

ICT practices, social class and pedagogy in Swedish lower secondary schools

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Abstract

In Sweden, according to the present curriculum lower secondary schools are responsible for providing and tutoring all students in information and communication technology (ICT) as a tool in the search for knowledge and learning. In this article, it is proposed that schools have different preconditions to fulfil these obligations, depending upon how they integrate ICT into their pedagogical practices. The aim of this article is to examine the relationship among classrooms, ICT access, and pedagogy by comparing three Swedish lower secondary schools with different social compositions. The data consist of observations, interviews and policy documents. It is suggested that it is necessary to have sufficient equipment and strong pedagogy for all schools to fully use the potential of ICT as an educational, learning and teaching tool. It is concluded that the schools do not have equal opportunities to provide students with a pedagogical practice that can enable ICT skills and knowledge due to unique mandatorships and social acting spaces.

Keywords: ICT, pedagogy, lower secondary school, equity in education, institutional habitus

Introduction

In a world characterised by technological development and its impact on the way people live, interact and communicate, schools play an important educational role in relation to technology. In Sweden, the results of research indicate that school choice has increased segregation in society (Kallstenius 2010, 15; Ravitch 2011, 146; Böhlmark and Holmlund 2011, 41). Evidently, schools in which a majority of students come from families with no experience in higher education achieve poorer results than schools in which a majority of students come from families that are accustomed to higher education (Skolverket 2012a, 72). These differences have increased substantially over time (Skolverket 2012a, 72). Research results also indicate that students from families which are accustomed to higher education are more likely to use information and communication technology (ICT) tools in more advanced ways than students from families that are unaccustomed to higher education (Tondeur et al., 2011, 162). Regarding these equality gaps among users, the term *digital divides* relates to access to ICT among individuals (Hargaittai 2002) or the use of technology among individuals (Warschauer 2003; Warschauer, Knobel and Stone 2004, 584; Reinhart, Thomas and Toriskie 2011, 181).

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This article reflects on the role of pedagogy in Swedish lower secondary schools in which social inequality is growing at a time of technological expansion. ICT in education reportedly contributes to educational equality (Heemskrek et al., 2012, 155). ICT is presented as a force with the potential to transform education for the 'better' (Player-Koro 2012, 93). It is also suggested as a means to contribute to educational equality due to its motivating effects on students and its potential to individualise and differentiate teaching (Heemshrek et al., 2012, 155). It is not necessarily true that school settings which offer greater access to the Internet and computers 'naturally' result in the successful use of ICT among students. As Leander (2007, 26) points out, school culture does not start or end with the implementation of technology. School values and practices have a tendency to be consistent and hard to change. Building upon the work of Hodas (1993), Leander (ibid.) argues that school use of technology is primarily a pedagogical issue rather than an access issue. Nevertheless, few researchers have examined school *pedagogy* as a precondition for the equal utilisation of technology (Selwyn 2010, 66).

This lack of research on the topic is also stressed in Sweden. In a report concerning ICT use in compulsory schools which was compiled by the Swedish Schools Inspectorate (Skolinspektionen 2011, 15), it was concluded that research analysing schools' pedagogical use of technology was warranted. These reports shed light on the need to critically review schools as agencies of the reproduction of social inequalities.

Educational segregation due to school choice in Sweden is a pressing issue which researchers view as a threat to social unity (Belfield and Levin 2007, 2). Building on this foundation, the goal of this study is to understand ICT as a pedagogical phenomenon that has the potential to create possibilities and/or restrictions, depending upon the schools at which young people become students. There is an urgent need to examine how schools' pedagogical practices affect students' relationships with technology and equity in education (Håkansson and Sundberg 2012, 241).

The aim of this article is to examine the relationship among classrooms, ICT access, pedagogy, and students' social backgrounds by comparing three different lower secondary school settings. The questions of interest are: (1) Which differences emerge in the pedagogical use of ICT in classrooms?; (2) How and why does access to ICT vary among schools?; and (3) Which consequences do schools' access and the pedagogical relation to ICT have for students' right to equal education?

Methods and sample

This study utilises data from three Swedish lower secondary schools with different demographic compositions. Data illuminating ICT in school practice were collected by a single researcher through observations and audio recordings of approximately 60 hours in one class with students aged 15 to 16 years in each school during the autumns of 2010 and 2011. The observations were used to help understand the

teachers' and students' practices, routines and interactions with regard to the use of technology in the teaching of various subjects.

Students' use of ICT in the classroom, how teachers and/or students talked about ICT, and situations inside and outside of the classrooms related to ICT use or access were recorded. Lessons in all subjects, both theoretical and practical, were observed.

Data on school practice and ICT were collected through recorded and transcribed in-depth interviews with 8 school leaders, 17 teachers and 48 students in the school settings examined. Given the interest in ICT in relation to pedagogical issues, the interviews were organised in four themes: (a) activities: what students do in the classroom, how they do it, and which possibilities and restrictions they face; (b) relations: how students talk and interact in school; (c) approaches: social, physical, and material opportunities in school; and (d) experiences and expectations: students' grades, school choice, and outlook on the future. An additional data context was a policy document from a technology company that described contracts with municipal schools. It also contained information about the services and range of technology it could provide. This document was used to understand the schools' ICT practices in relation to the observations and interviews (Hammersley and Atkinson 2007, 122).

The analysis of the observations, interviews and documents was inspired by *qualitative content analysis* (Schreier, 2012), which can be described as a conventional content analysis (Hsieh and Shannon 2005, 1279). The text data collected from the transcribed observations, protocols and interviews were first read closely and repetitively to attain immersion and a sense of the "whole" (Hsieh and Shannon 2005, 1279). From this initial review of the text data, several codes were derived depending on common characteristics. Observation sequences and interview segments that dealt with similar issues, such as teachers' use of technology, were placed in one category. Next, after a second review, codes that shared similarities and transcended each other to some extent were grouped in the main categories (Schreier 2012, 6). In a conventional content analysis, text data should speak for themselves without imposing preconceived categories or theoretical perspectives. Pertinent theories are addressed in the discussion/conclusion section of this article (Hsieh and Shannon 2005, 1280).

To strengthen the validity of the data analysis, the empirical contexts were submitted to triangulation (Watt Boolsen 2007, 188). Observations, interviews and policy documents were analysed as three interacting materials to understand the study object more thoroughly (Stake 1995, 107; Ritchie 2009, 43). This was done by comparing the students' and teachers' actions and mind-sets with the schools' and school leaders' expectations and requirements. Further, triangulation was used to compare data from each school context. Inspired by *triangulation across cases* (Stake 2006, 77), the school data contexts were contrasted with each other to promote a greater understanding of the individual schools' practices.

The schools' preconditions and ICT access

The student populations in the examined schools highlighted some obvious differences in parents' education levels, and access to ICT. The schools' different objective conditions, both socio-economic and material, are presented in Table 1.

School 1	School 2	School 3
Independent school	Public school	Public school
600 students	600 students	600 students
81% of parents with a post-secondary education	80% of parents with a post-secondary education	46% of parents with a post-secondary education
One student per computer	Public laptops in classrooms	16 desktop computers in 1 computer room
Teachers have personal laptops	Teachers have personal laptops	Teachers have one desktop computer available in classrooms

School 1 is an independent school located in the central part of a mid-sized town. It was one of the first schools in Sweden to implement a 1:1 ICT agenda. It has been working with ICT since the late 1990s. The school provides students with a personal laptop from year 7 of school (age 13) for use both at school and at home. The school also has a wide range of other technologies such as film cameras and programs for picture editing, working memory, speech synthesising, and treating dyslexia. It has been working with the same technology company, Apple, since 1999. It is attractive within the local educational market. Between 2003 and 2010, the school increased its student population by 38%. Statistics show that School 1 is successful as its merit rating is 16% higher than the average value for all compulsory schools in Sweden (Skolverket 2012b).

School 2 is a public school centrally located in a large city. In 2010, it launched an extensive ICT drive based on a central contract developed by the local municipality with a technology company, Volvo IT. The teachers were educated in ICT. In addition, the school invested in laptops, cameras, printers and peripheral equipment. Dell laptops and other tools are available in classrooms for all students to use during lessons. Further, teachers have personal laptops. Between 2007 and 2012, the school had a stable student population, with approximately 65 to 70 individuals in every class in year 9 (age 15). Statistics show that School 2 is successful as its merit rating is 14% higher than the average value for all compulsory schools in Sweden (Skolverket 2012b).

School 3 is a public school located in the suburbs of the same city as School 2. In 2011, it began a process to increase access to ICT in the school and educate teachers in practical ICT competence. This effort was enabled by a municipal contract to which all public schools are eligible. It has one computer room in which 16 desktop computers are available. Computers for teachers are available in

classrooms. In some classrooms there are projectors. The school's statistics concerning the student population reveal a negative trend. For example, in year 9 (age 15), between 2003 and 2012 the number of students declined from 147 to 78. Moreover, the school's merit rating is 4% lower than the average value for all compulsory schools in Sweden (Skolverket 2012b).

Theoretical framework

The concept of *institutional habitus* stresses how institutions, such as schools, shape "the habitus and practices of individuals through the organizational forms and collective practices" (Burke et al. 2013., 165). Institutional habitus is described as "the impact of a cultural group or social class on an individual's behaviour as it is mediated through an organization" (Reay, David and Ball 2005, 36). Institutions like schools influence individuals' educational opportunities and trajectories (Reay 1998, 524; Reay, David and Ball 2001; Reay 2004, 434). From this perspective, a school's habitus, which is similar to an individual's habitus, is "a system of lasting, transposable dispositions" and a product of historical, social and cultural meetings and actions (Bourdieu 1977, 82). Therefore, an institutional habitus is/can be manifested in individuals' actions, speech, body language and physical movements. The epistemological interest in this study is to generate knowledge about the relationship between ICT, culture, classroom pedagogy, and students' rights to equal education. Institutional habitus has been used to analyse the impact of school on educational paths chosen by students (McDonough 1997, 207; Reay 1998, 521; Reay, David and Ball 2001) and notions of school practices (Horvat and Antonio 1999, 320; Ingram 2009, 423; Reay, Crozier and Clayton 2010, 109). It has also been utilised to problematise the relationship between the home and the school (Bouakaz 2007, 76). However, with some exceptions (e.g., Edirisingha 2009, 9), institutional habitus has not been used to analyse how schools' practices shape students' pedagogical ICT knowledge and ability. Applying this theory in this setting represents an attempt to contribute to the field of critical studies in educational technology. However, the theory must be contextualised because the term institution can signify numerous types of institution, including prisons and churches.

The concept of *school habitus* accentuates that a school is a context with specific characteristics that are not valid in other institutional environments. A social milieu, such as lower secondary school in Sweden, which is mandatory, forces all young people between the ages of 7 and 15 years to attend school and subject themselves to its rules. Consequently, they experience "semi-autonomous effects" (Reay, David and Ball, 2005, 36). Students who are under the influence of classmates and teachers form a view of their possible higher education choices (Reay, David and Ball 2001). This influence is presumably even more present in a school system that is obligatory and has the same goals for all students. In the same way that an individual habitus has a structuring force (Ingram 2009, 424), a school's practices structure students'

dispositions in line with its beliefs and assumptions about education (McDonough 1996, 106). Thus, school habitus illuminates how *specific* objective conditions of educational practices help to shape a school culture, which is “formed and re-formed” within its social space (Burke et al., 2013, 179). This means that ICT practices in a school must be linked and understood in relation to the school’s history, its popularity in its geographical context, its position in the education market, and its composition with regard to students’ socio-economic backgrounds (Isling Poromaa, Holmlund and Hult 2012, 56). Therefore, school habitus, like the concept of habitus, is a useful theory to help understand and describe schools’ impact on ontological questions relating to objective living conditions and the creation of systems of dispositions that influence people’s thoughts and actions (Bourdieu 1977, 73). It is also helpful to analyse the school as an institution in which students are subjected to socialisation that creates prerequisites, possibilities and restrictions related to the use of technology.

The pedagogisation of technology

According to the current Swedish curriculum for lower secondary school, students must acquire knowledge of how to use ICT (Lgr11). ICT practices hold consequences for how students relate to learning. Findings from this study indicated that the use of technology in the classrooms varies. The results of reviews of the examined school practices indicate both commonalities and variations in the schools’ pedagogisation of technology. The results from each school are presented separately.

School 1 – 1:1, one student-one computer

The use of ICT in School 1 is described in a pedagogical ICT plan from year 1 (age 7) developed by the school. From year 7 (age 13), each student gains access to a laptop at school that is also available for private use. The use of ICT in School 1 is primarily manifested through activities with pedagogical goals and rules that are authorised by the teacher during lessons. There are few opportunities for students to surf the Internet without a purpose. Observations from classrooms in School 1 indicate that the computer is the students’ primary working tool in both theoretical and practical subjects.

In a lesson in natural sciences, students were ordered to present their findings from a field research project of plant layers. The computer was used as a supporting tool to present the results. Together, the students designed the presentation by communicating and constructing its content.

12:30: Kyle and Anna are trying to find a common way to solve the assignment. They are going to construct a keynote presentation. Helen, a group member, sits by herself before the teacher moves her to the seat next to Kyle.

12:40: Kyle and Anna lead the work. Helen sits in silence next to Kyle, who sits in the middle. Anna sits to his left. Helen responds positively when Kyle asks her if she likes the keynote presentation.

12:57: Helen sits inactively next to Kyle and Anna, who makes the decisions about the presentation's content, design and structure.

These segments indicate two things. First, students can use the technology in a constructive way to complete a task, which provides knowledge about an important area of science. It seems to work well here. Second, two of the students are active, whereas the other is passive. This issue is not addressed by the teacher and continues during the lesson. In this instance, technology was not used to provide a solution to what seems to be a passive learning process.

In an art lesson, teaching is supported by ICT. Students are told to use a well-known logotype and transform it into their own names. Initially, the teacher and students communicate about the task at hand, including how it should be designed within the frames given. The students are instructed to use the Internet to prepare a logotype. After the introduction, the students start to work individually. As they concentrate on the task, several students express their enjoyment. At the end of the lesson, the students present their results to the class. The impact of access to software programs in the pedagogical process is apparent. The teacher's pedagogy enables the students to engage in a creative learning process.

The pedagogical ICT practice in School 1 can be described as strict. For example, there are rules about how the ICT use should be managed by the students. The teachers are responsible for adapting the pedagogy to the agreed rules. Those rules include judging by observations, which is applied in all subjects with few examples of students breaching the school's policies in this matter. An observation from a lesson in the Swedish language highlights the rules.

The teacher starts by discussing which rights and obligations the students have concerning their computers. The teacher presents the rules for how students can use them. They are told to always read their email and always have the computers with them in class.

The rules communicate to the students that ICT is a pedagogical tool they should primarily use to solve assignments given by teachers. During a maths lesson, a student asks the teacher if he can listen to music through his earphones. The teacher tells him that he cannot. The demand from the head teacher to use the computer as a tool for teaching is underpinned by the reprimands that follow if a student breaks the rules on technology usage.

Head teacher, School 1: And if one [student] sits and abuses this, now this happens at some time every month, that student's computers are taken away for a few days because he or she

has broken the rules. The student has been surfing for something completely different than what it is meant for.

In School 1, students participate in a well-planned ICT practice. Although ICT is a pedagogical teaching and learning tool, it also has an important social function for students. The data reveal that the laptops the students use in School 1 also serve as a social meeting place in which they can play and communicate during breaks. A confiscated computer is a pedagogical handicap, but it is also stigmatising because the student cannot communicate with their classmates in virtual communities. The school rules and pedagogy influence students to embrace technology and to understand its potential. Therefore, the pedagogisation of technology is both a product of the school's educational approach and a way to legitimise the harsh rules that are sanctioned by the social groups that populate the school. Like the school management, the students understand and are attracted by technology as an educational force and a necessity.

School 2 – public laptops for students in classrooms

In the classrooms of School 2, a majority of teachers has integrated ICT as a pedagogical tool. No explicit rules exist for how ICT is used in classrooms. Each teacher establishes those rules. ICT is primarily used in theoretical subjects. The observation below demonstrates how the classroom pedagogy generally works. A maths teacher is teaching the students about coordinate systems.

09:43: The teacher shows three different types of coordinate systems on a projection. She has problems with the technology. Specifically, the computer and the Canon (projector) cannot reach each other. A student walks up to help the teacher to get the projection going. The students become somewhat restless and begin to murmur.

09:46: The teacher says “Now, I have started to talk. What does that mean?” The students fall silent because they know it means they have to listen to the teacher. The projection appears. The teacher continues her lecture.

Teachers' pedagogical competence has consequences for how ICT is used. The absence of teacher responsibility undermines the possibilities of ICT being used as a pedagogical tool. The observation below is from a French lesson.

09:35: A student comes in late. The teacher says nothing. The student has his headphones on and is listening to music.

09:40: The teacher walks up to the student. He pulls his books out.

09:45: Of the six boys in the class, four are listening to or playing with their smartphones, including two girls. A student shows her classmate pictures on her smartphone.

09:50: A student answers a phone call on her smartphone. She gives the phone to her classmate as the caller wants to talk to him. He is talking and leaning against a bench. The teacher looks at him, but does nothing.

A pedagogical practice in which ICT is not integrated as part of a planned structure opens up *an option* for some students to engage in activities where ICT is disconnected from school tasks. ICT use depends primarily upon the teachers' individual interests or knowledge. The following sequence is from a lesson in social studies.

The teacher talks about the students' use of smartphones and tells them that it is a problem they must resolve and take responsibility for. They are told to handle this issue using their common sense.

This view is one expressed by many teachers. Observations show that students handle this responsibility and freedom differently. A majority of them use ICT primarily as a working tool in classrooms. Students use private ICT during classes, which is encouraged by some teachers. Therefore, to some extent, the barriers between school and home resources are blurred. Students' own private ICT becomes an approved complement to the school's ICT. Observations provide several examples in which students use their private smartphones as a pedagogical tool.

Alexandra uses a digital Swedish-Spanish dictionary through her smartphone.

Guy uses his smartphone in English to look up words.

Students with dyslexia record lectures using their smartphones.

Students encounter an ICT practice that is characterised by an unofficial pedagogical concept based on individualised responsibility. The observed lessons have a structure that allows the students to use their smartphones to some extent. A majority of students benefits from the possibilities related to the individualistic use of the school's and their own private technology. However, for some students this has negative consequences. For those who do not possess a smartphone or their own laptop, ICT becomes a marker of socio-economic status. Further, a smaller group of students who use ICT for non-learning purposes can escape from the classroom into a digital room of leisure.

School 3 – 16 desktops in one computer room

In the classrooms, the students cannot use ICT at all. The only technology present is one desktop computer that is part of the teacher's desk. Teachers primarily show films or present slides through projectors. Assignments are handed out on paper and written by hand. The only possibility for students to utilise ICT as an educational tool is in a computer room that teachers can reserve. Classrooms in which the teacher's role and pedagogy is vague enable individual students to use private mobile and smartphones for recreational activities. During a lesson in the Swedish language, a student asked her classmate to listen to a song with her. The teacher told the

student to turn the music off, but the student did not listen. The same situation was observed in a maths lesson in which students sent messages, ignoring the teacher's rule.

However, there was a significantly higher number of observations in which students without teachers' restrictions used their private ICT in a non-learning fashion. School 3 could make use of its students' interest in technology if it offered attractive technology and an associated pedagogical practice that integrated the technology into the teaching.

Most of the observation sequences indicate how the students' schoolwork is built around conventional working tools. In a lesson in technology, students were supposed to draw a plan for their work.

Students don't have computers. They are directed to the following materials on a bench in the classroom: rulers, pencils, erasers, writing blocks, circle graphs, paper, and wooden models.

When using ICT, students sometimes have to work with very few and old computers and programs. Teachers do not have access to efficient programs such as Photoshop, which makes the task at hand difficult to carry out and creates frustration among the students. The observation below is from an art class.

They [students] had to remake a Rembrandt painting. They worked with Windows Paint. One of the students expressed dissatisfaction with the Windows Paint program by saying that it looked like a seven-year-old had made the images. Students seemed dissatisfied when working with this program.

Due to the restrictions of the technique, students' possibilities to achieve a satisfying result are limited. Moreover, the teachers' pedagogy depends on the poor tools they have available. This school situation results in teaching and learning methods that hardly offer any possibilities to develop the students' skills and knowledge about technology. Thus, the obligations established in the Swedish curriculum about students' right to learn to master ICT are not being met.

ICT is primarily a tool that teachers use for collective activity in a classroom. Accordingly, technology generally is not an individualised pedagogical tool for students. The observation segment below exemplifies a full class pedagogy and the consequences it holds for the students' learning possibilities. The teacher is planning to give a quiz through an online site. When the website is displayed through the projector on a screen, the students react by shouting out the answers. The observation protocol below describes some events from the lesson.

09:58: The teacher asks questions from the website. Olle responds.

10:03: Henric asks, "Why does he [Olle] get to answer all the time?"

- 10:05: Martin talks about something that is not part of the lesson.
- 10:07: The teacher tells Gina to remove the headphones she has put into her ears.
- 10:08: Villiam asks, "After this, can we do something fun?"
- 10:09: Reacting to a sentence on the website referencing a vehicle, Henric asks, "What is an Aston Martin?"
- 10:09: Laughing a little, Olle responds, "It is a car."
- 10:11: The teacher tries to quieten the students down by saying, "Shhhhhhh!"
- 10:12: Emilia says, "Enough!" Håkan teases her.
- 10:13: Once the questions on the site are finished, the students' results appear on the screen.
- 10:13: The teacher tells the students, "You got 96% correct answers."

When the computer is used in the classroom it becomes a shared activity. It creates a situation in which the noise level in the classroom is massive and the possibilities for the students to actually learn something from the quiz are limited. The lack of access, knowledge and experience with ICT use seem to restrain an ICT-oriented pedagogical practice. Teacher-initiated lessons in which ICT is utilised for schoolwork are rare. Consequently, students spend their weekdays in a school environment in which they have virtually no opportunities to individually work pedagogically with ICT.

The schools' ICT and acting space

The pedagogical use of ICT seems to be linked to access. They are related to each other because there can be no pedagogical development of ICT if there is no ICT to use. Access, use, and pedagogical applications are all subjected to the objective socio-economic reality of a school and thus have different outcomes.

The data indicate that the three schools have different levels of access to ICT. These differences are linked to the schools' mandatorship and available social and economic resources. As the head teacher of School 1 highlights, the school has its own mandate and, consequently, can work more independently with technology companies:

We have more freedom to choose which agreements we go into and that suits our business. It is our belief that our freedom is greater in this way; thus, there is no doubt about that.

Another dimension of the schools' mandatorship that influences the access to ICT in classrooms is the influences on the schools' budget control. According to the head teacher, School 1 cut the costs of its ICT administration and management by minimising the number of employees. As a result, financial resources can be used for development and investments in ICT, rather than administration costs. In addition,

maintenance work costs are reduced because the students 'own' their computers and are therefore responsible for maintaining them.

So we've organised ourselves in a completely different way, which means that our administrative costs are much lower, and we can afford to invest in computers in education so students can have MacBooks.

The independence of School 1 allows it to become a consumer of ICT. Its resources enable it to have a relationship with technology companies that is built on personal contact, trust and flexibility, according to the head teacher. It is more difficult for public schools (Schools 2 and 3) to develop a similar relationship with technology companies as they are stuck in agreements made within the municipality. According to the head teachers in the public schools, resources have consequences for which ICT equipment schools have available, which affects the teachers' possibilities and willingness to work with ICT.

Head teacher, School 2: It is simply a bad agreement. The municipality has made a bad business decision. It has invested millions in ICT that is limited, and all schools and municipal organisations are stuck with the same tools.

Head teacher, School 3: There's so much that doesn't measure up. I would like to see more ICT in classrooms and a will to work with such equipment. I would really appreciate that and I'm trying to encourage people [teachers] to work with it and get the education they need. That's the dream.

Head teachers have to follow the decisions, measures and agreements made by local politicians and officials. In Schools 2 and 3, the ICT equipment is provided by a technology company (Dell) and through an outsourcing contract with Volvo IT. This central agreement has consequences for the schools' ICT practices and access. School 2 is trying to solve the inflexibility embedded in the central contracts by using ICT resources beyond those provided by the municipal contracts. This tendency is highlighted in an observation from an art classroom in which students use Apple computers.

In the classroom there are three MacBooks with large screens [equipped with editing programs for movies, photographs and pictures]. The hall has a projector, TV, video and bookshelves with books about art and photography. The teacher tells the students about an order of iPads for the classroom. Here, there are also media equipment and cameras.

Central agreements within public schools also mean that the school staff members have to apply for funding so that external ICT competence can be promoted. This phenomenon is especially apparent in School 3 where, according to the head teacher, the regular staff members do not want to work with the existing ICT equipment. Teachers there spend considerable time writing applications and cooperating with hired, external staff.

Interviewer: Do you feel that you as a teacher have enough resources to work with technology?

Teacher: Yes, if I'm active and apply for money from the municipality, which they [head teachers] tell us to do. But then it's a matter of time again. [They] say find the money. You can get an allowance and hire staff to help yourself. If it works, it's great. But it's also a bit of my time to have the strength and desire to plan this. If you do so, you get burned out.

Interviewer: But don't you have staff at the school who can help you with this type of solution? You have to find them somewhere else?

Teacher: We get hired people coming in and working, so you can't buy the tools, but there are unemployed people who will support ICT. And that's suitable when you have 30 students who you can divide among us [the teacher and external staff]. That's great, but it takes time . . . and also you should audit your application and seek new money again the next year.

Although both public schools belong to the municipality and have similarities, the teachers have different preconditions to work with ICT. School 2 has staff resources *within* the school, such as a head teacher with an explicit responsibility for ICT tools and development. These types of resources do not exist in School 3. There is no person with pedagogical expertise within the school who can support and prevent problems related to ICT.

The schools' embodiment of ICT competence

Of equal importance to the issue of access is competence in the use of ICT. The teachers and students at the three schools have diverse knowledge about and competence in ICT. For example, students in School 2 use their private smartphones in classrooms to manage school tasks. Further, the data show that the students help the teachers, serve as resources, and represent embodied competence. The students' *habitus* becomes part of the knowledge bank embedded within the school's practice. Their skills are also emphasised and valued by the teachers. What is more, they are embedded in the school's pedagogical design, which undoubtedly has consequences for student learning, classroom pedagogy and the school environment. It is clear how access to technology is also intertwined with the embodied ICT competencies found in individuals and in schools.

Head teacher, School 1: To take in ICT without a good pedagogical philosophy is dangerous. I would say . . . to believe that only the implementation of the greater use of ICT in schools raises the level of knowledge is completely wrong. You should have a genuine pedagogical basic idea and you should take the experience from traditional pedagogy to make your efforts successful.

Head teacher, School 3: The aim for this year has been to provide all classrooms with projectors, and the teachers have had education in practical ICT and, therefore, have more competence and are supposed to develop this and to feel safe with it. Then, the next step has to be to work with ICT in classrooms.

The head teachers' answers point to ICT's embodiment in the pedagogy of schools that have different preconditions. Teachers in School 1 are expected to be able to use

ICT wisely from a pedagogical stance; it is a precondition to even being considered suitable to work in the school. School 3 does not require ICT competence for employment. Even though the head teacher expresses a willingness to develop the teachers' ICT competence, the interview segment shows that School 3 lacks ICT competence among staff members.

Discussion

This study's aim was to examine the relationship among classrooms, ICT access, and pedagogy. The data were collected in three Swedish lower secondary schools composed of student populations with diverse social backgrounds. There was an explicit interest in examining differences in the schools' pedagogical use of ICT in classrooms, how and why the schools' access to ICT differs, and how access and the pedagogical relation to ICT in schools affect the students' rights to an equal education. This study shows that the pedagogical use of ICT in classrooms is intertwined with access, teachers' competence, and pedagogy, and seems to be related to the schools' social structures.

School 1 is an independent school and labels itself as a school where ICT is an integrated part of the pedagogy. Teachers' ICT and pedagogical competence guides the learning environment. Consequently, the pedagogy means that ICT is a teacher-controlled tool. Through the demands of student groups, the school is an ICT-rich environment with advanced equipment and a common interest in a pedagogical practice that uses the latest and best technology. The school cooperates with a preferred technology company, and the slimmed down administration can find money for development and investments in ICT. The school *habitus* is coherent with the expectations and desires of the well-educated social groups that dominate here and understand the importance of ICT as a studying and learning skill (Bourdieu and Passeron 1977). Students and their families here can rely on the pedagogy to provide them with sufficient skills for further success in their education and working life.

School 2, a public school, has a pedagogy built upon the notion that students themselves are largely responsible for their own learning. Consequently, the classrooms display an ICT use that is diverse, in some classes fragmented, and not always teacher-controlled: students are allowed, for example, to use their private ICT to solve school tasks. To some extent, students are themselves expected to handle the freedom that the pedagogy opens up regarding ICT use. A majority of the students handle this responsibility well, although some seem to have problems concentrating and focusing the activities on schoolwork. Access to ICT is restricted by blunt central agreements signed by the municipality with a single technology company. Still, the school finds ways to work with alternative and (self-proclaimed) better ICT tools. Students use their own smartphones in the classroom, for example, and teachers are using other brands that suit educational needs. Thus, access problems are dealt with through competence and social and economic resources within the school

organisation. The pedagogy signals a *habitus* that encourages and forms students to enhance proper learning technologies since the school and its community have a coherence regarding the importance of ICT, and they also have a “natural” habit of using it at home (Tondeur et al., 2011, 162). This convention is linked to values about education that can be found in the schools’ well-educated social groups (Reay, 2005, 26).

School 3, a public school, shows a sparse influence of ICT. Teachers only have one computer at their disposal in the classrooms. This single unit is used to display projections and the like. The pedagogy, when it uses ICT, builds upon a shared pedagogical experience with few examples of individualised learning situations. The fact the ICT tools are provided as part of a contract signed by the municipality means that both the staff and students are restricted in both access and in what the software programs can achieve. The school also lacks the competence within its organisation to solve problems related to access and use. Consequently, teachers have little opportunity/interest to work with ICT since the available tools are limited and dissatisfying. The ICT practice illuminates how the school’s *habitus*, through its restricted substantive learning environment, socialises students into a halting, insufficient knowledge of ICT tools and how they can be used. The pedagogy the teachers are offering cannot be considered poor, nor can the learning situation be judged as either better or worse than other, similar education. Nevertheless, the poor integration of ICT into the pedagogy can be said to hinder or complicate the process of learning to use modern technology, and complicates the students’ educational paths. An equality problem arises when many students most likely cannot rely on technical equipment in their homes. Thus, the data from School 3 highlight the importance of ICT access, proper equipment, and a pedagogy that can benefit from the new technology and promote the skills students need to be successful in their future education and working life.

Differences in the pedagogical use of ICT in the classrooms

A technology-rich school is not a guarantee of a pedagogy that enhances and develops students’ skills and knowledge about ICT (Leander, 2007, 46). Still, this study’s results indicate that access to ICT does influence the integration and development of a pedagogy that enhances and utilises the teaching strategies that the technique can offer; similar views are proposed by Håkansson and Sundberg (2012, 243). The schools in this study host three very different forms of pedagogy related to diverse social structures that influence the schools’ ICT competence, access and use.

A pedagogy in which the teacher is the one to integrate ICT into education limits students’ possibilities of the private use of ICT in the classroom. The finding that a majority of students in School 1 has accepted these rules can be interpreted as the students and their families being attracted to the pedagogical function/relation that

ICT plays in the school's *habitus*. In consequence, it is not particularly remarkable that the use of ICT is integrated into the school's legitimate pedagogy. It thus seems that the students' ICT behaviour is shaped by a pedagogical practice that values ICT skills and knowledge (Burke et al., 2013, 165). By appreciating and being a part of this institutional/school *habitus*, all students acquire sound knowledge of ICT. They also develop a relationship with technology that is future-oriented and useful.

In School 2, the responsibility to use ICT is to some extent put on the students themselves. Therefore, resources embodied in the students' individual *habitus* become more important. Students who understand the role of ICT can make successful use of the pedagogical design (Tondeur et al., 2011, 162). However, those students who do not understand or cannot benefit from this pedagogy have more difficulty controlling their ICT use during learning activities. In classrooms in which the teacher is responsible for pedagogy and for the way in which ICT is used, a larger proportion of students use ICT directed towards schoolwork. Still, School 2 distinguishes itself in its acceptance of private ICT use in classrooms. Thus, individual students' knowledge of ICT is a competence that benefits other students and teachers, and is becoming an integrated part of the school's classroom pedagogy. The learning strategies and skills that emerge from the students' use of private ICT are incorporated and valued by the school pedagogy. In this way, the school's pedagogical practice with ICT is a product of historical, social and cultural meetings and actions (Bourdieu 1977, 82).

In School 3, individual teachers have a functional pedagogy that uses the sparse access to ICT as a complement to the ordinary teaching procedures. The integration of ICT into the pedagogy is poor, but this is not due to a lack of commitment from the teachers. Instead, the limited access to technology and resources explains why this school fails to provide students with pedagogy that enhances knowledge and skills in ICT. In addition to reading and writing, ICT is cultural capital that is embodied in the *habitus* (Bourdieu, 1977, 78). Students in School 3 are likely equipped with less 'ICT capital' than students in Schools 1 and 2, and School 3's pedagogy also does not compensate students in this matter: its impact on the students' use is weaker (Reay, David and Ball, 2005, 36). Students are subjected to "semi-autonomous effects" (Reay, David and Ball, 2001), and their ICT behaviours are not socialised within a pedagogical practice.

Software evidently affects what teachers can do in classrooms. The segment in which students were asked to create a replica of a Rembrandt painting demonstrates this impact well. The pedagogical process was not inspiring, and created an unfavourable attitude to the school's ICT tools. ICT's attractive and challenging potential was lost (Heemshrek et al., 2012, 156). This finding accentuates not only that the individual teacher is a key figure for successful student learning (Håkansson and Sundberg, 2012, 245), but also that having sufficient programs and software matters.

In any case, differences between schools regarding how ICT is used pedagogically are linked to schools' structural characteristics, such as equipment, organisation, support and policies (Tondeur et al., 2009, 224). Further, a successful ICT pedagogy is linked to cultural characteristics *embedded* in the school's *habitus* – that is, “the basic assumptions, norms and values and cultural artefacts that are shared by school members, which influence their function in school” (Maslowski, 2001, 8–9, cited in Tondeur et al., 2009, 226). In both School 1 and School 2, there are cultures among a majority of the individuals that share common assumptions about the importance of technology. Here, there is a ‘symbiosis’ between the structural and cultural resources within the respective schools' *habitus* that calls for ICT to be integrated into the pedagogy. However, in School 3 the structure and cultural context that the school acts within does not allow this, and adds complications for a pedagogy that enhances ICT skills.

Factors that explain the varying access to ICT among the schools

The head teachers at all of the studied schools see technology, ICT tools, and pedagogy as necessary for legitimately competing within the education market field (Bourdieu, 2005, 54). The data show that the schools' mandatorship creates different opportunities for head teachers to gain access to the desired ICT, which holds consequences for the students' and teachers' access to and use of ICT. For School 2, the lack of access to ICT tools through the municipal contracts is compensated by knowledge and the use of alternative ways of acquiring the necessary technical equipment. ICT tools are provided for staff members and students. Accordingly, even though independent School 1 and public School 2 have different authorities (and different pedagogies), they both have an institutional *habitus* that values ICT and resources to satisfy appreciated needs. Thus, ICT is regarded as part of the pedagogy and a way of being (Bourdieu and Wacquant, 1992, 127). School 3 does not seem to have the same powerful acting space, which limits its potential to provide its teachers and students with sufficient equipment. In addition, the school lacks internal competence to compensate for the insufficient ICT tools offered by the municipal contracts.

ICT and equal education

In today's 'knowledge-based' society, ICT is a greatly valued educational tool (Tondeur et al., 2011, 2). It is possible that knowledge about ICT will become even more important when the students in this study enter higher education and the labour market. Schools have an impact on students' “opportunity structures” (Ball, David and Reay, 2002, 55). In this study, the students' opportunities to *be aware of* how to use ICT varied, depending upon their social backgrounds. Different learning opportunities were embedded in different schools. School choice in Sweden has become related to social background (Lundahl et al., 2010, 47), which among other

things results in students having different possibilities to embody ICT as a working tool (Hollingworth et al., 2011, 358).

Schools with high educational capital have the greatest access to ICT and, therefore, have greater opportunities to ‘pedagogise’ ICT in classroom learning processes. Digital divides appear as a matter of *pedagogical divides* (Hargaittai, 2002; Warschauer, 2003). The schools in this study with the most access to ICT had more classrooms in which ICT (both the schools’ and the students’ own private ICT) was integrated into the pedagogy. This advantage in education mainly involved students with well-educated parents. The students’ educational opportunities then affect their later educational and occupational prospects (Lebens, Graff and Mayer, 2009, 265).

Students from low-educated families are likely to have fewer opportunities to interact with computers due to the restricted access to ICT equipment at home and lower self-confidence in using ICT at school (Lebens, Graff and Mayer 2009, 263). In school, students’ individual *habitus* is constantly under a demand to adapt to the social setting (Bourdieu, 1993, 88). The ICT abilities that students gain in school bear *restricted* or *expanded* opportunities. Inequality related to social structure accentuates the school’s role in compensating for this deficit through a pedagogy that develops students’ knowledge of ICT, a skill they do not develop at home. Social background should not be the primary factor in students’ trajectories and possibilities within the education system. ICT has the potential to develop more individualised and differentiated learning and teaching (Heemshrek et al., 2012, 155). ICT skills – both pedagogical and technical – must be mastered by students in order for them to meet the needs and demands of the working life that awaits them after school (Skolinspektionen, 2011, 1). Mere access to ICT, however, is not enough to achieve an equal education. It is the pedagogy that organises the technology in a logical way, enabling students to learn with equipment they are familiar with (Prensky, 2001, 2). But the pedagogy has to be given a chance to develop. In schools with students from homes unaccustomed to higher education this is especially important. The extent to which schools’ possibilities of giving students the necessary skills in ICT varies, which calls for attention and stresses the need for more studies that examine school practices, pedagogy and ICT in various social contexts.

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