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Educating for democracy?

The role of media and information literacy education for pupils in Swedish compulsory school

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Abstract.
This paper reports a study of pupils' experiences of media and information literacy education in five Swedish schools by answering the following overarching question, *what roles do the teaching of information seeking and critical assessment of information play for pupils in their school-work as well as in their everyday life?* Pupils in ninth grade were asked to fill in a questionnaire regarding their use of digital technology as well as their thoughts on media and information literacy education. The study shows that many pupils are knowledgeable about the terms of production pertaining to *content* in most online sources they mention. Still, infrastructural meaning-making that take into consideration issues of personalization, data integrity and surveillance, are largely lacking. The study also shows that the school's teaching is central to the pupils' development of a critical stance towards the information that they encounter online. These findings underline the importance of how schools choose to treat media and information literacy education. It is concerning then that infrastructural meaning-making is quite absent in the pupils' responses.

Keywords: Media and information literacy, Infrastructural meaning-making, Information search.

1 Introduction

Today's globalized information age is characterized by an ever-increasing wealth of information. Accompanying this information growth is an equally mounting proportion of misinformation, forming part of a changed information infrastructure that among other things blurs the boundaries between producer and consumer and where the influence of commercial platforms and algorithms is steadily increasing. The role played by propaganda and so-called fake news in the 2016 American president election, as well as the construction of the expression "alternative facts" could be seen as illustrative examples of this development, a development that brings the importance of critical assessment of information in a democratic society to the fore. This paper reports a study of pupils' experiences of media and information literacy education in

five Swedish schools by answering the following overarching question, *what roles do the teaching of information seeking and critical assessment of information play for pupils in their school work as well as in their everyday life?* We argue that to possess knowledge about the infrastructure from which information is gained and to be able to make use of this knowledge in everyday life should be recognized as corner stones of active citizenship in a democracy of our times.

Compulsory school plays an important role for making sure that everyone has an equal opportunity to critically assess information in order to make those well-informed choices that the liberal democracy depends upon. We argue that compulsory schooling also should provide pupils with intellectual tools for unpacking the information infrastructure that not only partakes in shaping how they learn and live but also co-shapes the basis of contemporary society. However, previous research points to the difficulties of making information seeking (IS) and critical assessment of information (CAI) a part of teaching and learning (e.g. Gross & Latham, 2009; Rieh & Hilligoss, 2008; Sundin, 2015; Sundin & Carlsson, 2016). Hence, more research on this topic is called for.

Sweden makes an interesting case for this study since adjusting compulsory school to, and preparing pupils for the digitized society is a high-profile area. At the same time Sweden is reported to be one of the countries where Russian propaganda is spread in both traditional media and social media (Kragh & Åsberg, 2017). Sweden holds a long tradition of embracing inquiry-based learning, accompanied by new technologies for information seeking in the classroom (Alexandersson & Limberg, 2012). This pedagogical turn has arguably contributed to making information seeking and critical perspectives on and assessment of information important fields of knowledge in Swedish schools. In contemporary Swedish educational policy digital literacy is addressed not merely as a question of being able to use digital technology but also as a question of ensuring that pupils have the tools to take a critical stance in a democratic society (e.g. The Swedish Ministry of Education, 2017).

Although information seeking and critical assessment of information are mentioned in relation to most subjects in the Swedish national curriculum, they are particularly pointed out as essential fields of knowledge for Swedish and Civics and are here explicitly related to the question of democracy. Hence, how information seeking and critical assessment of information are learned in relation to these subjects is the focus of this study. We chose to focus on pupils in ninth grade, which is the last compulsory grade in the Swedish school system. The pupils are then between fourteen and fifteen years old. In Sweden, most young people of that age can be expected to have their own smartphone and to use social media and search-engines frequently. Furthermore, most Swedish schools, including the schools in this study, provide pupils with personal laptops or tablets through so-called 1 to1 initiatives. Swedish nine graders can thus be expected to encounter and handle vast amounts of information of various kinds both in and out of school. This, along with almost having fulfilled their compulsory schooling and as such should be "fully trained" by the Swedish school system in IS and CAI, made us choose pupils of this grade for participation in the study.

2 Research on Media and Information Literacy in School Settings

The student-centered pedagogy has co-developed with a growing awareness in information studies research of students' increased responsibility for IS CAI, as well as of the development of these into fields of knowledge being taught and assessed by educators (Alexandersson & Limberg, 2012). How pupils seek and assess information are consequently widely studied phenomena within information studies. Several research projects have studied IS and CAI as objects of teaching and learning. For instance, Kuhlthau (2004) as well as Limberg and her colleagues (e.g. Lundh & Limberg, 2008; Limberg & Alexandersson, 2010; see also Rieh et al., 2016) have pointed to the connections between IS and learning. Several studies also point to challenges with student-centered pedagogy by showing pupils' troubles when seeking information (e.g. Gross & Latham, 2012; Large, Nesset & Beheshti, 2008; Pan et al., 2007). Francke, Sundin and Limberg (2011) claim that pupils tend to identify IS as searching for facts, at the expense of a more overall understanding of a topic (c.f. Blikstad-Balas & Hvistendahl, 2013; Todd, 2006). Additionally, previous research has shown that pupils often have a simple understanding of facts and tend to construct a dichotomy between facts and opinions (Alexandersson & Limberg, 2003). Furthermore, earlier research has consistently confirmed a relationship between low proficiency and overestimation of competence in relation to information literacy (Gross & Latham, 2012; Mahmood, 2016).

Another starting point for research on IS and CAI in school settings in recent years has been the increasing significance of digital technology and the use of social media and search engines that has changed the information infrastructure of schools considerably (c.f. Sundin & Carlsson 2016). Research on online searching and information literacy demonstrates the difficulties pupils have in critically assessing information (Francke & Sundin, 2012; Julien & Barker, 2009; Rieh & Hilligoss, 2008). An interest in online searching in relation to literacy is not widely spread outside information studies, but there are exceptions. For example, the educational scholars Morrison and Barton (2018) argue for the need to develop search engine literacy training and communication studies scholars Hargittai et al. (2010) show how assessment of information already starts when choosing a search engine.

Moreover, several studies point to the struggles pupils have in understanding how search engines work (c.f. Sundin & Carlsson, 2016; Julien & Barker, 2009). Andersson (2017) shows in her ethnographic study of how teenagers search for information that Google is often invisible to young people and primarily associated with school assignments. As pointed out by Sundin and colleagues, search engines today constitute an infrastructure that has become so naturalized that it is often taken for granted (Sundin et al., 2017; Haider & Sundin, 2019) and as such they represent new and different challenges for information literacy education. In conclusion, this points to the importance of updating the teaching of IS and CAI in compulsory school in order to adapt it to the changing ways in which knowledge is being used, produced and communicated in society today (Francke & Sundin, 2016).

3 Infrastructural meaning-making

A concept guiding the analysis presented in this paper is that of information infrastructure, here 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" (Sundin & Carlsson, 2016, p. 990). Conceptualizing information – and the conditions for how it is disseminated, accessed and stored – as infrastructure, allows for an analysis of media and information literacy (MIL) education that recognizes information and knowledge production as co-constructed by material, and social structures both shaping and being shaped by society (Haider & Sundin, 2019; c.f. Bowker, 1994, 1996). In contemporary society those material and social structures are deeply ingrained in the capitalist ideology. Hence, the information infrastructure cannot be meaningfully approached, analytically nor empirically, without recognizing that a few commercial actors, such as Google, Amazon, Facebook, Apple and Microsoft, and their business models for commodifying information access, now control this central feature of society. Plantin et al. (2018, p. 295) describe this in terms of a dialectic development as "the platformization of infrastructure and the infrastructuralization of platforms". Building on the work of Plantin and collegues, we here deploy the concept of platform in order to recognize the influence of the capitalist spirit (cf. Mager, 2012) and its consequences for the current information infrastructure.

Established understandings of MIL have been criticized for failing to embrace the whole palette of critical dimensions that the platformized information infrastructure presents us with. Such critical dimensions concern for instance the opaqueness of search engines and the algorithmic governance of social media flows. In their book *Invisible search and Online Search Engines*, Haider and Sundin (2019) argue for what they refer to as infrastructural meaning-making as a way of addressing some of the limitations identified when MIL is applied to the platformized information infrastructure of today. With the analytical concept of infrastructural meaning-making Haider and Sundin (2019) claim that making sense of the platformized information infrastructure involves not only to posses the skills for finding and being able to critically assess information and information sources. It equally involves being able to problematize the perceived neutrality of algorithm driven search and to understand why specifically you encounter particular information. Talking about infrastructural meaning-making then is in every aspect a socio-technical approach to MIL that brings together meaning, materiality, trust, skills and understanding in an assemblage situated in the specific cultural and societal conditions of the capitalist information age.

Having said the latter, Haider and Sundin also argue for the need to accept the limitations of educating MIL. You do not convert someone who holds a strong belief in the anti-vax movement with MIL education. In fact, as boyd (2017) argues, education for MIL could actually reinforce the problem it was supposed to solve. MIL is also about trust and trust takes time to emerge. An interest in trust makes clear that MIL is not (only) an individual ability. For the purpose of this study the concept of infrastructural meaning-making is used normatively, as a way of framing aspects that we believe that a MIL education with democratizing ambitions ought to consider. An im-

portant aspect of this meaning-making is the ability to take a critical stance, however, equally important is to be able to have a reasonable trust in those societal institutions, e.g. universities, schools and libraries, that produce knowledge at the same time as the critical perspective is not thrown overboard. To trust information and to critically assess information are to some extent two practices in conflict with each other.

4 Method

The findings reported in this paper form part of a larger study that was conducted during spring 2017. The larger study comprised data from interviews with teachers and librarians, textual analysis and a questionnaire directed at pupils, and was conducted at five schools situated in southern Sweden.[1] Including several schools allowed for comparisons that made explicit more general patterns as well as particularities in the individual schools. For the purpose of this paper, we focus on the perceptions of the participating pupils expressed in the questionnaire. When selecting schools for the study we looked for schools of different size and location as well as with different forms of management (both private and public). Although the five schools that finally agreed to participate do meet the initial criteria for selection, it should be noted that despite their differences the schools also share many characteristics. It should also be noted that common attitudes or a formal policy regarding how IS and CAI should be approached and taught is not always present at the participating schools. This means that our findings foremost reflect the attitudes and experiences of individual pupils, although the schools and their different settings provide a necessary and regulating framework for both teaching and learning, that probably affects the answers we received. Table 1 gives an overview of the participating schools.

School	Private/public	Total nr of pupils	Pupils in 9th grade	Nr of participating pupils
1	Private	≈400	≈60	17
2	Public	≈520	≈60	57
3	Private	≈540	≈50	47

[1]Carlsson, H. & Sundin, O. (2017). Sök- och källkritik i grundskolan. En forskningsrapport [Search critique and critical assessment of information in compulsory school. A research report]. Lund: Lunds universitet.

4	Public	≈600	≈130	91
5	Public	≈850	≈90	27
Total:		≈2910	≈430	231

Table 1. Participating schools

In order to get a rich and broad picture of the pupils' perspectives on how IS and CAI are taught and learned at the different schools, pupils in ninth grade were asked to fill in a questionnaire with questions regarding their use of digital technology as well as their thoughts on MIL education. Only pupils of those teachers that chose to participate in the study were offered to fill in the questionnaire. Hence, the number of participating pupils varies between the schools (see Table 1). Both pupils and parents were informed about the study in advance and that participation was voluntary. Altogether 37 pupils chose not to participate, whereas 231 did participate. The questionnaires were answered during class with one of the researchers present to answer questions. The research complies with the ethical guidelines in Good Research Practice (Swedish Research Council, 2017).

The questionnaire consisted of nineteen questions, out of which eight were altogether qualitative and text based. Eleven questions were multiple-choice, with the possibility to comment one's answer. The length and reflective quality of the text-based answers and comments varied greatly both between pupils and between schools. Pupils from school 4 rarely commented or answered the text-based questions whereas pupils from school 2 and 5 generally provided extensive and rich comments and answers. Due to these differences, school 2 and 5 are more visible when findings are presented and discussed. When the text-based answers are quoted, the authors have translated these parts of the material into English. Some grammatical adjustments have been made to facilitate readability.

In a first step of the analysis of the questionnaires the answers of the multiple-choice questions were compiled using SPSS, whereas the text-based answers and comments were analyzed through careful and repeated readings in order to establish common themes for each school as well as for the sample as a whole. At the second step of analysis the results from the questionnaires were analyzed with a closer attention paid to the theoretical perspective.

5 Pupils' perspectives on information seeking and critical assessment of information

5.1 Tools and platforms for Information Seeking in School

In order to gain a deeper understanding of how Swedish nine graders interact with and make sense of the contemporary information infrastructure, the pupils where asked about what tools and platforms they use when looking for information to be used for school assignments. Regarding tools a majority of the participating pupils state that they use a laptop or tablet provided by school. It is also quite common to use one's own, or a parent's smartphone tablet or laptop. Only 2 % state that they use a public desktop in the classroom or the school library (Appendix table 2). It is interesting to note the high use of private mobile devices, which suggest that these pupils mainly interact with the information infrastructure through exceedingly customized and personalized interfaces, in line with the platformization of infrastructure, pointed out by Platin and colleagues (2018).

Regarding platforms used in the given context, most respondents state that they turn to Wikipedia followed by search-engines such as Google and Bing and NE.se – the Swedish national encyclopedia online, YouTube and online forums. Social media are rarely used by the respondents in the given context (Appendix table 3). In the following, we comment some of the platforms. The extensive use of Wikipedia is not surprising. Previous research show that people put considerable trust in ranking lists of search engines (Pan et al., 2007; cf. Kammerer & Gerjets, 2012), and regularly choose from the first hits (Pan 2009). Wikipedia often turns up at the top of those lists (Höchstötter & Lewandowski, 2009) and is as such a convenient choice. As stated by one of the respondents "I also use Wikipedia since the platform is quite big and usually when you search for some information, Wikipedia always turns up as the first alternative" (PS2).

Pupils that comment on their choice of YouTube refer to the advantages of being able to encounter information orally and as moving images. As expressed by one pupil: "[i]f I use YouTube to find facts /.../ you can find teachers that talk about the thing you're looking for" (PS3). Others remark that YouTube is not a platform where one starts one's search, rather one is directed to YouTube through links from other sites. The answers indicate an awareness of the diversity of the platform and how it can be used differently for different purposes.

In their written comments, the pupils in many cases have reflexive discussions about to their usage of most platforms. In this sense, those who commented, appear to be quite knowledgeable about some conditions of the current information infrastructure, and express strategies for handling its challenges. Still, the pupils' focus is mostly on evaluating the credibility of the content of the information they encounter on these platforms rather than demonstrating any infrastructural meaning-making. Comments that express awareness of a more contextualized critique, involving questions such as "Why do I encounter this information at all", (cf. Sundin & Haider 2016) are largely lacking.

Google does not seem to be neither promoted nor banned by teachers. Rather, Google appears more to be a naturalized tool, which echoes findings of previous studies that point to how Google has become an invisible part of everyday life (c.f. Sundin et al., 2017: Haider & Sundin, 2019). When comparing to how the pupils discuss and reflect on their use of search engines with their use of the other platforms, search engines are not addressed with the same amount of critical awareness regarding credibility, function and terms of production. Even if some pupils recognize how the search engine works, the pupils appear to put a lot of trust in Google, which also corresponds well with findings in previous research (cf. Sundin & Carlsson, 2016).

> Google is not in itself a source of information but a search engine. One can with the help from Google find sources easier. Usually Google automatically sorts and orders sites and links so that the most relevant ends up at the top and when it comes to a topic where information changes often or news come up, Google makes sure to show the most relevant, to make searching easier. If a company or a site has paid Google to end up higher on the site (which benefits both sides, Google & the company), this is made explicit. So the risk of getting irrelevant information without knowing it is low.
>
> *PS2*

Given the absence of contextualizing discussions of Google and social media, that take into consideration for instance issues of personalization, data integrity and surveillance, there is reason to believe that this type of critique has not been prevalent in the MIL education that the pupils have attended. Pupils' perceptions of this education are discussed in the next section.

5.2 The Pupils' Perceptions of MIL Education

Most of the pupils in the present study state that they have been taught about CAI and IS. Only 7 pupils stated that they had not received any such education (Appendix table 4). Those pupils who gave a positive response were asked to elaborate on their education, how it was done, what it contained and important things they learned. Their answers vary greatly. Several indicate that they cannot remember how the teaching was organized or what it contained while others made extensive descriptions of more or less detail.

> At school we have had CAI every now and then. One time we had a test in Civics where we would review a source and write if we thought it was relevant or not. We have also learned about CAI in general and learned that it is very important to review the sources we use. In addition, sometimes when we do assignments in Civics and Science we have to critically assess the sources we used.
>
> *PS2*

The vast majority of pupils who answered the text-based question describe that they had been taught how to value the credibility of a source while only a few describe that they had been taught about IS. One pupil describes that in the teaching of IS that they

had to learn ”[h]ow one seeks facts and information in the easiest way. The use of key words and how to filter the answers” (PS2). Another pupil writes that they had been taught, "how you search on Google to find what you are looking for, for example by removing certain words you do not want to include, etc” (PS1).

When students are more specific about what they have learned, certain things come up frequently, for example, to always compare different sources, to be critical of online forums and social media and instead use NE.se [a Swedish commercial encyclopedia], as well as being aware of the author's intention for writing the text. Running through the answers are descriptions of checklists of various kind that correspond with the traditional criteria for source criticism: authenticity, time, dependence and tendency: “Who has written the text? Why was the text written? When is the text written? e.g. language, sincerity. Are there more sources that state the same thing?” (PS5) The text-based responses give the impression that the pupils have a more or less vague picture of the content of the education of IS and CAI that they received during seventh to ninth grade. Previous research has pointed to the difficulties of making these activities a part of teaching and learning (e.g. Limberg & Sundin, 2006), which might partly explain why the pupils have such vague memories of this part of their education. However, those who answered have quite a clear picture of what they have learned, which is largely expressed in the form of checklists for the critical assessment of text-based information. Checklists, such as these, 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).

A large majority of the pupils’ state to have use for what they have learned about IS and CAI when working with school assignments (Appendix table 5). However, there are various reasons why the pupils find what they have learned useful. Some find this knowledge important because school assignments require credible facts and information. One pupil expresses that “for every writing task that requires you to have relevant and correct facts I use the different methods I learned in school to find credible facts” (PS5). Others point out that CAI forms part of the basis for their grade. For some however, the education seems superfluous. “Most of what I've learned from the teaching of CAI, I believe, falls under ‘common sense’ " (PS5).

5.3 Pupil’s Perceptions of their own Abilities

A majority of the pupils’ states that they perceive of themselves as good or very good at searching for information for school assignments online (Appendix table 6). The pupils were also asked about their ability to critically assess online information. Here too, the majority of pupils estimates their ability to be good, but fewer perceive of themselves as "great", in comparison with the ability to search for information (Appendix table 7). These results correspond well with results from investigations where similar questions have been posed to Swedish teenagers about their abilities regarding CAI. (e.g. The Swedish Ministry of Education 2016) as well as with earlier research (Gross & Latham, 2012; Mahmood, 2016).

A few pupils have chosen to comment their answers. In their comments some pupils express doubts in relation to their ability to critically assess information, as exemplified below.

> I consider myself to be critical of what I read, because I've seen so many facts that are wrong on the Internet. My weakness is people I look up to that I would easily believe no matter what they say, and when I simply want to look for small stuff, it could be that I just turn to the first ever site.
>
> *PS3*

This type of self-critical approach is not expressed in relation to the ability of searching for information, which confirms the results of the multiple-choice questions. This may indicate that the pupils are not aware of the difficulties and critical dimensions of IS, to the same extent, as they are when it comes to CAI. For some, to be good at searching for information simply means finding what you are looking for. One pupil writes "I rarely have trouble finding facts for my assignments and therefore consider myself okay at online information searching" (PS2). A few also refers to a broader experience of Internet use: "Because we work digitally all the time in school, I'm very used to navigating information on the Internet" (PS2). There are also examples of including more query related aspects: "I find it easy to know what I should enter in the search box in order to find the information I'm looking for" (PS3). From the comments it appears that IS is primarily understood as a technical skill.

Furthermore, the ability of IS is often enmeshed or confused with the ability to critically assess information. One pupil gives the following comment to the question: "Do you think you are good at searching for news, facts and information for school information online?"

> I'm not world class. But it works well because I ask myself questions that show whether the source(s) have true theories or not. The questions are, for example, who is the owner of the source? Can you get in touch with him? Have many other sources written similar things? Are there any connections between the sources? Why was the source created? WHEN was the source created is almost always the most important. Is it an open source (who can change and type text) or is it perhaps that the source is a blog or the like where many can state their opinions?
>
> *PS2*

From the pupils' answers, IS stands out as a mean to an end and not as an object of learning in its own right. It is compared to the critical assessment of sources, quite invisible (Sundin & Carlsson 2016; Haider & Sundin 2019).

5.4 The Role of MIL Education in Pupils' Everyday Life

The increased use of digital tools and platforms by young people means that they get access to information in new ways also outside school (cf. Andersson, 2017). When the pupils in the present study were asked about what tools they used for information

searching in their spare time, the majority indicated that they use their own phone. Many also state that they use their own computer and/or tablet (Appendix table 8). When asked what platforms they use in their leisure time, social media and search engines are at the top of the list (Appendix table 9). In a text-based question, students were asked to share what they do when using the platforms. The answers show that they are used for different purposes, which roughly can be divided into four categories: entertainment, socializing and staying in touch with family and friends, searching for information and facts and keeping up to date. One pupil writes:

> The social media I use are mostly to check updates about everyday things that my friends post. I use Snapchat to talk to my friends. I use Youtube for entertainment and sometimes information. In case I want to find out something in particular I use Google and Wikipedia.
>
> *PS2*

Another pupil expresses herself as follows:

> I almost only ticked the boxes for social media as they are the services I use a lot in my spare time to stay in touch with friends and family. Googling things is something you do every day, to find something or simply because you're bored. When I use Facebook it's for chatting with other people. There are many links to articles on Facebook but most are unreasonable "clickbait" to get readers. Youtube I use to watch videos for entertainment. I usually go to different forums, once again mostly for entertainment.
>
> *PS5*

The quotes above point to the difficulty of associating platforms with certain parts of life. Search engines, Wikipedia and Youtube are the services used extensively both at school and in pupils' everyday life (Appendix table 9). Many pupils critically assess and discuss the information they encounter and use in their spare time. More than half (67 %) of the pupils' state that they always or sometimes come across information that they question whether they can trust when they are online. Several pupils also express that they relate critically to the content of discussions with friends and acquaintances on, for example, Snapchat.

> On snapchat, you can't believe everything you hear, or what people want you to believe (e.g. that rape victims are lying and a convicted rapist being innocent). I'm always critical when it comes to information people post on snapchat, and I try to constantly get as much information as possible, from both parties, when there's, for example, some dispute or fight mentioned.
>
> *PS2*

In the quote above, the pupil talks about how she applies the methods the school teaches of CAI, to assess information and rumors in social media in her spare time.

This indicates that the school's teaching may be influential outside the classroom. Another student expresses this even more clearly.

> I use social media daily like Instagram and twitter and there you get a lot of information, I usually trust blindly what it says but lately, because of the work we have done in school I've become more critical of everything I read there. I know that information rarely is checked and it's easy to lie on social media.
>
> *PS2*

In the questionnaire the pupils were explicitly asked if they felt that the school's teaching of IS and CAI was useful for them even in their spare time. More than half indicate that this is the case to some extent (Appendix table 10). The vast majority also states that they have only been educated about IS and CAI in school.

> I've learned all the techniques I know from school. Before I learned about critical assessment of information, I believed everything online, even though it was completely absurd. I thought that if you wrote something, it had to be true.
>
> *PS2*

Those who specify alternatives highlight that they learned from the advice of parents, or other family members, as well as friends or through own experiences of encountering false information online. Otherwise, there are occasional examples of pupils stressing, for instance, events in the media as alternative sources of knowledge to the school's teaching.

The text-based responses indicate that the school's teaching is central to the pupils' development of a critical stance towards the information they encounter online. For those pupils who have parents that discuss the issue, this more informal education appears to play an important role. However, merely a few mentions that they get this support at home. These findings underline the importance of how schools choose to treat IS and CAI as objects of teaching and learning. It is concerning then that the infrastructural meaning-making we argue for is largely lacking.

6 Discussion and conclusions

The results from this study give insight into how pupils, that are about to finish Swedish compulsory school, reason about information search and critical assessment of information, and the role played by school in these matters. Many pupils who provided comments demonstrate a quite impressive awareness about certain aspects of the information infrastructure they depend on for their education and in everyday life. Our analysis shows that the pupils are knowledgeable about the terms of production pertaining to *content* in most online sources they mention, such as social media and Wikipedia, and appear to be trained to compare different sources in order to establish

the credibility and trustworthiness of the information they find and encounter. These aspects are of great importance and should be expected to be captured by MIL education in a digital age. Still, the infrastructural meaning-making that we argue to be equally important, is not present in the pupils' responses to any larger extent. One reason for this could be that although social media, Wikipedia and online forums are examples of peer-to-peer production enabled by digital technology, in relation to critical assessment of information, they are more easily translated and compared to the conditions of print media. In a sense Wikipedia and social media are remediations of newspapers and encyclopedias from a previous print-based information infrastructure, albeit of course with different material conditions for the production and dissemination of information. Critical assessment can then conveniently be turned into a question of authorship and establishing provenience in relation to content, by applying criteria that draw on traditional source criticism in the shape of checklists.

Search engines arguably order knowledge in ways that evade notions of a remediation of a print-based information infrastructure. How this ordering works, that this ordering even takes place, is largely black boxed and invisible and thus much more difficult to grasp and capture in MIL education. Google's ranking list come off as a neutral given, and not as a result of culturally situated algorithmic governance (Haider & Sundin, 2019). Hence, although questions of authorship and content of course are still relevant, they need to be supplemented by other forms of understanding assessment, which traditional criteria for source criticism fail to capture. This requires knowledge of the platformized information infrastructure that not all teachers are likely to possess, which in our findings are illustrated by the pupils' lack of discussions of these issues. Given the importance pupils state that the schools' instruction on critical assessment of information has, this is a problem that needs to be addressed.

Related to the invisibility of search engines is the invisibility of search as an object of critique and learning, which has been observed also in previous research (Sundin, 2015; Sundin & Carlsson, 2016). Most pupils in this study state that they perceive of themselves as good at both finding and assessing information, but there is a tendency to embed searching into critical assessment or to treat it as merely a set of practical skills. Although these activities cannot be meaningfully teased apart, when failing to treat them as separate phenomena, pupils run the risk of not capturing the critical aspects of search, which is an important aspect of infrastructural meaning-making.

As pointed out in the introduction of this paper, active citizenship requires the ability to understand the complexity of the current information infrastructure. It is important to note here that infrastructural meaning-making is not merely about critique – it is also about trust (Haider & Sundin, 2019). The findings of this study do not give any clear picture of how the pupils navigate between these positions. What we can tell is that they have learned to be critical towards information they encounter online. Whether Swedish compulsory school has succeeded in also building that trust in society's knowledge institutions, that democracy depends on, is for another study to find out. The important job of building trust is however not simply a task for MIL education, not even for compulsory schooling. It is a political undertaking for society at large.

The pupils participating in this study express to have skills and competences to handle some challenges that the contemporary information infrastructure poses, still important pieces of the puzzle, that is infra-structural meaning making, appear to be missing. The most important conclusion drawn from this study then is that we must turn talk about the importance of information search and critcal assesment of information into action and discuss what it actually can be, how it should be taught and what it means to be media and information literate in contemporary society.

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8 Appendix 1: Tables of results

Table 2. Tools for formation seeking in school

Tool	Total nr of pupils	%
Private phone	118	49,4
Private tablet	45	18,3
Private computer/laptop	113	47,3
Tablet from school	32	13,4
Computer/laptop from school	177	74,1
Public desktop	6	2,5
Other	11	4,6

Table 3. Platforms for information seeking in school

Service	Total nr of pupils	%
Search engines	192	80,
NE.se	157	66
Wikipedia	193	81
Instagram	5	2,
Facebook	13	5
YouTube	91	38
Twitter	6	3
Snapchat	7	3

Online newspapers	114	48
Online forums	36	15,
Other	17	7,

Table 4. Have you, as you recall it, being taught about critical assessment of information and information seeking during your xxxschool years?

	Total nr of pupils	%
Yes,	124	52
Yes, but not a lot	80	34
Neither little nor a lot	18	8
No, not at all	7	3
Don't know	7	3
No reply	3	1
Total	239	100

Table 5 Have you had use for what they you've learned about information searching and critical assessment of information when working with school assignments?

	Total nr of pupils	%
Yes, always	94	39
Yes, sometimes	97	41
No, seldom	20	8
No, not at all	5	2
Don't know	19	8

No reply	4	2
Total	239	100

Table 2. Do you think of yourself as good at searching for facts, news and information for school assignments online?

	Total nr of pupils	%
Yes, very good	101	42
Yes, ok	115	48
Neither good nor bad	12	5,
No, not so good	6	3
No, not good at all	3	1,
No reply	2	1
Total	239	100

Table 7. Do you think you are good at deciding if you can trust news, facts and information you find online?

	Total nr of pupils	%
Yes, very good	62	26
Yes, ok	139	58
Neither good nor bad	32	13
No, not so good	3	1,
No, not good at all	1	1
No reply	2	1
Total	239	100

Table 8. Which of the following tools do you usually use in your spare time? You can tick multiple options.

Tool	Total nr of pupils	%
Private phone	214	90
Private tablet	62	26
Private computer/laptop	151	63,
Borrowed tablet	13	5,
Borrowed laptop	41	17,
Borrowed desktop	6	3
Family computer	22	9,
Other	18	8
No reply	3	1,

Table 9. Which of the following platforms do you usually use in your spare time? You can tick multiple options.

Service	Total nr of pupils	%
Search engines	178	75
NE.se	43	18
Wikipedia	113	47
Instagram	155	65
Facebook	138	58
YouTube	194	81
Twitter	46	19,
Snapchat	160	67

Online newspapers	80	34
Online forums	55	23,
Other	15	6
No reply	3	1,

Table 10. Do you feel that you have use for what you have learned in school about information searching and critical assessment of information school when you're online in your spare time, for example when Googling or using Social Media?

	Total nr of pupils	%
Yes, always	50	21
Yes, sometimes	103	43
No, seldom	47	20
No, not at all	14	6
Don't know	17	7,
No reply	8	3,

Appendix 2: Questionnaire for pupils, year 9, spring semester 2017, translated from Swedish

By answering this questionnaire, I agree to participate in the study *Search critique and critical assessment of information in compulsory school* (see information letter).

First, we kindly ask you to answer some questions about searching for and critically assessing information in school.

1. Which of the following tools do you usually use to search for information and facts online in relation to school assignments? You can tick several options.

☐ Private phone
☐ Private tablet
☐ Private computer/laptop
☐ Tablet from school
☐ Computer /laptop from school
☐ Public desktop
☐ Other

2. Which of the following platforms do you usually use to search for information and facts on the Internet in relation to school assignments? You can tick several options.

☐ Google, bing or other search engine
☐ NE.se
☐ Wikipedia
☐ Instagram
☐ Facebook
☐ Youtube
☐ Twitter
☐ Snapchat
☐ Online newspapers (e.g. Dagens nyheter, Sydsvenskan, Svenska dagbladet [Swe. dish newspapers])
☐ Online forums (e.g. Flashback)
☐ Other

3. Tell us why you choose use the services you ticked in question 2 to search for facts and information on the internet in relation to school assignments.

4. Tell us why you do not choose to use certain services mentioned in question 2 to search for news, facts and information in relation to school assignments.

5. Do you think of yourself as good at searching for facts, news and information for school assignments online?

☐ Yes, very good
☐ Yes, ok
☐ Neither good, nor bad
☐ No, not so good
☐ No, not good at all

6. Do you think you are good at deciding if you can trust news, facts and information you find online?

☐ Yes, very good
☐ Yes, ok
☐ Neither good, nor bad
☐ No, not so good
☐ No, not good at all

7. Have you, as you recall it, being taught about critical assessment of information and information seeking during your xxxschool years?

☐ Yes
☐ Yes, but not a lot
☐ Neither little nor a lot
☐ No, not at all
☐ Don't know

8. If you have been taught about critical assessment of information and information seeking, tell us about how it was done and what it contained

9. If you have been taught about critical assessment of information and information seeking, make a list of five important things you learned.

10. If you have been taught about critical assessment of information and information seeking, do you recall any school librarian being involved?

☐ Yes
☐ No
☐ Don't know
☐ My school do not have a school librarian

11. Have you had use for what they you've learned about information searching and critical assessment of information when working with school assignments?

☐ Yes, always
☐ Yes, sometimes
☐ No, seldom
☐ No, not at all
☐ Don't know

12. Which of the following tools do you usually use in your spare time? You can tick multiple options.

☐ Private phone
☐ Private tablet
☐ Private computer/laptop
☐ Tablet from school
☐ Computer /laptop from school
☐ Public desktop
☐ Other

13. Which of the following platforms do you usually use in your spare time? You can tick multiple options.

☐ Google, bing or other search engine
☐ NE.se
☐ Wikipedia
☐ Instagram
☐ Facebook
☐ Youtube
☐ Twitter
☐ Snapchat
☐ Online newspapers (e.g. Dagens nyheter, Sydsvenskan, Svenska dagbladet [Swedish newspapers])
☐ Online forums (e.g. Flashback)
☐ Other

14. Tell us about what you do when you use the platforms you ticked in question 13

15. Do you come across news, facts, or other information that you question whether you can trust when using the platforms, you ticked in question 13?

☐ Yes, always

☐ Yes, sometimes
☐ No, seldom
☐ No, not at all
☐ Don't know

16. If you answered yes to question 15, please give examples on one or several occasions when such a thing happened

17. Do you feel that you have use for what you have learned in school about information searching and critical assessment of information school when you're online in your spare time, for example when Googling or using Social Media?

☐ Yes, always
☐ Yes, sometimes
☐ No, seldom
☐ No, not at all
☐ Don't know

18. Apart from the school's teaching, tell us about other ways that you have learned to decide whether you can trust information you encounter online?

19. Do you have any tricks that you have learned outside school that you use to decide whether you can trust information you encounter online? Tell us about them here.