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Outsourcing trust to the information infrastructure in schools: How search engines order knowledge in education practices

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Abstract

Purpose – This paper investigates the experiences of school teachers of supporting pupils and their apprehensions of how pupils search and assess information when search engines have become a technology of literacy in schools. By situating technologies of literacy as sociomaterial the purpose of this paper is to analyse and discuss these experiences and understandings in order to challenge dominant views of search in information literacy research.

Design/methodology/approach – Six focus group interviews with in total 39 teachers working at four different elementary and secondary schools were conducted in the autumn of 2014. Analysis was done using a sociomaterial perspective, which provides tools for understanding how pupils and teachers interact with and are demanded to translate their interest to technologies of literacy, in this case search engines, such as Google.

Findings – The teachers expressed difficulties of conceptualizing search as something they could teach. When they did, search was most often identified as a practical skill. A critical perspective on search, recognizing the role of Google as a dominant part of the information infrastructure and a co- constructor of what there is to know was largely lacking. As a consequence of this neglected responsibility of teaching search, critical assessment of online information was conflated with Google's relevance ranking.

Originality/value – The study develops a critical understanding of the role of searching and search engines as technologies of literacy in relation to critical assessment in schools. This is of value for information literacy training.

Keywords Information literacy, Trust, Schools, Search engines, Sociomaterial, Searching, Information infrastructure

Paper type Research paper

Introduction

For more than two decades, search engines in general and *Google* in particular have co-shaped what there is to know, and maybe even more importantly, practices of how to know things. The mobility of our digital devices has made constant access to our information infrastructure possible. Here the information infrastructure is understood as networks constituting the conditions for knowing and hence constructing what is to be known, the importance of this knowledge and how it can be accessed and stored. Thus, knowledge is mediated to us by the information infrastructure and to trust (or distrust) this infrastructure, consciously or not, is a prerequisite for contemporary society to function (cf. Hardin, 2002; Simon, 2015). In this article we argue that search engines constitute an important part of the information infrastructure of our everyday lives. We also note that the search engine is one of many recently introduced technologies of literacy in schools that are connected to “new literacies” (Lankshear & Knobel, 2008). Today, both teachers and pupils have access to *Google* through smartphones, laptops and reading devices anytime and everywhere, and the boundaries between school and everyday life are increasingly blurred. Still, despite its importance, searching for online information in school settings, typically equated with the use of search engines, is nowadays often taken for granted – by pupils, teachers, and even by researchers.

One possible explanation is that using a search engine seems easy. However, the complexity of searching is still present, yet hidden in algorithms which to a large extent direct what information is accessed and the order of how information is presented (e.g. Eklöf & Mager, 2012; Halavais, 2009; Introna & Nissenbaum, 2000). Hence the search engine’s order of information is neither simple nor neutral. Bearing this in mind, we take a normative starting point for this article, arguing that if or when the importance of pupils’ and teachers’ abilities in information searching and in assessing of information is recognized, the question of how to advance information literacies from a critical perspective becomes crucial. Having said that, it has proven to be difficult to find ways to make these activities a part of teaching and learning (e.g. Limberg & Folkesson; Limberg & Sundin, 2006). Therefore, we direct our attention to teachers and explore their experiences of supporting the pupils and their understanding of how their pupils search for and assess information. By framing technologies of literacy as sociomaterial, the study aims to analyse and discuss these experiences and understandings in order to challenge dominant views of search in information literacy research. It does this by analysing focus group discussions with teachers in the Swedish elementary and secondary school, in which they reflect on assessment of information and search.

In the following section we present a focused literature review. Thereafter, we introduce the theoretical perspective of sociomaterialism, followed by a description of the method and material used. The empirical results are integrated with an analysis, presented in four themes. In the final section on discussion and conclusion we relate the results to the aim of the article and deliberate on some consequences for the emerging field of media and information literacy.

Assessment of information and searching from a literacy perspective

Research on information seeking in relation to information literacy has often focused on the seeking process. Carol Kuhlthau’s (2004) pioneering series of studies on pupils’ information seeking process (ISP) in schools did establish a connection between

thoughts, emotions and practices during the ISP. With a similar focus on the process perspective, Pertti Vakkari and Nanna Hakala (2000) have demonstrated how pupils' relevance criteria change with the process of solving a task. There are also examples of research on information seeking in collaborative learning that supplement Kuhlthau's model (e.g. Sormunen, Tanni & Heinström, 2013). Information seeking is a broad concept and for the sake of clarification, Tom Wilson (1999) has suggested a distinction between this wider term and the more specific information searching. Searching is then "defined as a sub-set of information-seeking, particularly concerned with the interactions between the information user (with or without an intermediary) and computer-based information systems" (Wilson, 1999, p. 262f). In the present paper, it is searching rather than seeking that is addressed, but not in a traditional sense. In library and information science searching often becomes an issue about optimising precision and recall in information systems. As we approach searching from a sociomaterial perspective other questions are of interest, namely pertaining to how people and technology are entangled in practices of searching for information.

Previous research on online searching and information literacy has shown the difficulties of pupils in critically evaluating sources and understanding how search engines actually function (Julien & Barker, 2009). Building on such findings Heidi Julien and Susan Barker (2009) argue for the need to develop the pupils' searching and evaluation skills. In an extensive literature review, Ian Rowlands (2008) and his colleagues question the belief that young people are more advanced than previous generations in the way they use the web for finding information. In one of many similar studies Thomas Scott and Michael O'Sullivan (2005) demonstrate the lack of searching skills of pupils in the US. At the same time, with the expansion of the Internet, pupils have been given more responsibility for assessing the relevance and trustworthiness of information. Today, pupils are not just supposed to read literature provided by teachers and librarians, they are often asked to find information on their own as well, and to construct their own arguments (Limberg et al., 2008).

How online information is assessed and what types of criteria are used has been reported in many studies (Francke, Sundin & Limberg, 2011; Rieh & Hilligoss, 2008; Savolainen, 2011). Earlier research has shown that pupils often have a naïve, understanding of facts and has highlighted the dominant status of facts in contemporary schooling. Mikael Alexandersson and Louise Limberg (2003) have brought to light a dichotomy, often occurring between facts and opinions among pupils. Helena Francke, Olof Sundin and Louise Limberg (2011) have claimed that pupils regard information seeking as fact seeking, rather than seeking to understand (cf. Blikstad-Balas & Hvistendahl, 2013; Todd, 2006). One expression of the pupils' problems in assessing information is the abundance of guidelines and checklists for assessing the information available online. These guidelines and checklists include, among other things, recommendations such as this: "Authority – Who is behind the source? Objectivity – What is the purpose? Authenticity – What information is presented? Relevance – When was it written?" [translated from Swedish] (Linnaeus University, 2013). Checklists, such as this, have been criticized in the information literacy literature, among other things, for not considering contextual aspects (Meola, 2004; cf. Elmborg, 2006; Tuominen, Savolainen & Talja, 2005).

Furthermore, earlier research has demonstrated difficulties for teachers to develop teaching in the field of information literacy (Merchant & Hepworth, 2002). There are different conceptions of what information literacy should have as a starting point – the teaching of skills or the pupils' inquiries (Williams & Wavell, 2007). There has also been a call for information literacy to be integrated in the classroom through inquiry-based or problem-based learning (Chu, Tse & Chow, 2011; Smith, 2013; Walton & Hepworth, 2011). Limberg and Folkesson (2006) have shown that the assessment criteria of information literacy abilities in schools do not mirror what is actually taught by teachers and librarians. Heidi Hongisto and Eero Sormunen's (2010) classroom study on information literacy in secondary schools echoes Limberg's and her colleagues (2008) arguments for an increased focus on critical assessment of information and information use rather than information seeking skills. Earlier research on information literacy has thus provided an understanding of the difficulties in teaching information literacy. However, there is a lack of interest in exploring search from a sociomaterial perspective as well as taking into account the co-constructive nature of literacy technologies. Instead of analysing technologies of literacy as something outside human activity, that either could be seen as a neutral or a determining tool, embedded in practices (cf. Bruce, 1997) it is argued here to regard these technologies as sociomaterial.

The co-constructive agency of technology in practices of search is discussed in the works of Ken Hillis, Michael Petit and Kylie Jarrett (2014). They claim in *Google and the culture of search* that the concept of relevance has been co-developed with search engines and is juxtaposed with "utility, objectivity, and quality of search" (p. 62). In other words, people experience *Google* as representing an objective representation of what is to be known, and at the same time the search results are personalized for the individual searcher. Empirical research supports this claim. For example, Bing Pan et al. (2007; cf. Kammerer & Gerjets, 2012), conclude that college students put considerable trust in *Google's* ranking of links. However, there are also consequences of a different nature stemming from our current information infrastructure, discussed in the literature. In *Infoglut* (2013), Mark Andrejevic point to the paradoxical notion of us being technologically better equipped than ever to access information, and at the same time "we are simultaneously and compellingly confronted with the impossibility of ever being fully informed" (p. 2). When so much attention is directed to the need of a critical attitude toward what we read and see, there is, according to Andrejevic (2013), a tendency to use the critique to argue for a constant uncertainty in which all knowledge claims could be contested.

It is evident from previous research how search engines defragment a field of knowing and how the sheer amount of possible information sources makes a complete picture impossible. What we do not know is how those who are supposed to educate our youth, the teachers, apprehend this situation in schools, seen from a sociomaterial perspective.

A sociomaterial understanding of information literacy

Our theoretical perspective in this article is sociomaterial (e.g. Orlikowski & Scott, 2008), meaning that technologies are understood as embedded in and made possible by practices. Such a perspective has most often been developed in the tradition of information literacy research within a sociocultural tradition and/or within new literacy studies, building on Vladimir Vygotsky (cf. Lundh & Alexandersson, 2012; Meyers, 2009) or a practice-theoretical perspective (Lloyd, 2012), but has been less explored within

the theoretical frame of Actor-Network Theory (ANT). We deploy the sociomaterial perspective, with more specific inspiration from ANT, in order to understand how the activities of assessing information and searching are not just connected to, but in fact are part of the technologies involved (cf. Bruce, 1997; Johansson, 2012). From a sociomaterial perspective humans and non-humans are analytically treated as being equal, and both are being approached as actors. Drawing on Bruno Latour (2005), the interaction between people, artefacts and policies and so forth could thus be analysed as actors coming together in an assemblage, or network. In a school setting, teachers, pupils, textbooks, websites, syllabus, and, as we could add, search engine algorithms are actors from this perspective, forming a network that is enacted through their interactions with each other. The analytical focus here is not on technology or on people as stable, separate entities, but on the interaction between them.

For an actor-network to remain its actors must translate their activities to those of other actors (Law, 1999; Latour, 2005, p. 108). When new actors are brought into the school setting, for example new technologies of literacy such as search engines, translations must take place in order to make interactions within the assemblage possible. Wanda Orlikowski and Susan Scott (2008, p. 465) describe search engines in a sociomaterial perspective in the following way:

A web search conducted with the *Google* search engine is sociomaterial “all the way down,” entailing computer code written and updated by software engineers, executing on computers (configured with particular hardware and software elements which were designed and built by computer engineers and production workers), and whose operation depends on the millions of people who use computers to create and update web pages everyday, and the millions of people around the world who enter particular search criteria into their web browsers running on still other computers designed and built by yet other people, and so on.

When *Google* is brought into the assemblage of a school setting and given a central position there is a continuous negotiation and translation between different actors considering how to translate to *Google*.

The concept of an obligatory passage point, developed by Callon (1986), refers to an actor that all actors in a network need to interact with and translate their interests to. In school settings, the syllabus and its knowledge requirements could be seen as an obligatory passage point. Teachers plan their teaching in relation to the syllabus, pupils want to get a good grade and therefore relate to the syllabus. Publishers develop their printed books or digital information with the syllabus in mind. At the same time, *Google* has not just been brought into everyday life, but into the classroom as well. In a short time *Google* has become an obligatory passage point in many contemporary practices (Mager, 2009) and, thus, contributes to the shaping of what is regarded as knowledge. José van Dijck describes how *Google* co-produce academic knowledge: “Knowledge is not simply conveyed to users, but co-produced by the search engine’s ranking systems and profiling systems, none of which are open to the rules of transparency, relevance and privacy in a manner known from library scholarship in the public domain” (2010, p. 575). A sociomaterial perspective provides tools for analysing how pupils, and in fact teachers, interact with and are required to translate their interest to *Google* in

particular. The search engine co-produces knowledge and in our case we analyse how the translations are made in relation to the search engine.

Method

Focus group discussions with teachers were carried out in order to get as rich and varied descriptions as possible of what is going on in the classrooms. In the focus groups, the participants' various experiences and attitudes are met and analysed on a collective level rather than as individual statements (Morgan, 1997). The focal point of the focus groups were the teachers' experiences of the pupils' information searching and assessment of information – what is often regarded as activities of information literacy – and the teachers' experiences of teaching in relation to information literacy.

Six focus groups with in total 39 teachers (average age 42 years) from four different schools (School 1, School 2, School 3, School 4a-b) were conducted during the fall of 2014. The length of the focus groups varied between 54 minutes and one hour and 26 minutes, with an average length of one hour and 14 minutes. All focus groups were conducted at the schools where the participants worked. Two of the schools have classes ranging from preschool class (the pupils are 6 years old) to level 9 (the pupils are 15 years old) and two of the schools have classes ranging from level 4 to level 9. Two of the schools are private and two are municipal, but they are following the same syllabus (Lgr11) and its specific knowledge requirements. The teachers' have had experiences from working with pupils ranging from year 4 to 9 (ages 11 to 15) and the average experience of teaching was 13 years. Altogether they represent teachers from a broad variety of subjects, for example Swedish, Natural Science, Civics, History, Social Science and Mathematics. Ten of the participating teachers were teaching in the subject Swedish, which is the subject, according to *The Swedish Curriculum for the compulsory school* (Lgr11, 2011), formally responsible for teaching information searching. However, according to Lgr11, information searching and source evaluation should be practiced in all subjects. The mix of teachers from different subjects, with different experiences and working with pupils of different ages created good opportunities for rich discussions.

The discussions were open ended but moderated by one of the authors with an discussion guide in order to make sure that the discussions in different focus groups revolved around roughly the same topics. In accordance with the theoretical perspective, the focus group discussions took their starting point in very concrete and material situations. *Google* became a catalyst for much of the discussions. This was a deliberate decision by the researchers, but it was also a topic that the participants could relate to easily. Later on in the discussions, the teachers were confronted with two scenarios that they were asked to deliberate on. One scenario concerned which instructions pupils should get when starting a project and the other scenario concerned what teaching should include in relation to information searching and critical assessment of information. The scenarios worked in multiple ways, giving the more experienced teachers an opportunity to relate to actual events while teachers with less experience of the investigated topic were given a chance to reflect. The scenarios also encouraged the teachers to provide rich descriptions of their experiences and thus provided insights into the daily practices in the classroom.

For the purpose of this paper, we are interested in the participants' joint descriptions of daily practices in the classroom, particularly interactions and enactments of relations

between significant actors, such as search engines, pupils, syllabus and teachers. Hence, here the primary analytical focus is on the content of the focus group discussions. However, paying attention to the particular context and composition of participants in each focus group made it possible to also consider the social dynamic in each group (cf. Halkier, 2010). All focus groups were recorded and subsequently transcribed at a level of detail corresponding to our analytical focus on content rather than social dynamics and conversation. That is, the discussions were reproduced verbatim, but intonations, accentuations, pauses, and so forth were not included. When quoting, some adjustments to the written language have been made. The second step in the analysis consisted of careful and repeated readings of each transcription. The readings resulted in establishing three empirical themes that occurred in all focus groups. The themes encompassed similarities and differences both with regards to individual statements made by participants and between the aggregated collective levels of each focus group. Finally, the different themes were analysed with a closer attention paid to the theoretical perspective. A specific focus in this phase of the analysis concerned translation (Law, 1999) between actors, which is a core assumption in Actor-Network Theory. This last phase of the analysis led to the establishment of a fourth theme (*Critical assessment of information as a matter of concern*).

All quotations have been translated from Swedish to English. There are a number of terms in the scholarly literature that try to capture the practice of determining if and how we could trust a certain information source: source criticism, information evaluation, information assessment, media credibility, quality of information, cognitive authority (Savolainen, 2007) – just to mention a few. In the following, the term critical assessment of information will be used since the term brings about a critical dimension when referring to methods and practices of evaluating the trustworthiness of online information.

Result

Goal or method

The role of *Google* in today's society in general and more specifically in schools cannot be underestimated. A number of studies have shown how *Google* is mobilized in inquiry-based learning (e.g. Julien & Barker, 2009; Sundin & Francke, 2009). At the same time this paramount position is not reflected in the education system (Sundin, 2015). A dividing line in discussions with the teachers were if particularly searching but also to some extent critical assessment of information should be seen as a teaching content in itself or if they were only to be seen as methods to achieve other learning goals: "do you want the to reach the goal direct or do you want to train [them] to reach the goal?" (School 4a) If the former is the case, the pupils' less developed information searching and assessment of sources could be overcome by providing them with quality controlled information sources in advance. However, if the latter is the case, information searching and critical assessment of information becomes an integrated part of teaching and partly a knowledge domain in itself by necessity. Another focus group discussed the difficulties teachers experience, particularly with younger pupils, when trying to teach critical assessment of information: "I don't know, I think they are too young for this". The teacher continues by stressing what he believes is too much focus on computers: "It sounds a bit old fashioned to say this, it has become a bit hysterical with computers in schools. It is really good, and it should facilitate as reference book ... but it has turned

somehow ... they are not as mature as we think. Sometimes it feels like we are supposed to teach them too much.” (School 1)

If the teacher has no intention to focus on critical assessment of information or searching as a learning content, the question is rather how to make sure the pupils access quality-controlled information. Here, teaching has not been translated to search engines and the search for information (Law, 1999). One of the check-list criteria mentioned above, “who is the author”, turns up frequently in the focus groups, especially when *Wikipedia* is compared to traditionally edited and editor-controlled encyclopaedias: “I try instead to lead them towards NE [a Swedish commercial online encyclopaedia] because it is much clearer in stating whom actually has written the article” (School 4a). Often the time factor is mentioned as crucial for teaching priorities:

- No, I probably thought about it when I talked about that essay, that we provided them with sources. It was because we had so extremely little time, therefore they don’t have time to sit [many voices] and we have ten computers and forty students.
- Yes, but it's in some ways also my point because they get stuck in this searching. (School 4b)

In a way searching can be controlled if the teacher undertakes the search: “if that is the case and there still is someone who want [to find] something then you’ll have come to me so I search for it and if we find it we find it” (School 4b).

The examples above show that the wish to protect the pupils from non-reliable sources is connected to a lack of interest in making both critical assessment of information and searching a content of teaching and learning. Critical assessment of information and search have a stronger position in some subjects in the Swedish curriculum than in others, particularly in the Social Science subjects and in Swedish (Sundin, 2015): “Yes, well, last spring I actually had an entire course named sources and critical assessment of information where I mixed Social Science Subjects and Swedish so it was only those capabilities that were assessed” (School 2). To some extent, the discussions also reveal an increased focus on search the older the pupils are, which is also in line with the knowledge requirements in the syllabus. One teacher of pupils age 15 states: “/.../ so it’s a goal in itself that they should be more independent and take initiatives, and then they should not have as much [help]. Then it’s part of their work to look up information for themselves, independently” (School 4c). This statement stands in contrast to the one above on information control and demonstrate how search and critical assessment of information are treated differently depending on the teacher, the subject and the age level of the pupils.

The teachers had difficulties in conceptualizing searching as a part of the teaching and learning. The researcher could ask questions about searching, but the teachers made their own interpretation of the question and often started to talk about critical assessment of information instead. Searching was rarely identified as an issue in itself: “But it feels like the gist of information search is that a great responsibility follows to manage critical assessment of information” (School 4c). In another quote, the teachers stress assessment of information and use, rather than searching

- /.../ the problem is not for them to search for facts.
- No, exactly.
- But many times how to relate to the facts one searches for and how to use them. (School 1)

The teachers' discussion echoes in fact some of the information literacy literature that argues for an increased focus on information use rather than searching. The difficulties the participants had in conceptualizing searching could be related to critical assessment of information and how it has had a long and established role in the school environment, even before the great advance of digital technology in this setting. Searching, on the other hand, became a part of school culture when the database was introduced, a form of technology that resists comparison with older media technologies. The concept of remediation could be used here to understand this difference. Bolter and Grusin (2000, p. 273) define remediation as: "the formal logic by which new media refashion prior media forms". Search engines do not remediate old ways of finding information in the same way as for example *Wikipedia* remediates printed encyclopaedias.

The different ways the teachers approached critical assessment of information and/or searching – either as a method to reach other goals or as learning the content in them – could be understood as different ways of translating *Google* into the practice of teaching. Diverse translations can take place even though the teachers work with the same syllabus. The teachers' understanding of the role of information literacy in the curricula in this case resembles earlier research (e.g. Boon, Johnston & Webber, 2007; Limberg & Folkesson, 2006).

What is a savvy searcher?

When the teachers in the focus groups made searching a part of teaching and learning, the focus was above all on conceptualising searching as a practical skill of filtering the vast amount of information any topic creates. One theme in the discussions was the pupils' ability to formulate questions or search terms that they could use in *Google*: "and then they, I think, have difficulties also to formulate questions on *Google*" (School 1). In a quotation, one participant discussed how the pupils often became overloaded with irrelevant information due to too broad questions:

Though I think it is as [teacher X] says that they sometimes have difficulties in searching for facts. Since they do not know how to ask the questions. If I have a question [on] what is typical for this profession they do not know that they should enter 'typical' for what are typical chores of a truck driver or something. They don't understand how to formulate the question.
(School 1)

In the quote, the difficulties concern how to assure topical relevance by adding search terms in order to get better precision. However, discussions also related how terms could be used in order to delimit the results to more reliable information: "Write 'official' is also one way sometimes to get a little closer" (School 4a). These, and other, examples of simply reducing the number of hits could, in the words of Andrejevic, be referred to as "shortcuts that bypasses the need to comprehend proliferating narrative or referential representations" (2013, p. 4). Andrejevic does not mention search engines in this respect, but the problem of apprehending more information than you ever can

read could also be converted to the web and *Google*. That is, if the relevance of a *Google* search is not questioned, you do not need to consider questions of representation; the hits on top of the list are seen as unquestionably correct. There are also other tricks of the trade mentioned in the discussions on how to assess information. One teacher describes for example how they analyse domain addresses: "We usually talk about the suffix dot se [.se], dot com [.com] to mention credible sources" (School 4a). Tips on how to reduce the number of hits or how to quickly assess a website by looking at the domain address qualify as typical information literacy skills that could be found in many checklists.

Practical skills were prioritized when the discussions centred on teaching content of searching: "[I] really tried to teach them step by step how to look for information online" (School 4c). The teachers attributed a critical dimension to the assessment of information, but not to searching:

- For me it is probably very much about that they should understand who it is that [...] who or what is the Internet because [those] who has written all of this is there, it's not a thing but [...] everything that is there is written and there is a purpose for it to be there, and to find out the purpose, having the keys to find the purpose behind why this information is here ...
 - And be aware that it is a tool of power for various forces, political propaganda or tools for buying or lure us [inaudible] lots of money. And to really think through who wrote this and why.
- (School 4a)

More critical notions such as these were given when referring to searching replaced by a practical skill approach: "[t]hen it is better that we give them the tools to manage it the right way. To search for information is not something bad or cheating, but it is all about getting educated and then you should surely do it the right way. That is where we are, in that we should help them in this jungle of everything that is out there" (School 4b). When searching has become naturalized into our everyday life (Hillis, Petit & Jarrett, 2013), the activity is not identified as something you need to learn. Sundin (2015) notices in an analysis of the Swedish curriculum for compulsory schools (level 1 to 9) how searching is translated into a neutral method in the curriculum, rather than being approached from a critical perspective.

There are some exceptions in the material indicating that searching could be treated as something more than practical skills. One of these exceptions is a wish to relate a savvy searcher to the general understandings of a topic: "I was going to say that it feels like you must have some knowledge and be able to search. I mean [if] there is a person to look up you must roughly know where he lives and roughly what he works with" (School 2). You can, according to the participant, not just use the information infrastructure for searching without being able to understand what you find. In another of these exceptions, one teacher formulates what searching as a subject for teaching and learning could be:

I actually had some of that with my students last semester, about what comes up when you search for a word, and many students thought it was

the page with the highest relevance that came up or the page that maybe was the most trustworthy that came up first, but it's not really like that...
(School 2)

Here the teacher questions the habit of equating *Google's* relevance ranking with trustworthiness, without really distancing herself from the skill-oriented approach. In general, what was being left out of the focus group discussions were the consequences of a development where search engines have become obligatory passage points (Callon, 1986) in many contemporary practices. As such they contribute to the formation of how information is distributed and how trust is constructed in society.

Relying on Google

The teachers complained about the pupils' lack of ability to critically assess information. When searching for something, they only read the first link on the list, according to the teachers: "The pupils buy the first thing they find" (School 2). There was almost unanimity among the teachers regarding the pupils' lack of critical assessment of information while searching for information. One teacher describes the phenomenon the following way: "I have had fourth grade pupils, but I also have had younger pupils and they do not have this critical assessment of information but they swallow pretty much everything – hook, line and sinker" (School 4b). In this case, the pupils were only 11 years old, but further on in the same focus group it seems that the age does not always matter:

Teacher 8: I do not know how the ninth grade do, what kinds of experiences you have. Because they are, after all ...

Teacher 7: Embarrassingly bad at it.

Teacher 8: Are they?

Teacher 5: There is not much critical assessment of information there either, I do say.

(School 4b)

That the pupils often, according to the teachers, demonstrated a lack of critical assessment of information goes hand in hand with a very high level of trust in *Google*. The ranking of search results in *Google* – what *Google* calls relevance – is rarely questioned. Hillis, Petit and Jarret (2013, p. 58) state: "*Google* equates quality and relevance", and if you put trust in *Google's* relevance criteria, as a consequence you outsource critical assessment of information to the information infrastructure and, more precisely, to the algorithms of the search engines. This outsourcing of critical assessment of information to *Google* could also be related to plagiarism:

/.../ one should not generalize, but many students are completely uncritical and many students do not see the difference between borrowing a text and creating a text yourself, but they quite gladly cut and paste it into their papers, then it is their text, as if they themselves had written it, and they get almost offended if you say that it is copied since they have changed a little bit before and a little bit after. It can be a big chunk in the middle that could be copied, but they have made a little [change] here and there and it is their text. (School 4a)

If the answer provided by a *Google* search is seen as a perfect representation of what there is to know on a scale of importance (relevance), so why should that text be altered? The pupils' habits of copying and pasting could of course be seen as a conscious attempt to cheat, but it could also be interpreted as a lack of understanding of *Google's* algorithms for calculating relevance. It is not only the pupils who translate their questions to *Google*; the search engine also translates its "response" to the particularities of a specific search. There is a desire for the instantaneous: "what they get is what there is, it's this instantaneity again, is it *Wikipedia* [as the] first [link], it is *Wikipedia* I click on" (School 4c). Reflexivity is a necessary part of the critical assessment of information, but when immediacy and instantaneity are privileged, reflexivity becomes subordinated: "Fastest, being ready fastest is the best and then they get a finished text just like that, whoops, and it's ready (School 1). If the representation of what is to be known is made by *Google* every time a search is executed, it is taken to mirror an "objective" ranking of "quality" and there is no need for reflection in a school culture characterized by speed (c.f. Hillis, Petit & Jarret, 2013, p. 62). *Google* makes a fast summary for us – in less than one second – of what there is to know and prioritises between vast numbers of websites. The notion of *Google* as a knowledge-machine, with many historical precursors, taking charge of our learning, becomes apparent (cf. Andrejevic, 2013, p. 14). Andrejevic (ibid.) writes about "the attempt to bypass representation." The hit list of *Google* is obviously all about representation, and when *Google* is used in a non-reflexive way the question of representation seems to be forgotten. The former CEO of *Google* stated in 2013: "I actually think most people don't want *Google* to answer their questions. They want *Google* to tell them what they should be doing next" (Jenkins Jr, 2010). Our ways of knowing and getting to know are increasingly outsourced to *Google*, a claim that is further supported by the findings of the present study.

Critical assessment of information as a matter of concern

Despite the fact that the teachers reported pupils having problems, the call for critical assessment of information characterises much of contemporary western culture: "Should I trust this now or do I have to assess information critically all the time – quite exhausting actually" (School 2). This theme is less dominant in the material, but since it is theoretically interesting and potentially consequential, it is still included. One of the teacher's complaints seems paradoxical compared to many of the other teachers' experiences. She suggests that her efforts in creating source critical pupils have led to another kind of problem. The 15-year-old pupils "don't trust anything since they have learned to be good and critical towards information. Then it's like this, 'no, I don't trust anyone' (School 3)". The discussion in the focus group continued with another teacher questioning this 'problem', which led to a short discussion on the topic among three of the participants:

- But then one has somehow actually succeeded with what you were doing in sixth grade with pupils, I think
- But at the same time you leave them with a "you-can't-trust-anyone-world" that's not good either
- No well that's where we lead them really because we ask them to question everything. "what purpose does this person have when he/she says that" and try to find opposite sides. In the end they can't make up their own minds. It just becomes like they just take in [inaudible].

(School 3)

Andrejevic (2013) claims that due to the vast information landscape it is virtually impossible to be sure of being fully informed on anything. This has, according to the same author, been seen as a token for all kinds of conspiracy theories and political extremism, for example attempts to deconstruct established evidence of the green house effect or the perpetrators of the 9/11 attacks. This distrust of every knowledge claim could be seen as the other side of the coin. To neither question the relevance of the top hits nor question the credibility of the information as such could in fact be seen as expressions of the same idea. Either you do not have to question anything or you should question everything. The teachers in another group relate to their own thoughts of how the need for critical assessment is different in different subjects and one of them states in relation to history that “No, not everything, but it is a biased truth” (School 4a). Yet another teacher argues instead for showing the pupils “a bank of trustworthy places” (School 4b). This theme should of course be related to the theme of *Goal or method*.

Critical assessment of information can be used to question the legitimacy of any knowledge claim and searching becomes only a question of searching for information supporting the departure point of the searcher. This notion of questioning everything could be related to Latour’s (2003) argumentation for matters of concern instead of matter of facts. The enormous amount of information on websites, tweets, Facebook-updates and so forth, makes it impossible not to find information saying something else – there is always an alternative voice that could support your own bias. One teacher reflects on this in the following way:

/.../ actually, the internet creates its own reality as well, there is a new reality, that puts facts together in new contexts, then it becomes its own reality in a sense that has relevance as long as it is in there and that is where many pupils know much more than ... well, I know almost nothing about it. I notice that it’s put into new contexts and so on, a bunch of facts and it fits together, but it fits in a completely different way than it did from the beginning in some way. (School 2)

Latour (2003) has called attention to how science studies – once developed in order to understand the co-constructivist character of established knowledge – now are used to motivate absolute certainty and promote conspiracy theories. Andrejevic (2013) connects Latour’s writings to “information practices of the vulgar postmodern right that seeks to undermine the version of critique as truth telling” (p. 11). The fact that many people today have experienced self-publishing information on the web in combination with the incredible number of webpages on any subject has made possible “the attempt to deconstruct certainty itself” (Andrejevic, 2013, p. 11). Latour’s (2003) answer is to turn from matters of fact to matters of concern. He asks us to study the gathering of things, that is how objects are made into things through the gathering of actors: “all objects are born things, all matters of fact require, in order to exist, a bewildering variety of matters of concern” (Latour, 2003, p. 246). Referring back to the practice and method of critical assessment of information, to assess information is, according to this view, not a question of checking if a fact is “true” or not in a referential sense. It is rather a question of assessing how the fact is made through associations and links in a network – not just in a technical sense but also in a sense of metaphorical understanding. It is

additionally a question of understanding the role of search engine algorithms seen as actors in this process. Sheila Jasanoff (2004) describes the role of the researcher: "to make visible the connections that co-production renders invisible" (p. 22). To make search a focus of teaching requires not simply conveying search know-how, something that most people at a basic level already possess, but an understanding of how relevance, according to search engines, is produced and, more fundamentally, the role of search engines in society.

Discussion and conclusion

This paper calls for a renewed interest in search as a content of teaching and learning. The theoretical perspective is sociomaterial, particularly deploying some analytical concepts from the Actor-Network Theory. Focus is placed on actors and how they mutually constitute each other in network relations. On the one hand the main actors in this study are teachers, and pupils, as described by the teachers. On the other hand, the main actors are also *Google* and the mediated knowledge claims *Google* ranks.

In the focus groups, critical assessment of information and searching are treated as analytically independent from one another. Searching and assessment are often given a causal relationship: When searching becomes a common way to access information; critical assessment of information becomes more necessary. According to the teachers in the reported study, as well as in earlier research (e.g. Pan et al., 2007), the pupils' put a lot of trust in *Google*. In many cases they confine their reading to top hits in the result-list. In a way, the search engine results therefore actually become a part of the assessment. A website is given its significance not just according to its content, but also due to how the media ecology functions on the web and how well a website is adjusted to the algorithms of *Google*. There are about 200 variables in the search engine's algorithms. Number and quality of in-links is one such variable and there are also variables for personalisation purposes. It presumes that a website with many other sites linking to it ends up high on the result list. Your earlier search behaviour and your geographical location influence the order of hits on the result list as well. Exactly how this works and to what extent is something search engine optimization (SEO) companies work hard to unmask. When assessing a website, you are in fact evaluating the functionality of *Google*'s relevance assessment and the assessment is therefore to a larger extent carried out by non-human actors than by humans.

At the same time, the teachers had difficulties conceptualising search as something they could teach. In the cases they actually did, search was most often identified as a practical skill. The extremely important role *Google* has in many contexts, as the number one access-point for information for most people, was not brought up. There was no discussion of the importance of understanding how *Google* construct the importance of knowledge in many areas in society, not the least in schools. Limberg and Folkesson (2006; see also Limberg & Sundin, 2006) argue for the need to analyse and discuss the content of information literacy as an object for teaching. The information literacy literature has investigated the evaluation of sources, or critical assessment of information, for many years (e.g. Meola, 2004; Savolainen, 2011; Sundin & Francke, 2009), but there has been less interest in developing ways of understanding the role of searching and search engines as technologies of literacy in relation to critical assessment. The information literacy literature has explored the information seeking process (Kuhlthau, 2004; Vakkari & Hakala, 2000), but in this literature the

sociomaterial aspect of search is not considered. Furthermore, seeking has lately been identified as less relevant compared to critical assessment of information or information use (Limberg et al., 2008). There seems to be a conflation between critical assessment of online information and *Google's* relevance ranking. It is argued here that what we need to develop is not just an updated approach to critical assessment of information, one that considers the changing character of the web medium, but also a critical apprehension of search that gives us reflexive abilities to understand how search engines provide us with a new order of knowledge. Search engines could in this respect be seen as machineries of significance production.

The analysis presented above has implications for our understanding of information literacy as a part of the broader concept of *media and information literacy* (MIL). In recent years, MIL has evolved as a concept bringing together two distinct, yet overlapping research traditions (e.g. Koltay, 2011; Lee & So, 2014; Livingstone, van Couvering & Thumim, 2009). It is difficult to talk about digital media today without referring to how they often are fragmented and accessed by search engines. Google, as well as Facebook and Twitter, for example, could be seen as a super-medium in this respect, which provide the user with information produced by others (Sundin, 2015). Richard Roger (2013, p. 87) asks rhetorically: "Has the back-end algorithm taken over from the traditional status-makers, the publishers, editors and other classic adjudicators?" That is, a topic of interest is to some extent defined by how Google represents it (Haider, in press). In that way, as we have argued elsewhere (Sundin, 2015), *search* needs to be brought into the picture in order to understand digital media. At the same time, people's information seeking, an often explored phenomena in information literacy research, need to consider the materiality of the medium. Sara Livingstone and her colleagues (2009) conclude that the strength of information literacy research lies in dealing with access while the strength of media literacy research lies in meaning and critical understanding. It has been demonstrated here how information literacy research can contribute to MIL, when moving beyond the skill-approach, without claiming that searching skills are less important. If the two research traditions are taken together you get a critical understanding of information access and in this study, such a lens has been used to investigate the role of search and critical assessment of information in schools. When *Google* is brought into the classroom, it seems the different actors in schools have not been fully able to successfully translate their activities to each other. The syllabus is not appropriately translated to the knowledge culture that *Google* offers. Pupils have not been able to translate their activities to *Google*, at least not in the eyes of the teachers. They have in turn not been able to make search a meaningful content in their enactment of media and information literacy, even though much of the information activities circulate around *Google*. Theoretically speaking, it seems to be a conflict between two obligatory passage points (Google and the syllabus) in partly overlapping actor-networks.

In conclusion, in order for a neoliberal, consumer culture to work, we have to be trained to be "good" consumers, presumably making rational choices dependent on the information available to us. In this neoliberal discourse information is not just what you read in order to make informed choices. Rather information is in itself conceptualised as a good on a market, where for instance the most popular sites end up at the top of the result list. Search engines have been in focus here, but they are of course only a part of the information infrastructure. What characterizes this infrastructure is its invisibility

(cf. Bruce & Hogan, 1998; Hillis, Petit & Jarret, 2013). Geoffrey Bowker (2008) claims, and we agree, that the better the infrastructure functions, the less we think about it. In the case of *Google*-related activities, the search engine has become so popular partly because of its black box function that makes it perfectly possible to use without understanding how it works. As information scholars in general and information literacy scholars in particular, we need to analyse and make visible the intricacy, and to some extent unpack some of the technologies of literacy. Today's culture of search demands a critical understanding of the co-dependence of searching and assessment of information in schools.

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