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## Where is search in Information Literacy

### A Theoretical Note on Infrastructure and Community of Practice

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*Published in:*  
Sustainable Digital Communities

*DOI:*  
[10.1007/978-3-030-43687-2\\_29](https://doi.org/10.1007/978-3-030-43687-2_29)

2020

*Document Version:*  
Peer reviewed version (aka post-print)

[Link to publication](#)

*Citation for published version (APA):*

Sundin, O. (2020). Where is search in Information Literacy: A Theoretical Note on Infrastructure and Community of Practice. In A. Sundqvist, G. Berget, J. Nolin, & K. I. Skjerdingsstad (Eds.), *Sustainable Digital Communities: 15th International Conference, iConference 2020, Boras, Sweden, March 23–26, 2020, Proceedings* (pp. 373–379). (Lecture Notes in Computer Science; Vol. 12051). Springer. [https://doi.org/10.1007/978-3-030-43687-2\\_29](https://doi.org/10.1007/978-3-030-43687-2_29)

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1

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## Where is Search in Information literacy? A Theoretical Note on Infrastructure and Community of Practice

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**Abstract.** In this conceptual paper theory of infrastructure is combined with one of situated learning, with a focus on search and search engines. The aim of the paper is to make a theoretical contribution to the information literacy research field by discussing theoretical contradictions as well as strengths when combining the two theoretical perspectives. Search engines and their use are part of the contemporary information infrastructure and are a such often not thought of when being used. It is argued that a critical perspective on information literacy in relation to search seems to demand that they are treated as situated and general at the same time. The paper concludes that sociomaterial perspectives on information literacy research offers both infrastructures and practices a place.

**Keywords:** Information Literacy, Infrastructures, Situated Learning, Search engines

### 1 Introduction

I have a ten-year-old son who sits a lot with his iPhone. He uses the internet mostly through visible applications on his phone. Sometimes when he searches for something he just writes a few words in the address field and then off he goes. This is not a rational use of a certain general-purpose web search engine based on specific criteria. For him, this is just finding what he wants. Mostly he asks me or my wife to find very specific things, such as the 10 most beautiful goals by Zlatan Ibrahimović, who is the best goal-keeper ever, or a photo of the biggest pike that you can fish. We have not yet discussed how search engines work because so far he is not interested and they have not yet broached this issue in school. He basically treats search engines as facts machines. Moreover, in school he and his class have searched for information, but they have not talked about what they have done or how and why they got the search result they did. At least not according to my son. In fact, the Curriculum for the compulsory school, preschool class and school-age educare [1] states that for his age one of the core contents of the school subject Swedish is: “Searching for information in books, periodicals and on websites for children using search engines on the internet”. That is, they are supposed to search for information, but they are not supposed to learn how searching the internet works. Search is treated as a neutral tool for learning something else.

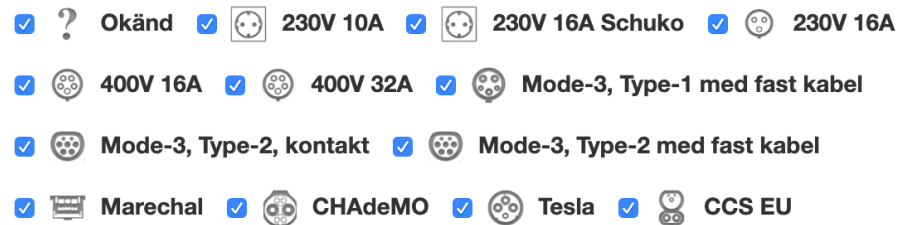
In this conceptual paper I combine a theory of infrastructure with one of situated learning, with a focus on search and search engines. Thereby I do not aim to just bring search engines into information literacy research, but I also aim to make a theoretical contribution to the field by discussing theoretical contradictions as well as strengths when combining the two theoretical perspectives. A starting point is that searching for information has become such a self-evident part of everyday life that talking about a search-ification of everyday life as well as a mundane-ification of search is justified [2,3]. That is, everyday-life practices of all kinds have been suffused by search to such an extent that it is actually difficult to identify the activity. At the same time, searching has become so easy, so mundane, that anyone without any particular skill or knowledge can do it and still get what most people would regard as a satisfying result.

The next section discusses infrastructure as a conceptual device and how that complies with situated learning and, more precisely, the theory of community of practice. Thereafter, a couple of interview transcripts are discussed followed by a short conclusion.

## **2 Learning to use the infrastructure of search**

Theoretical engagements with the notion of infrastructure often have a focus on information [4,5,6]. An infrastructure is tangible in the various sociomaterial relations that make it possible and which enable the carrying out of certain functions in society, such as the electricity grid is tangible in being able to read in the dark, to charge the car or to search for information online. Infrastructures are sociomaterial also in the sense that they include classifications, standards, regulations and so forth, which all shape its materiality in specific ways [7]. That is, they also include norms and values of how, when and where they should be used. One key idea from infrastructure studies is how infrastructures, when they work properly, tend to go unnoticed. Geoffrey Bowker and Susan Star [5, p. 33] formulate this as, “[t]he easier they are to use, the harder they are to see”.

Often, you only notice infrastructures when you are new to an infrastructure or when they break down. An example of the first instance is when travelling from UK to Sweden. You immediately notice the electricity infrastructure because of the different standards for power plugs. As inhabitants in UK are used to having problems with electricity standards when travelling, they might remember to carry out a quick Google search for “standards”, “charger” and “Sweden” before embarking on a journey. The first link tells you: “In Sweden the power plugs and sockets are of type F. The standard voltage is 230 V and the standard frequency is 50 Hz” (<https://www.power-plugs-sockets.com/gb/sweden/>). When living in Sweden, this is, in most situations, everyday-life knowledge that you do not need to know; however, when travelling it becomes important. As long as they do what they are supposed to do, you hardly think about the electricity system and its standards. For newer technology, this is not always the case. Recently, I bought a plug-in hybrid car that can be charged with electricity. I learned quickly that in Sweden there are at least 12 different standards – as you can see from this picture taken from a Swedish website on how to find your nearest charging station (<https://www.uppladdning.nu/>).



**Illustration 1.** Different charging standards for electric car batteries in Sweden 2019-07-30.

The standards are developed to accommodate car companies, national and supranational regulations, battery factories, electrical companies and so forth. The standards compete and, to some extent, supplement each other. For me, as a new owner of a chargeable car, the infrastructure for plug-in hybrid cars has certainly not become invisible in the same way as the workings of petrol stations is invisible to me when filling the tank of the car. Furthermore, a number of competing companies supply the electricity and, in contrast to petrol stations, it is often necessary to have a separate account with each of the companies if you want to use them. I need to learn how to use the infrastructure.

For general-purpose search engines, as well as for social media and other contemporary digital services, it is obvious, without going into the details, how they are made and remade every time they are used. All digital traces of individual use are aggregated at a collective level which then shapes further use through, for example, the autocorrect function and, of course, the search result as such. Besides user data, the infrastructure of search also consists of indexes and algorithms, as well as a number of standards, templates, and classifications and the devices used. For the ordinary user, if noticed at all, a search engine is just an empty white query box (or an address field) in which you write what you want to find or do. Another trait of this conceptual device of infrastructure is that it emerges in practice and that it, accordingly, must be investigated as parts of practices [6, p. 379]. The analytical starting point is not on the technology as such or its different parts – user data, index, algorithms – but how the infrastructure is used, for example in the practice of tourism and how search engine use emerges there, or the practice of schooling and how search engine activities today are embedded in that practice. A further trait of infrastructures – together with their standards and classifications – is that they are not neutral. For an ordinary citizen, it is enough that there is light when the lamp is switched. But a critical citizen could ask questions, for example about prices of electricity, how bulbs can be recycled and whether the electricity is from renewable energy or fossil fuel. In order to read on a winter evening in Northern Europe, you just turn on the light, but if you want to become a critical citizen, you have to make the infrastructure visible and learn more about it.

How do you learn to use an information infrastructure such as search engines? Just as with electricity, which you can use by just switching on the lamp, many times you just have to type a word to get a result that is at least good enough. At the same time,

the workings of search engines for a large number of sectors have dramatic consequences in society, such as for business, tourism, politics and schools. Again, you do not have to know very much in order to find out something about what you are looking for. But just as with electricity, if you want to be an informed and critical citizen this is not enough. For example, research has convincingly demonstrated that search engines are not neutral, but in fact can reinforce prejudice [e.g. 8], that they gather your data in a way that affects your privacy [9], that they are not just tools for finding information but also contribute to establishing what knowledge there is to know [10], and that they can be manipulated by groups with a particular agenda who identify so-called data voids and formulate and popularize phrases and keywords that people thereafter use in order to find extremist content [11]. That is, you have to learn the implications search engines have for different avenues in life. Again, search engines should not be seen as a constant variable effecting something else. Instead, they are more and more parts of social practices in life which they, together with other actors in the practice, shape and reshape.

In information literacy research, a number of scholars lean on situated learning [e.g. 12] and/or practice research [e.g. 13] when understanding how information literacy is learned and enacted in various practices [e.g. 14, 15, 16, 17]. Information literacy research with a sociocultural and practice theoretical interest often underlines the need to talk about literacies, rather than literacy, in order to stress the situatedness of literacy. It is taken for granted that practices and their embedded information activities are tied to local communities to such an extent that references to generalised competences, abilities or knowledge are problematized and sometimes even criticized.

### **3 Learning the infrastructure of search**

Web search engines are extremely complex technologies whose development is based on input from a number of academic fields – including computer science, information science and general linguistics – and they are situated within legal frameworks, cultural practices and economic systems. They have continuously changed since the first web search engine (Webcrawler) was launched in 1994, and their development has since moved outside academia and closer to the business sector [18]. Furthermore, search engines are increasingly inbuilt into the operating systems of computers, smartphones, tablets and in all kinds of connected gadgets and devices. They are moving in a direction where text input is supplemented with voice assistance for use, such as in my plug-in car. Search engines are everywhere, yet at the same time they are not thought of at all by most people.

During the spring of 2019, I conducted 32 couple interviews with 62 late teenagers (17-19 years). The interviews are part of the larger project “Algorithms and Literacies: Young people's understanding and society's expectations”.<sup>1</sup> The interviews were a way

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<sup>1</sup> The research complies with the ethical guidelines in Good Research Practice (Swedish Research Council, 2017); the research project has been reviewed by Swedish Ethical Review Board for the South of Sweden and according to their decision it does not fall under the Swedish Research Act (203:460).

for us to make people reflect on what they normally do not think about; to reflect about their epistemological practices of finding out something. In this paper I will only very briefly address two specific interview questions, namely variants of: “Do you remember when you started using social media” and “Do you remember when you used Google for the first time?”. Almost all interviewed teenagers could identify the first social media applications they used. Two of the participants were Linda and Louise, both 18 years old. They went to upper secondary school taking a technology programme in the south of Sweden:

*Researcher:* Do you remember when you started using social media?

*Linda:* Yes, I was only allowed to start using Facebook when I was 13. It was one such age limit, but everyone around me started earlier. But I remember it. And then, the other social media, like Instagram, I think got a little bit earlier. And then Snapchat when it was released like in 2014.

*Louise:* I had ... I like didn't care about Facebook, but then it seemed like, “yes, everyone has Facebook. Maybe there is something good with Facebook?” “[giggle] But like, let's see if I can remember how old I was, like 13-14 something. And since then, I've added social media in relation to what friends around me used and what I've seen worked. I think I got Snapchat in let's say nine grade and started using it like that there.

The interviewed youth often associated their first distinct social media experience with their first smartphone that gave access to a new world. Facebook – despite the fact that they do not use it so much anymore – was the most often-mentioned application through which the participants were introduced to social media. Directly after the participants answered the question about experiencing social media for the first time, I asked, “[d]o you remember when you used Google for the first time?”. The answers to that question were in nearly all cases less clear than to the question about social media. Many participants hesitated when trying to remember when they started to use Google or similar search engines, but in general it was a much earlier experience which was far more difficult to remember. The interview quoted above continues:

*Researcher:* But do you remember when you started to use Google, searching on Google?

*Louise:* No. [giggle]

*Researcher:* Was it much earlier?

*Linda:* Yes.

*Louise:* It is a lot older. I remember in like second grade, on the school computers ... using Google, but no, I don't know.

*Linda:* No, I don't remember either. It just feels like you've always used Google.

*Louise:* and after a while you started to realize what it was, but you have used it before. Just so like "freely", I don't know.

If social media was connected to their first smartphone, it appears that Google was connected to their first computer use. While social media clearly relate to their everyday life and leisure, search engine use was often related to school practices. Google was so much inscribed into school practices and the introduction of computers that, when asked, they remembered starting to use it even before they knew what it was. While social media applications are easily identified and demarcated, also in relation to one's biography, search engines are difficult to discern as a program separate from the computer as such.

For Bowker and Star [5 p. 35, 293f], with reference to Lave and Wenger [12], the process of becoming a member of a community of practice (learning) implies that the infrastructures of the community become more and more invisible. In relation to information literacy this could be regarded as somewhat of a contradiction. Visualizing information infrastructures, such as the role and function of search engines in social practices, is a necessary part of promoting information literacy in educational contexts at the same time as learning in a community implies becoming more and more blind to its infrastructure. There appears to be a need to make a distinction between learning for use and learning for critical use. A critical use also entails being able to switch between pragmatic and critical use depending on the situation. Furthermore, the infrastructure of search is today the same in many communities [3 p. 55-57]. In a situated sense there are always norms and expectations of when and how a search engine should be used or not. You are for example usually supposed to put the phone away during dinner and in schools. In a generic sense, enacting information literacy implies also certain skills, abilities and knowledges that have weight beyond specific practices and communities.

#### **4 Short Conclusion**

When my son, whose experience I used to introduce this short paper, searches for something, he thinks that he finds facts, that he gets straightforward answers to straightforward questions, not that he uses search engines to gauge a topical area. To search using general-purpose web search engines is an activity that is now tied to a large number of practices. Search engines constitute a crucial contemporary information infrastructure and, as such, in everyday life they are invisible to most people. As argued above, search engines (most often Google), despite their central role in contemporary society, are often not even thought of when starting to use them, as exemplified in the quotations above. In the interviews I have conducted, it became clear that the anecdotal observation of my ten-year old also applies more widely to older youths. This finding challenges how infrastructures have been dealt with in relation to communities of practice, as referred to above, in at least two ways: Firstly, according to infrastructure studies combined with situated learning theory, the infrastructure should be easier to recognize when you enter a community of practice as a new member. However, the interviews reveal that search engines almost never seem to have been a visible information infrastructure for the current generation of teenagers. This can be compared to social media, which in almost all interviews were easy to identify and talk about. Secondly, infrastructure studies note how infrastructures are tied to specific communities.

For sure, search engines are given meaning differently in for example schools compared to leisure practices, but they are also in some respects the same in different communities. If we want to emphasise critical perspectives, we also need to extricate literacy from its practice-based existence and discuss crucial affordances of technology such as search engines. A critical perspective on information literacy demands that we situate searching and search engines in specific communities of practice. Yet, we also need to explore how search and search engines tie different practices and different communities of practice together. We further need to acknowledge that critical information literacy is not an abstraction, but that it needs to encompass critical awareness of the interlinked commercial, social and political interests of the actually existing contemporary general-purpose search engines acting as multi-sided platforms. That is, we need to bring in sociomaterial perspectives to information literacy research in which both infrastructures and practices and, above all, how practices are part of infrastructures, are given a place.

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