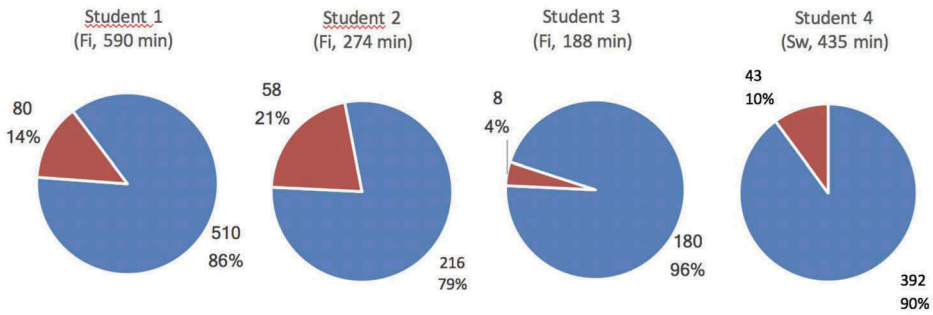
Figure 2. Time spent on phone use in recorded classrooms for three Finnish focus students and one Swedish focus student. The red part of the figure shows mobile phone use during multiple lessons. The topmost number in parentheses indicates how many minutes each focus student was recorded for

amount, particularly against the background of phones being a new addition to the school setting.

Figure 3 shows a representative example of the relative distribution of application use on mobile phones. As is evident, the dominating phone uses in the Finnish data are the social media apps Whatsapp and Snapchat, followed by a range of other applications (Wilma is a school administration application). Likewise, in the Swedish study, Snapchat is the dominant media application used, followed by Messenger (Whatsapp is not very common).

Figure 3 exemplifies the general pattern found in the material: phones are mainly used to communicate with others, and these others are almost always outside the classroom. In a recent study, Olin-Scheller, Sahlström, and Tanner (forthcoming) show how choices between different media applications on smartphones are made based on the different purposes of interactions with different partners. Communication can be initiated both from within the classroom and outside it, and it includes both visual and textual material. A typical example of how students use their phones in whole-class interaction is shown in Figure 4, where a student, Malin, is listening to a history class lecture and taking notes on
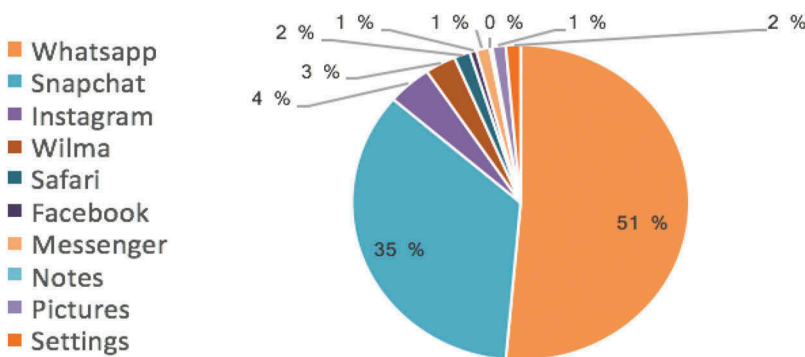
Figure 3. Relative distribution of mobile phone application use in the studied classrooms in Finland
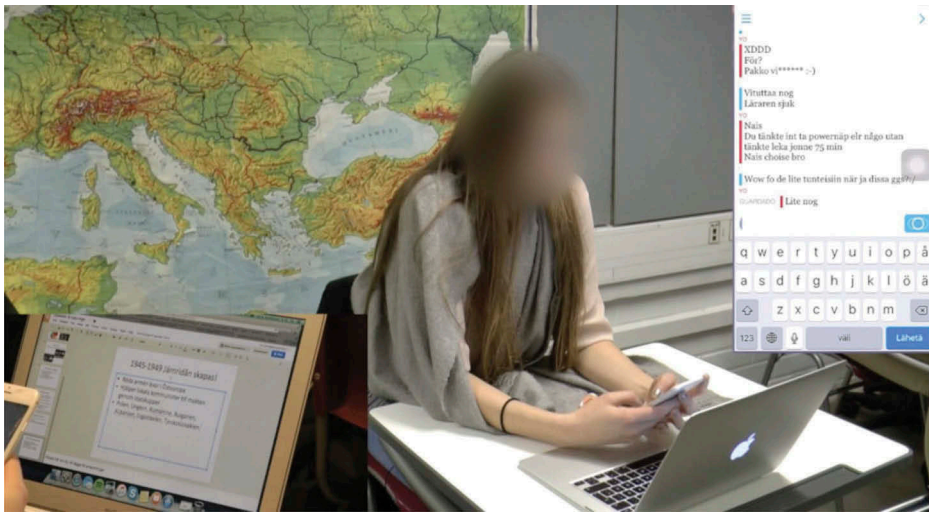
Figure 4. Malin engaged in phone-mediated participation during whole-class teaching

the Second World War, while at the same time interacting with friends outside the class through her phone.

Figure 4 shows the typical screen and desk ecology of the students in the material: the student's laptop is open and active, in this case showing a screen of a PowerPoint presentation about the Iron Curtain. In front of the laptop screen, a student holds her phone, where she is chatting, multilingually, with a friend. The topic of the chat is whether or not one has to be in class and differences in absence policies between schools.

In terms of student engagement, the phone screen enables interactive participation (e.g. written and visual messaging, liking, sharing, browsing) parallel to the teaching, without directly interfering the teacher's presentation, and without violating or threatening the overall participation expectations for students in whole-class teaching segments. Students can and do interact with people outside their classrooms. In comparison with face-to-face interaction, where speakers and recipients usually are visible, and where emotional stances are indexed through facial features, laughter and gesture, the phone screen participation is less indexical than face-to-face interaction, meaning that in practice, teachers cannot assess what students are doing and students have greater influence over their classroom participation and engagement. Compared with talking during the lesson, which previously represented the opportunity for peer-to-peer interaction in whole-class teaching segments, the phone presents a significantly smaller disturbance to the teaching. However, phone use also means that students are less accessible for peer talk and classrooms become less inclusive as interactional spaces.

For the teacher, the most important implication of the students' phone use is that students now can interact silently, resulting in quieter and less rowdy classrooms. This interaction is primarily non-indexical and does not provide clues as to its possible relationship with the ongoing teaching. For the teacher, then, the mobile phone use of students in classrooms leads to less inclusion of all students in the whole-class experience and decreased power and authority on the part of the teacher'. As indicated by the

overview in Figure 2, social interactions, occurring parallel to instructional content, dominate students' phone use. However, we also see examples of how phones are used for task-related information-seeking purposes. Sahlström et al. (in press) discuss how mobile phones also afford possibilities for students to engage in teaching-related content in ways that could increase each student's participation in the learning process, including during whole-class teaching. It is difficult to gain insight into teachers' perspectives on use of mobile phones in classrooms as a knowledge resource, owing to the lack of research. However, in their current use, mobile phones do not seem to work as devices for students' engagement in teaching-related content in whole-class interaction.,

In sum, student phone use significantly alters the organisational structure of participation in whole-class interaction. It also has different interactional consequences for students and for teachers. For the phone users, there is radically increased access to interaction with people not present in the classroom. For the teacher, there is loss of access to and control over student classroom participation and orientation to content and radically increased competition for students' attention. Somewhat ironically, the digitalisation of classrooms, which was expected to drive pedagogical change and lead to increased inclusion, seems to have had the opposite effect, with phones seeming to conserve rather than challenge participation patterns in frontal teaching, and seeming to increase non-teacher-controlled classroom differentiation. There is a considerable increase in student communicative acts within the context of the classrooms, but the interactions do not seem to be the kind that straightforwardly supports either learning or equality.

Discussion

Opportunities to access and engage with content are underscored in the research literature as key aspects of just and fair classroom learning. This article shows that, in general, whole-class teaching as it is currently being practised in the classrooms we studied is not particularly conducive to creating equal opportunities for participation. The interactional logic of the basic participation frameworks and the turn-allocation practices in classroom interactions (e.g. the participation economy) seem to promote difference rather than equality, making it difficult for whole-class teaching to provide what it is aiming for, namely, equal opportunities for all students to develop their communicative and discursive skills and capacities within and beyond their school subjects.

Our comparative analyses of daily classroom instruction in mathematics, presented in case I, suggests that the teaching practices found in prior research seem to be fairly stable and that there is still considerable whole-class teaching in the Nordic countries. The results suggest both similarities and differences among Finland, Norway and Sweden. Mathematics instruction in Norwegian and Swedish classrooms appear to be rather similar, while Finnish classrooms exhibit a somewhat different pattern. One interesting difference is how Norwegian and Swedish mathematics teachers explicitly encourage their students to speak up and contribute to shared interactions in mathematics learning. How this influences the balance of the 'participation economy' in the observed classrooms requires further analyses. One interesting development – compared with earlier studies –

is the dissonance between, on the one hand, Swedish and Norwegian teachers' active encouragement of student engagement and participation and, on the other hand, the persistence of rather stable and teacher-dominated interaction patterns (e.g. Cazden, 2001; Wells, 2007) in the observed classrooms. The inherent imbalance in the 'classroom participation economy' seems beyond the reach of the observed teachers' pedagogical ideas and ambitions, thus making equal participation hard to fulfil.

What has changed in all the Nordic classrooms studied here, and is continuing to change as this text is being written, is the increased presence of mobile phones and laptops in classrooms. Classroom use of digital technologies alters student engagement, in terms of both opportunities for participation and access to content, both of which are, on the surface, radically increased. However, based on the data presented in this article, the introduction of mobile devices and laptops into the classroom does not seem to have resulted in changes in teaching patterns, nor do teachers seem to have adapted or changed their teaching in relation to this new interactional context.

To a certain extent, this is a surprising finding. But the continued use of whole-class teaching during this time of rapid change does make sense in relation to the participation constraints of whole-class interaction. The 1:1 access between students and devices provides students with an opportunity to participate in interactions in parallel with whole-class teaching, where their opportunities for participation always have been and continue to be limited, without directly disturbing the teaching. For this reason, the de facto digitalisation of secondary-school classrooms via students' mobile phones and laptops seems to conserve rather than change whole-class teaching as a general pattern.

Concluding remarks

For Nordic classrooms, where there is a societal expectation of and responsibility to achieve educational equity through teaching, the features of participation described in this article are only partly good news. Across the classrooms we have studied, teacher-led whole-class instruction seems, on one hand, to provide equal opportunities to access content given the teachers' accurate, explicit and elaborated representation of the curricular content. In particular, teachers' deliberate use of students' utterances through uptake and conceptual explanations seems vital for equal access to mathematics in the observed classrooms. However, analysed through the lens of student participation, a somehow mixed picture of educational justice emerges, with ample support and room for student participation in Norwegian and Swedish classrooms but less in the observed Finnish classrooms.

Individualised teaching and the presence of digital technology-based 1:1 solutions seem to weaken rather than strengthen social justice and equity following our analytical lenses of participation and access to content. The increased access students have to content unrelated to the classroom has reduced classroom equality as students have chosen to remove themselves from the learning contex. As other studies suggest, individual choice by students in whole-class teaching has a tendency to increase rather than decrease difference (Österlind, 1998; Sahlström, 1999; Dalland & Klette, 2016). Furthermore, our analyses demonstrate that the new technological devices paired with traditional teaching may actually limit access, both to learning-relevant content and to

learning-relevant discourse. As students navigate their personal pathways through the Internet in the classroom, the institutional boundaries between "classroom", "school" and "everything else" have become blurred.

In this article, we have attempted to approach large questions using data from two empirical classroom cases. Within their limits, our findings seem to pose some serious challenges for the Nordic welfare society vision of classrooms as core societal hubs for justice and equality. The focus of our work has been on whole-class teaching, which is one of the primary tools available for attempting to achieve justice and equality in educational access for all students. This interaction format seems to contain inherent constraints that do not support equitable student engagement. Further, the way the Nordic classrooms have responded so far to the massive digitisation of society seems to pose serious questions rather than provide comforting answers – questions such as: what do we need classrooms for after all; and what should teachers and students be doing in them?

Disclosure statement

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