From digital divides to digital inequality

—The emerging digital inequality in the Norwegian Unitarian school*

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Abstract: This position paper highlights existing and emerging, prospective digital divides in Norwegian schools and asks whether we are now moving from traditional digital divides to digital inequality in our digitized society and schools. Despite very good technology density in Norwegian society and schools in general, there is the reason to pay attention to whether this situation creates new kinds of digital inequalities among already vulnerable pupil groups. Therefore, this position paper focuses on whether under the new Norwegian educational reform. The Knowledge Promotion, it is necessary to consider this issue from another angle because of e.g. the increased status of digital literacy and implementation of ICT-based (Information and Communication Technology) exams in the national curriculum. The position paper focuses on what kind of digital inequalities we see the profiles of and what issues the government has to consider to prevent these tendencies escalating.

Key words: digital divides; digital inequalities; pupils; Norway

1. Introduction

How would it be if you had to share one computer with eight of your colleagues at work everyday throughout the year? How would it be if you had to share one textbook with ten other of your fellow pupils when you went to school? And how would it be if you didn't know how to use a textbook or a computer? These questions might trigger us to reflect on how important good access to, and familiarity with computers is, both at work and in school in our Network society (Castells, 1996). In many ways, we are in the middle of a digital revolution and we have to ask ourselves if there is reason to be worried about digital divides in our (apparently) digitized, global world. Or is this something that will disappear as people all around the world in general becomes more and more involved in the technology? In Norway, we can observe the contours of a digital inequalities as a "side effect" of a large scale implementation of technology in society and in school the last ten years, but we still don't know yet the longitudinal consequences of such implementation. In the debate around such issues internationally, there is some disagreement about whether digital divides in access to technology and use of ICT are increasing or decreasing across different demographic categories (Hargittai, 2003). For instance, Compaine (2001) argues that there is no need for remedial action in this area because digital divides will decrease over time. Whereas Dickard (2002) underlines the need to focus more on the increasing digital diversity among different groups in the population. Without adopting any stance, there appears to be a need to develop this area more in depth, in order to reveal more consistent patterns in prospective research. Therefore, this position paper focuses on how the digitized society and

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schools in Norway create new possibilities for teaching, learning and adapted education, while at the same time might create unintended side effects. This has become increasingly relevant over the last five years as ICT and the new digital technology (broadband, Internet, World Wide Web) that has had a huge impact on society, with increasingly improved infrastructure and technological density. The entire aspect of new net-based teaching resources, portals, ultra-fast search engines, multimedia and interactive learning platforms (Learning Management System), together with a general digitalization of daily life exemplifies this development. As a consequence, participation in the Network society in 2008 means that the majority of Norwegian citizens are able to obtain all the services from public authorities via the Net (e.g., http:// www.norge.no), communicating in new ways via the Net and mobile phones (skype, chat, SMS, e-mail, etc.), having access to vast information resources and knowledge via the Net (e.g., http:// www.utdanning.no; http:// www.viten.no) and, at the same time, are able to portray themselves (e.g., http:// www.facebook.com), have a "voice" in the public arena (e.g., Internet blogs, discussion forums) and participate in Net societies (http:// www.myspace.com; http:// www.secondlife.com). The question that arises is whether the rapid digitization of society and schools establishes a gap between the digital literate and digital illiterate, and if so, how does this influence human development for the "have nots", as well as teaching, learning and adapted education in our contemporary society. This situation is especially relevant in Norway with its high technology density and since the new educational reform, The Knowledge Promotion (Kunnskapsløftet) (Curriculum work for the 13-year primary and secondary schools, Ministry of Knowledge, MOK, 2006), which has been implemented during the last two years. This reform considerably increases the status of ICT as the fifth basic literacy (digital literacy), which is obligatory for teachers and pupils in all subjects at all levels (1-13). Norway is therefore the first nation in the world that highlight digital literacy so clearly in the national curriculum and this is a historic event in the Norwegian educational history. As a consequence of this increased ICT status in subjects, in syllabus and in exams, a new "digital classroom" (learning platforms or Learning Management System) is more or less an established structure in secondary schools, and demands that pupils have continuous access to computers and Internet both at school and at home (because of increased subject-related and homework activities that are located on these learning platforms). And the new White Paper nr. 31 (2007-2008), *Quality in School* (MOK 2008) from the Norwegian government underlines very clearly that the school owners has a responsibility to make sure that every pupil has necessary access to ICT, independent of social background. Thus, this position paper aims to highlight how all this influences the socio-cultural participation of teachers and pupils both within and outside of school in our contemporary Norwegian society. Therefore, the problem this position paper deals with is how can the Norwegian government hinder digital divides in the digitized school? The position paper has a policy perspective as a backdrop and seeks to review the most relevant obstacles with regard to socio-cultural participation and the digital diversity teachers and pupils are facing in today's digitized school in Norway. In the following section, I present some contemporary policies and trends influencing this area.

1.1 Digital self-confidence in the network society

In the Network society (Castells, 1996), it is necessary to become digitally self-confident in order to participate in general as well as in school. Technology increasingly becomes seamlessly integrated in our everyday practices and in the way we communicate, and demands the capability for administration of hyper complexity (Qvortrup, 1998) in order to cope with in a society that, in many ways, is only "10 years old". Consequently, our traditional perception of participation and communication has changed, and the Net generation (Tapscott, 1998) is, in many ways, the innovator in this area. The Net generation's school pupils in 2008 are, in

many respects, the *Screenagers* (Rushkoff, 1997) or *New Millennium Learners* (Pedro, 2006), and are digitally self-confident in this new online digital "landscape". In many regards, they live as an online existence and are much more comfortable with the digitization of society and school than their parents' generation (Tapscott, 1998). They write, they blog, they chat, they search, they construct knowledge, they play, they find digital teaching aids, they try out identities, they make films, etc. with a digital self-confidence not seen in previous generations. As a result of technological convergence, they have an arsenal of digital resources available at the click of a mouse, which provides completely different opportunities than a decade ago when the PC (personal computer) was unknown in school and the textbook had hegemony. The digital format and Internet play important roles in this generation's contemporary culture, but little is known about those youngsters who, for various reasons, remain outside the digitized society and school, stranded in a digital gap. Access to technology is, therefore, a premise for participation both globally and locally, and a number of questions arise as a result of this. What happens when access to technology, both in school and homes, is very good among the majority of Norwegian pupils and rather poor among a minority of pupils? Can this results in a Matthew effect (Merton, 1973) and creates an even larger gap between different groups of pupils with regard to school achievement? Are schools aware of, and capable of handling this situation with regard to adapted education? Does this development increase the need for new policymaking within the area of digital divides or will it become equalized over time? These issues are highlighted below.

1.2 Technology density in Norwegian society and school

In recent years, Norway has become one of the leading countries with regard to accessibility of technology in society and schools, and consequently there is a need for more knowledge and awareness about how this situation influences socio-cultural participation, socio-economic patterns and digital divides. This digitization of society and schools in Norway has resulted in a situation that leaves little doubt that the digital revolution has made its mark both in society and school system to an even greater extent than that of in other countries. In recent years, Norway has been one of the highest ranking nations in relation to technology penetration in society (Castells, 2001; OECD, 2001, 2003; Vaage, 2005, 2008; Utdanningsdirektoratet, 2008). According to the report "Broadband Coverage Analysis 2007" (FAD, 2007), it is currently possible for 98% of Norwegians to be connected to broadband; 60% of Norwegian households were connected to broadband in 2007. Other societal streams in Norway make it reasonable to say that at some point in 2009, over 90% of households will be connected. Two recent European studies ranked Norway high in terms of digital skills among its population–and lowest in terms of those lacking digital skills (Eurostat, 2006, 2008). In upper secondary school, there are 1.7 pupils per PC (and this is continuously getting better), and for the first time in Norwegian history, most[1] pupils who started their upper secondary education in 2007, received their own laptop free of charge from the government and counties (Utdanningsdirektoratet, 2008). Of these pupils 41% spend five hours or more every day in front of a screen in their leisure time outside school (Vaage, 2008). For elementary pupils (age group 9-16), the tendency is same and digital learning resources are increasingly replacing textbooks for homework (SAFT, 2006). And in some counties, the paper based textbook is replaced by digital textbooks in several subjects in upper secondary schools. Eighty-eight percent of 10-year-old pupils and 99.4% of 16-year-old pupils have their own mobile telephone (Telenor, 2007). In schools, digital literacy has enjoyed a historic rise in academic status, becoming the fifth core

[1] The different counties in Norway have different solutions with regard to this. Some counties give the pupils PC-grants so they can buy their own laptop, some have given laptops to selected classes as a pilot project and others have bought laptops which pupils borrow for three years (which is the length of upper secondary school in Norway).

competence to be incorporated in all subjects at all age levels under the Knowledge Promotion Reform. Consequently, Norway is a particularly good starting point, representing opportunities, challenges and dilemmas in the running of schools. One can therefore ask to what extent does this have any impact on creating an even larger gap between the digital literate and the digital illiterate and, eventually, how do well-known socio-economic patterns fuel this situation even further?

2. Digital divides and digital inequality

Digital divides can be said to be an expression which attempts to capture how digitization of society and schools creates unintended side effects that vulnerable pupil groups encounter. It can be related to other terms such as digital gaps, digital illiterates, "the have-nots", digital immigrants, etc. More specifically, Hargittai (2003) defines digital divide as "the gap between those who have access to digital technologies and those who do not; or the gap between those who use digital technologies and those who do not understood in binary terms distinguishing the 'haves' from the 'have-nots'" (Hargittai, 2003, p. 2). A common trait of digital divides and related terms focus on how the digital revolution establishes new trajectories that can be seen globally, nationally and locally. In this position paper, the term of digital divides focuses on how the pupil, both as e-citizen in the Network society and as pupil in the digitized school, might be influenced by unintended digital divides in their socio-cultural participation. Therefore, the term of digital inequality is also used to capture the underlying differences that might occur as a consequence of digital divides. Digital inequality is, therefore, "A refined understanding of the 'digital divides' that emphasizes a spectrum of inequality across segments of the population depending on differences along several dimensions of technology access and use" (Hargittai, 2003, p. 2).

In Norway today, typical individuals in the digital divides, are considered to be people in the age group of 67-79 years. These individuals use home computers and the Internet 35%-55% less than other age groups. On average, women in this age group use the technology least of all, which constitutes a digital divides among elderly people in Norwegian society. At the same time, the previously mentioned study, Eurostat (2007) demonstrates that Norwegian women in the age group of 55-74 years use the technology much more frequently than similarly aged women in other European countries (Eurostat, 2008). However, it is a challenge for Norway to avoid elderly people suffering a digital divides, especially as many institutions and services that they have been used to visiting physically have disappeared into the "digital arena" (bank services, post services, etc.) during the last ten years.

When it comes to digital divides in schools, this is merely touched upon in Norwegian educational policy documents prior to the new White Paper nr. 31 (2007-2008), *Quality in school* (MOK 2008). One reason for this is that implementation of ICT in school has very often well-intended purposes which might under communicate the more problematic side effects within this area. Some aspects of the earlier studies from Norway (e.g., Krumsvik, 2006) document show that in the process of integrating new technology, teachers are confronted with a number of digital challenges and dilemmas, which schools never had to deal with before. Thus, the complexity for teachers in this area is large, therefore, the majority of the teaching staffs in Norway are facing digital challenges which is the cause of much frustration in many ways. On the other hand, policymakers argue that ICT implementation is important in today's digital society and may help in better ensuring the principle of equality and inclusion, which is one of the foundation pillars in the Unitarian school in Norway. However, to give an example of the pitfalls in this new digital terrain, implementation of ICT in USA has created an unexpected side effect: "…the creation of a technological underclass in American public schools" (Cuban & Tyack, 1998, p. 125). This digital diversity

followed traditional socio-economic and cultural "trails" and created new problems for already vulnerable schools and pupil groups. Another study from the US, *Computer and Internet Use by Students in 2003* revealed a similar tendency and found that digital divides were closely tied to the socio-economic status of the pupils' parents, their family income and their ethnicity (DeBell & Chapman, 2006). For K-12 pupils, the study found that pupils with parents with graduate education had 53% better access to home computers compared with pupils whose parents only had high school credentials. In school, these differences were resolved to only 6% between the same groups. The study found a similar tendency in variable family income: 51% difference with regard to access to home computers with income over $75,000 per year compared to family income under $20,000 per year. Also in this case, the differences between these two groups were resolved in school to only a 6% difference. Regarding access to home computers based on ethnicity, the picture became more complex (as illustrated in Figure 1).

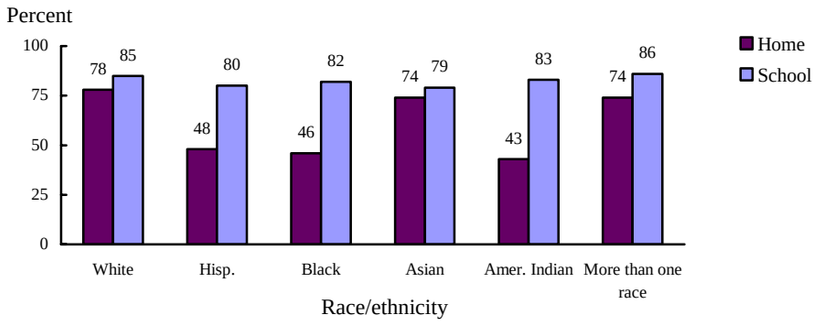

Figure 1 Computer and Internet use by students in 2003 (DeBell, M. & Chapman, C., 2006)

Figure 1 shows that pupils with "White", "Asian" or multiple ethnicities had considerable better access to home computers than "Hispanic", "Black"[2] or "American/Indian" pupils. However, in school these differences were corrected. As a summary of this study, there is reason to claim that under such circumstances, ICT access in school balances out the diversity which occurs in homes based on parents' education, income and ethnicity. Nevertheless, there is reason to claim that pupils with PC access at home have an advantage both in relation to developing their digital literacy, but also having better opportunities to use PCs for homework, as well as in preparation for ICT-based exams. At the same time, these studies focus on access to computers and we know from several countries that access to computers at schools does not mean that teachers and pupils necessarily are using them in their lessons. Scepticism to technology among teaching staff seems to be an international phenomenon and thus subject-related ICT use in school varies greatly from school to school. Nevertheless, it can be claimed that access is a strong indicator in regard to digital divides due to no access—no use.

In a study from the Organisation for Economic Co-operation and Development (OECD), *Understanding the Digital Divide* (2001), the same dilemma is highlighted under European conditions, where the danger of "falling through the Net" threatens certain groups. The report calls for remedial action concerning vulnerable groups because of the digitization of society all over Europe. This provides the call for an awareness concerning these issues in European countries where the technology density in general is quite good for the majority—which demands remedial action for the "have nots". Hargittai (2003) states that "reports have documented the presence of an Internet 'digital divides', i.e. inequalities in access to and use of the medium, with lower levels of

[2] One can ask if it is appropriate to use the term "Black" in these politically sensitive times and sometimes this can be interpreted as a stigma. However, the reason I am using it in this position paper is attached to a specific study which has this label as one of the variables.

connectivity among women, racial and ethnic minorities, people with lower incomes, rural residents and less educated people"(Hargittai, 2003, pp. 4-5).

What then, are these conditions in Norway in our contemporary society? Will we find the same patterns as in the US and elsewhere in Europe? In Norway, there are so far few studies that focus on emerging prospective digital divides in the population. However, Frønes (2002) found that youngsters and pupils with a non-Western ethnic background seem to be trapped in a digital gap. Especially in the Norwegian capital, Oslo, Frønes found that minority youngsters (and their parents) suffered under a digital divides.

A recently published study, *The Norwegian Media Barometer 2007* (Vaage, 2008) provides more updated information about different media use in the Norwegian population, which is relevant to study more closely. The study shows that concerning the use of home computers, people with higher education (postgraduate, Master's degree) spend 37% more time each day in front of the computer than people with less than high school credentials. A similar tendency is found regarding use of the Internet and reveals that people with higher education (postgraduate, Master's degree) use the Internet on a daily basis 31% more than people with less than high school credentials (Vaage, 2008). More specifically, this study demonstrates that Internet users with a higher education are the more active users of e-mail and, to a greater extent, use the Internet to search for information. Entertainment such as computer games, watching films and so on, attracts PC and net users with a lower level education (Vaage, 2008). In summary, we can assume the same patterns as with use of home computers, that the proportion of Internet users are largest among people with a postgraduate education. We can ask the question: do we see any profiles of this in school already? Are parents' role models for their children's computer use at home and in school? These issues need to be studied more in depth in the future because the possibility that beneath these tendencies in media use may lie some patterns that we know from other educational areas have a strong influence on academic achievement. What we do know from these areas is that parents' socio-economic background is a very strong indicator with regard to both pupils' good achievement in school, and the dropout rate among pupils in school. Markussen and Sandberg (2005) found that the reproduction of social diversity is very common in the Norwegian upper secondary school and that the dropout rate is very high. The main reason for this situation is that support for education is low in homes where parents themselves have a poor education. In such homes youngsters spend little time on homework, are often absent from high school, have low achievements and aspirations and their parents have a negative attitude to education, etc. Pedersen (1996) summarized this situation by the term "marginalization's reproduction". In many ways, this is a paradox in the Norwegian educational system, because of the explicit ideal that the Unitarian school should include everyone, which should receive adapted education and has the right to a 13-year elementary and secondary education. This, together with awareness (both from research and in policymaking) since the 1970s that our schools reproduce social diversity, should result in the conditions to avoid this situation in our educational system 30 years later. However, as we have seen above, the Matthew effect (Merton, 1973), according to which, every one who shall be given, is still very strong and it can be asked whether eventually new digital divides will fuel this effect even more.

Another important issue in Norwegian school system is the gender differences concerning achievements in subjects. In Norway, girls perform significantly better than boys in all subjects (except Physical Education). This situation has lasted for several decades (Skaalvik & Skaalvik, 2005) and has actually increased during the last couple of years. It may be asked whether the digitization of society and school will reinforce or balance out this situation, and below I will discuss some preliminary findings from a few Norwegian studies concerning this issue.

3. The emerging digital inequalities

As both society and school in Norway are becoming more digitized, there is reason to claim that digital divides occur across well-known boundaries, as well as emerging in new forms (digital inequalities) as a consequence of a society in extreme, digital change. From previous research within the area of mass media, Hargittai (2003) argues that “Mass media seem to reinforce knowledge gaps across the population” (Hargittai, 2003, p. 9). What we know less about is how the new technology, Internet and broadband, is influencing such aspects. However, Hargittai argues that the Matthew effect does seem to arise: “With respect to the Web, the Matthew effect predicts that those having more experience with technologies and more exposure to various communication media will benefit more from the Web by using it in a more sophisticated manner and for more types of information retrieval” (Hargittai, 2003, p. 9). What can be seen from this is a situation where access to technology is the premise, but the experience of use becomes more and more valuable. This also has an influence on participation in different digital arenas. The phrase “local in the global” is used widely and underlines that globalization has been presented with new conditions after the digital revolution. The escalating net societies such as my space, YouTube and Facebook demonstrate that geographical localization is subordinate in the global, virtual world. However, again, this is for those who have access and are digital literate. Therefore, when we discuss digital diversity today, it is necessary to consider whether citizens and pupils are able to participate in the Network society and be open-minded to new, emerging patterns never seen before, and patterns that have to be dealt with as a consequence of the digital revolution. The complexities in this area are therefore continuously developing, but currently it can be said that the most important themes that arise are tied to digital inequality at both macro and micro level in society and school. Below I will try to examine these issues more specifically.

3.1 Digital divides between continent and countries

There is no doubt that the Western world in general has better access to technology in homes and in school than other parts of the world (with some exceptions, Castells, 1996, 2001). One overall global aim is to bridge the digital gap between continents and to realize globalization and hinder digital divides. If it can be assumed that these digital divides between continents and countries are more or less disappearing, and DiMaggio and Hargittai’s (2001) term “digital inequality” seems to capture better which differences will exist even after access to the medium is almost universal. To give an example of this, we know that despite good Internet access in some countries, it does not mean that people have free access to the entire Web. Some countries and states want to exercise full control over the Internet, broadband speed and mobile phone technology and therefore restrict people’s use of technology. Issues such as these demands a discussion based on basic democratic principles in every society. If people’s use of technology is restricted as a result of surveillance and technological obstacles (e.g. firewalls), it is probable that this will create new digital divides between those who have free, uncensored access to the net and those who have restricted access. The new FRA-law in Sweden (accepted by the Swedish Riksdagen in June 2008), which implies surveillance of all Internet traffic which goes through Swedish territory, have initiated a heated debate in the Nordic countries about the personal security for citizens. Such digital surveillance shows us that we as e-citizens are vulnerable in the digitized society and that the politicians in all countries have to be very careful to avoid hasty decisions within this area.

Regarding Norway, this country is in a unique situation as the country scores very high in technology density both in homes and in school. Also, all citizens have free access to all information on the net. Eurostat (2007) shows that for Internet access by households Norway is 34% above the average level in EU countries and for the

best Internet access is among the top five countries within the EU (and EEC). In regard to broadband connection, the situation is almost the same and Norway is ranked among the top five countries in this area as well. The study also shows that Norwegian citizens are among those top five countries with the most frequent use of Internet is the age group 16-24 (males, 34% above average), top three in the age group 25-54 (male, 29% above average) and top four in the age group 55-74 (male, 30% above average). Concerning Norwegian women, we find that in the age group 55-74, 54% use the Internet, and together with Iceland this is the most frequent use among all the EU countries (35% above average). With regard to specific use, Norwegians in general score high on Internet-related activities and are considerably above the average EU level in all categories. Norwegians (and Icelandics) score high in digital literacy, for instance Norwegians are much more likely to create web pages than other EU citizens (Eurostat, 2007). This situation gives a good backdrop for eventually equalizing digital divides both in society and school, and is therefore the reason to ask whether Norway has any problem with digital divides at all (compared with other countries)? In the next section, I discuss some of the emerging tendencies within this problematic area and ask whether Norway is facing "new digital divides" that other countries have not yet faced.

3.2 Digital divides and digital inequalities between different regions in Norway

Even though the technology density in Norway is very good, mountainous municipalities with rich water resources used for power, in general have higher technology density in schools compared with poor municipalities. However, there is also diversity without any apparent reasons and thus the PC density in Norwegian schools in 2005 varied from 1 pupil per PC in some schools to 64 pupils per PC in others. However, there were only 2.5% of schools with less PC density than 20 pupils per PC (ITU, 2005). Although the situation is considerably better in 2008, there is still diversity between schools. It is therefore tempting to claim that a common pitfall in Norway today is to consider schools as identical with reference to such computer density questions, without considering geographical location. There are no studies that deal with the issue of school location and technology density in depth, but some studies can shed some light on this area. One of the findings from the "Norwegian Media Barometer 2007" is that concerning access and computer use in general among youngsters and adults, it shows some diversity between densely populated areas of Norway compared with sparsely populated areas. The study reports that people in densely populated areas of Norway use home computers 15% more frequently than people in sparsely populated areas and that people in densely populated areas of Norway use the Internet 20% more often than people in sparsely populated areas (Vaage, 2008). Such issues have to be linked to the fact that broadband coverage in Norway is currently less developed in sparsely populated areas compared with densely populated areas (ITU, 2005; FAD, 2007). For instance, high-speed broadband access (10 mb/s or more) is 3.7% in elementary schools in sparsely populated areas, while it is 14.1% in the most densely populated areas (Utdanningsdirektoratet, 2008). One consequence of this is that pupils attending small schools in poor municipalities or in sparsely populated areas often have less high-speed broadband access in school compared with schools in wealthy municipalities or in densely populated areas. Of course, broadband speed is an important premise for how ICT is used in school in general as well as in the various subjects.

From these studies mentioned above, there is reason to claim that the Norwegian government must be aware of these emerging digital inequalities across municipalities and that it can be further reinforced by well-known socio-economic patterns tied to parents' educational level and PC access in homes.

3.3 Digital inequalities between schools and school leaders

Studies from Norway (Erstad, 2004b; Krumsvik, 2006) show that school management is an important premise provider with regard to how implementation of ICT is carried out and how digital literacy is woven into

subjects. The national ICT project PILOT (ITU, 1999-2003) which included 120 secondary schools in Norway, found that there were wide variations concerning how school leaders carried this out in their school development. Similar tendencies were found in ITU Monitor 2007 where ICT innovative schools that managed to integrate subject-specific digital learning resources into subjects, became even more successful in their ICT-initiated school development. The opposite was found among those schools that only attempted to integrate the basic ICT skills into their goals. The ITU Monitor 2007 found that these processes reinforced the previous trends and could actually contribute to even larger digital inequalities between schools over time (Arnseth, Hatlevik, Kløvstad, Kristiansen & Ottestad, 2007).

Another trend from the same study is that school management in upper secondary school are distinct from school management in elementary school in that they give higher priority to encouraging teachers to increase their competence and provide them with better resources to both develop their pedagogical and administrative use of ICT in their jobs. Against this backdrop, there is reason to claim that if the government in Norway wants to equalize digital inequalities, schools and school management are very important catalysts to allow pupils with less access to technology at home to obtain it in school and, at the same time, build up a necessary digital literacy as a consequence of a school strategy that recognizes where the “shoe pinches” both among teachers and pupils. A Becta (2006) review actually documents that pupils who do not have sufficient access to technology at home become even more digitally illiterate if the school management does not recognize how this might further reinforce digital inequalities. Again, it can be seen that in Norway the total picture of a completely digitized society and school are dealt with very differently by school leaders and schools in general, even if the new national curriculum strongly demands them to use ICT in all subjects at all levels.

3.4 Digital inequalities between teaching staff and school level

Even if both the PILOT study (Erstad, 2004b; Krumsvik, 2006) and ITU Monitor 2007 (Arnseth, et al., 2007) show that school managements are important catalysts for the implementation of ICT, we find that beneath these tendencies the terrain varies. The ITU Monitor shows that diversity at the same school level is still large and the danger that this might fuel more specific digital inequalities related to subject use of ICT is a relevant issue. This is based on the fact that there are large diversities between teachers within the same teaching staff regarding how they prioritize digital literacy and ICT in subjects, even though the new national curriculum demands them to do so. This study also shows that teachers in upper secondary school are the most frequent users of digital learning resources, and that the focus is often on the need for pupils to develop digital literacy that underlines the ability to interpret digital information critically (Arnseth, et al., 2007). However, it is problematic that upper secondary schools are most active in this area, since the necessary digital literacy of teaching pupils should be the responsibility of the early stages of elementary school. In this way, ICT could be a main thread throughout the whole school system and thus when pupils attend upper secondary school and have already achieved a high, subject-related, digital literacy through frequent use over many school years. A premise for this is that teachers are sufficiently digitally literate to deal with this situation, but currently we have to admit that the majority of teachers are digital immigrants and digitally insecure. The government must therefore proceed with and increase in-service training of teachers, if teachers are to be able to cope with the demands of the curriculum, as well as coping with pupils’ needs within this area.

3.5 Digital inequalities based on socio-economic status

As previously mentioned, parents’ socio-economic status seems to be an important factor when determining how pupils develop their digital literacy. What appears to be a trend from several studies highlighting the

Norwegian context, is that pupils use multimedia far more often at home than at school. Yet, this must be viewed in regard to other factors. Especially it's important to be aware of pupils' background and attitudes to schoolwork (Arnseth, et al., 2007). At the same time, it can be assumed that adapted education can acquire new conditions if teachers are able to utilize pupils' digital literacy with regard to variation, a wide range of learning strategies and adaptation to every pupil's needs.

What is known from other studies concerning parents socio-economic status is that what parents do—their children very often adopt. This can be seen in activities such as reading books, visiting cinemas, going to the opera, etc. This is due to cultural capital (Bordieu, 1994) as well as economic capital. Under Norwegian conditions, there are so far few studies that focus on how this influences computer use at home, but *The Norwegian Media Barometer 2007* reports some tendencies. Based on this study there is reason to claim that people with high incomes use computers at home 20%-25% more frequently than people with low incomes. Also, underlying variables might include that people with high incomes often have important jobs and a better education. In this study, we find the same patterns concerning Internet use and there is reason to claim that people with high incomes use the Internet 20%-25% more frequently than people with low incomes. We might also say that the underlying variables here are, of course, that people with high incomes often have important jobs and a better education. As a supplement to the tendencies mentioned above, it can be said that we find the same trends between low income, low education and low job positions with regard to use of home computers and the Internet. This might constitute a digital inequality, the extent of which is still not known, but it must be considered seriously with regard to well-known socio-economic patterns in other educational areas (dropout rate, school achievement, etc.).

We can therefore ask whether such tendencies above reinforce digital inequalities with regard to both frequency of use and also how parents and their children develop their digital literacy over time. To illustrate the complexity, we are facing regarding this issue, Bjordal's (2008) study found that middle class parents meet new challenges in the digitized school. One mother called the school where her son was a pupil, and told the teacher that she was not able to handle the Internet probably and therefore she was quite frustrated because she couldn't help her son with his homework in science (because this school had only digital textbooks in the subjects). She begged on her knees that the teacher should bring back the paper based textbook, so she could be able again to help her son with his homework in science. Is this a phenomenon that other middle class parents will face when textbooks goes more and more online in the Norwegian schools? Or is this something that will fade away over time? Anyway, in a broader perspective we might ask if such circumstances can alter some of the Mathew-effect (Merton, 1973) regarding traditional socio-economic patterns in the Norwegian school system.

3.6 Digital inequalities based on ethnic background

As a group, immigrant families in Norway have less education and lower incomes than the majority population (Vassenden, 1997). The PISA 2006 study revealed that minority pupils in Norwegian schools scored significantly lower in all subjects than pupils with an ethnic Norwegian background (OECD, 2007). Concerning dropout from upper secondary school, 55% of minority pupils complete their exams compared with 68% of ethnic Norwegians, who completed their exams within five years (SSB, 2006).

With regard to technology access, both international and national studies by Jackson, et al. (2001), Katz and Rice (2002), Bakken (2003) and Torgersen (2004) show that families with a minority background have less access to computers and the Internet than the majority population. Castells (2001) claims that without rectifying remedial actions will, for example Internet use in school contribute to reinforcing the existing social differences with roots

in class, education and ethnicity (as the previously mentioned studies from the US and Europe showed).

The Norwegian study *Young in Norway* (Torgersen, 2004) reports that in 2004, 84% of youngsters with a minority background had access to computers at home (69% had Internet access), while 94% of the majority youngsters had access to home computers (84% had Internet access). The study also shows that minority pupils without computers at home had especially weak results at school. At the same time, the study reports that minority pupils who have access to computers at home achieve better at school than pupils of a Norwegian ethnic origin. Later in this position paper, I will elaborate further upon these issues (especially under Digital inequalities based on individual pupils' digital literacy).

3.7 Digital inequalities based on gender

Digital inequalities based on gender have been revealed in several studies. Torgersen (2004) found that there were gender differences related to how girls and boys used ICT and how often they used it. In ITU Monitor 2007 they found that boys reported that they take position of the technology (technical aspects) more than the girls (Arnseth, et al., 2007). However, girls seem to be more capable of creating different aesthetical artefacts as part of their digital literacy. The most important finding in this study was that girls report that they, to a greater degree than the boys, are occupied with learning at school when using ICT. In a broader picture this fits in very well regarding girls' significantly better achievements in all school subjects over time. What might be asked is whether ICT can boost boys' motivation for learning since they handled the technical part of ICT very well. Nevertheless, one has to be aware of the increasing developing gap between girls and boys with regard to their focus; boys focus more on the technical part of ICT—girls focus more on ICT for learning.

3.8 Digital inequalities based on individual teachers' digital literacy

The ITU Monitor 2007 (Arnseth, et al., 2007) has revealed that there are large differences between pupils at the same level in possessing digital literacy, as well as how they develop their digital literacy. One of the main reasons for this is that there are differences between teachers when it comes to how they focus on pupils' development of digital literacy. As a result of these differences, schools face big challenges regarding those pupils who do not manage to learn how to use digital learning resources on their own. In the debate for and against ICT in school, issues such as these are often undercommunicated.

Another part of this picture illustrates teachers' dilemma concerning pupils' homework and ICT: "Evidence relating to the specific use of ICT to undertake homework shows an upward trend. However, Valentine (2005) found that teachers were deterred from explicitly setting homework using ICT because of concerns about a digital inequality in children's access to technology out of school" (Becta, 2006, p. 34). Even if this problem is smaller in Norway, pupils facing this dilemma every day cannot be ignored. The digitized society and school with learning platforms (LMS) at every secondary school make this problem very clear; how can you as a pupil participate and do homework on these platforms after school when you do not have a computer or net access at home?

3.9 Digital inequalities based on individual pupils' digital literacy

One of the main cornerstones in the Norwegian 13-year elementary and secondary school is to give every pupil the same opportunities to develop their competences and skills. Owing to the principle of integration, this implies that both ordinary pupils and pupils with special needs should be given adapted education tailored to their individual needs. Such worthy ideals are also important to consider with regard to digital literacy in order to hinder digital inequalities among pupils, and the PISA 2006 (OECD, 2007) shows that the majority of Norwegian pupils have very high self-digital confidence compared with other Nordic countries and the OECD average. So what about those pupils who do not master the technology and are digitally illiterate among a majority of digitally

confident pupils? This group has received little attention in the implementation debate concerning ICT nor regarding adapted education. It is apparent that the debate for and against ICT in school has overshadowed the vulnerable pupil groups with regard to digital literacy. Without taking a standpoint on the issue, it is reasonable to claim that one of the causes for this is that while the rhetoric concerning technology's excellence has enjoyed favourable conditions, in reality, a number of teachers have been opposed to the use of technology in school. Cuban describes them as: "… those who are content to have students leave their classes to go to the computer lab down the hall" (Cuban & Tyack, 1998, p. 126). We might ask whether there are any positive effects for pupils being left alone with the computer without the teacher, but again, the digital illiterate seems to suffer more of this "abdication of the teacher role" when computers are used in Norwegian schools. These digitally illiterate pupils encounter many barriers that other pupils do not encounter, and therefore the threshold for gaining knowledge in ICT-dense classrooms is even higher than in traditional classrooms and this is something they have to overcome on their own (if the teacher "abdicates" in such a setting). There appear to be several factors influencing this area. What is of special importance is the unawareness among both policymakers, school management and teachers about the vulnerable digitally illiterate pupils. This is often based on stereotypes and myths about technology, teachers are not familiar enough with the technology, colleagues and superiors with a phobia about technology, traditional classroom practice and teaching cultures and lack of support and assistance for both teachers and pupils. In the battle for and against ICT this has become an area that is under communicated and therefore impacts upon an innocent third party: the digitally illiterate pupil.

4. Discussion

The above-mentioned elements illustrate that it is difficult to make clear distinctions between these elements, because in many ways they have a symbiotic relationship. Therefore, these elements constitute an important backdrop for the importance of focusing on and identifying pupils who are digitally illiterate and initiating remedial actions which make them capable of developing the necessary digital literacy. It is quite clear that access to technology is the supporting element in such processes and school owners, school management and teachers need to ensure that pupils get the necessary access to technology both at school and at home.

However, from a critical point of view one may wonder why these issues are more important in Norway today than they were ten years ago? One important issue is, of course, the enormous digitization of society experienced in Norway during the last ten years and the new national curriculum which has considerably increased the status of ICT (MOK, 2006). As a consequence, another important issue which has emerged in the last three to four years is that the Directorate of Education in Norway has increasingly implemented ICT-based exams. The arising question is whether such issues will reinforce already established digital inequalities among pupils, as the minority is more familiar with pen and paper exams than exams on computers. What can be gleaned from international studies concerning the relationship between computer familiarities compared to writing test performance? Wolfe, Bolton, Feltovich, and Niday (1996) revealed that pupils in secondary schools with little experience in writing on computers were actually disadvantaged by having to do the test in this fashion. Another study by Russell (1999) found that, after controlling for reading performance, middle-school students with low keyboarding speeds were disadvantaged by a computer-writing test relative to students with similar low levels of keyboarding skills taking a paper test. The opposite effect was detected for students with high keyboarding speeds, who fared better on the computer than in paper examinations. Horkay, Bennett, Allen, Kaplan, and Yan (2006)

found the same patterns in their study and that familiarity with technology is very important to consider in relation to assessment forms.

In Norway, Nævdal (2004) found that for girls the grade level increased parallel with how much time they used a PC at home. For the boys there was a positive correlation between consistent use of home computer and grade level. However, for those boys who used the computer very frequently (and those who seldom used it), there was a negative correlation between PC use and grade level.

These studies give some insight into an area which is still relatively new, but nevertheless has to be considered in regard to digital inequalities. Also, as several studies have previously found—a main premise for taking an exam is familiarity with the exam forms and the tools used during the exam. This is also very important regarding the validity of exams and "whether we measure what we think we are measuring".

However, can we find any tendencies regarding the potential relationship between pupils' ICT use and school grades based on socio-economic background? Also, is there any relationship between pupils' ICT use and their parents' educational level? Attewell and Battle (1999) found that pupils who used computers at home had better grades in mathematics and reading, even after controlling for family income and social and cultural capital. They also revealed that the connection was stronger for pupils with parents who had a higher education and it was stronger for boys than girls. These findings were partly explained by the fact that pupils from a middle-class background were able to utilize the technology in ways that were more relevant to education than pupils from a working-class background. This is because parents from the middle class to a greater degree encourage their children in computer use which is relevant for school work, while the working-class parents to a greater degree let their children use the computer for entertainment. The study shows that the Matthew effect also occurs with regard to ICT use and the authors ask whether implementation of ICT in school can make the digital inequalities even larger across well-known socio-economic patterns and across gender, rather than counterbalance these divides.

In the Norwegian study *Young in Norway* (Torgersen, 2004), some of the same patterns as reviewed were studied. The authors emphasized that they did not study whether using computers resulted in better grades, but rather examined whether there was any connection between use of computers and grades in regard to whether pupils who do well in school are using the computers in a different way than pupils with low grades. Torgersen (2004) found that the more the pupils used ICT, the higher educational background the parents had. At the same time, they found that there were large variations between different computer activities. Pupils who do well in school and whose parents had a higher education, used e-mail more, did more homework on the computer and searched for more information on the Internet. At the other end of the scale, they found that "low achievers" whose parents had a low education, played more TV and computer games. These findings are in line with Attewell and Battle's study (1999) and reinforce the picture that both parents' educational level and pupils' abilities are reflected in how the pupils use the computer. However, from a critical point of view, it can be asked what computer activities today are actually digitally competence-relevant and what is "just entertainment". The distinction is not as clear as it previously was because of the multidimensional aspects of, for example Second Life and World of Warcraft, which are more complex and challenging than the computer games created in the mid-1980s.

5. Implications

This position paper has attempted to highlight the relevant aspects concerning emerging digital divides and digital inequalities in Norwegian society and how these influence pupils in school settings. Therefore, the problem

of *how can the Norwegian government hinder digital divides and digital inequalities in the digitized school* portrays a series of socio-cultural challenges concerning participation in the digitized society and school and underlines the complexity within this area. Thus, the position paper emphasizes the need to elaborate upon this area of digital inequality at both macro and micro levels in order to meet the challenges that are most relevant for pupils in schools.

The first emerging challenge in the Norwegian school-setting in 2008 is the apparent growing digital inequality among the majority and minority pupils, where the majority have very good technology access at home and the minority pupils (often with another non-Western, ethnic background) have more limited PC and broadband access at home. The government has to map out this situation in more depth, establish strategies and provide economic support to groups that suffer under such conditions. In this way, it will be possible to resolve some of the digital divides in relation to PC and broadband access in homes.

The second emerging challenge is the growing digital inequality based on socio-economic status in the way that pupils use the technology. The Matthew effect seems to impact upon this area as well—children of parents with higher education seem to use ICT on a more subject-related basis, both at school and at home, than pupils whose parents have less education and who seem to use ICT more for entertainment. The government has to map out the situation concerning this issue, establish strategies and link adapted education more closely to ICT use among pupils in and out of school.

Third, another emerging challenge is that the use of ICT differs dramatically from teacher to teacher, and this situation creates potential digital inequality for pupils based on teachers' digital literacy. This is an example of a "new born" digital inequality within Norwegian society and that pupils with digitally illiterate teachers will experience in not receiving the necessary education in how to use ICT for subject-related issues. Again, the government needs to consider such emerging pitfalls and provide the necessary resources for in-service education for teachers to increase their digital literacy.

Fourth, a premise for implementing computer-based exams is that all pupils have PC access both at school and at home, and that they become sufficiently familiar with the technology used in such exams. It is apparent that certain pupil groups in Norwegian schools are not familiar enough with the technology to deal with these situations, and this is another reason why it is important to break down digital inequality. In a worst case scenario this unfamiliarity with technology can result in lower achievement in exams because some pupils are unable to handle the PC tool properly. It is very apparent that the government must be aware of this side effect regarding ICT exams and it is quite clear that if they manage to deal with the three aspects mentioned above, the examination challenge will disappear over time.

A common trait of all these four challenges is that they are interdependent and cannot be separated and isolated from each other. This is one reason for the importance of looking at both the macro and micro levels when examining digital inequality in a society and school as digitized as in Norway. Therefore it is necessary for the government to admit that there are persistent emerging digital inequalities across continents, nations, municipalities, socio-economic patterns, ethnicity, teachers' competence, gender and pupils' competence which must be taken seriously to avoid the Matthew effect having an impact upon all this areas. It is thus important that the new Norwegian White Paper nr. 31 (2007-2008), *Quality in school* (MOK 2008) underline this issue, but it is also necessary to follow up these statements with actions and economic support in the counties and municipalities.

In conclusion it can be said that recognizing and acting upon these digital inequalities is especially critical in Norway (based on the considerably increased ICT status in the new educational reform), if technology is to

become further integrated into learning and teaching both at school and in homework. From my point of view, there is reason to claim that the cornerstone of the Norwegian educational system, adapted education, is the most important remedial action to reduce digital inequality among pupils in the digitized school. This is because adapted education demands that Norwegian schools and teachers establish total consideration of pupils' abilities and competences, and the issue of PC access and digital literacy must be an inherent part of this picture in the Norwegian school system. At the same time, it is quite clear that more research is needed in these "scenarios" of different prospective kinds of digital inequality, because it is not just a question of access anymore—more fundamental questions are raised around socio-cultural participation as a premise for communication, knowledge building and learning in this digitized society which is only "10 years old". This means that the digitized Norwegian society must consider prospective digital inequalities from different perspectives than previously, in order to be able to achieve the fundamental principle of the Norwegian school system: The Unitarian school.

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