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Citizens' networks of digital and data literacy

Simeon Yates, University of Liverpool, UK.

Elinor Carmi, City University, UK.

Introduction

As argued throughout this volume (LINKS TO OTHER RELEVANT CHAPTERS) dis-/mis-/mal-information are a cause for growing concerns across the world (Carmi et al, 2020). Focusing on misinformation Wardle and Derakhshan (2017) argue that misinformation is “information that is false, but not created with the intention of causing harm”. However, scholars and the media tend to use this term interchangeably in various contexts, mixing it with disinformation, malinformation, fake news (Farkas and Schou, 2018) and the idea of an infodemic (Simon and Camarago, 2021). While the exact definition of misinformation is not the topic of this paper, for the following discussion we need to highlight that the practices around it can vary quite a lot and depend on how it is applied conceptually and practically. As our own research points out (Carmi et al 2020, Yates et al, 2021) mis-/dis-/mal-information as technically defined by scholars are not everyday terms used by citizens. What does overlap are the concerns shared by scholars and citizens over the spread of ‘misinformation’ or ‘fake news’.

As noted in this volume and elsewhere scholars have been discussing the spread of misinformation around such things as elections, Covid-19 or the climate crisis. They have documented how people across the world are effectively bombarded with misleading messages through various media from social media (e.g. Facebook, Instagram, Twitter or TikTok), private messaging apps (e.g. WhatsApp, WeChat) and broadcast media. This raises the question of how citizens can respond to this? What resources (social, cultural and material) can they draw upon to identify, evaluate and respond to mis-information?

This chapter focuses on this question by exploring citizens' digital and data literacies, especially the social networks (personal and digital) that citizens depend on for support. We will argue that these networks, which we call *networks of literacy*, are key to understanding the way people engage with digital media and systems. *Networks of literacy* are the ways in which people engage with others, where they engage, and with which media to gain the understanding, skills and competencies in a way that suits them. We will specifically draw on insights from our three-year Nuffield Foundation funded project “Me and My Big Data: Developing citizens data literacies”. We explore whether citizens possess the social networks they can draw upon to support the digital and data literacies needed to address dis-/mis-/mal-information. As we argue elsewhere (Carmi et al., 2020), understanding people's data literacies are key to developing education programmes, or demand policy changes that can assist them to better manage misinformation and more broadly in a datafied society.

Underpinning research

The Me and My Big Data project, spanned from 2018 until 2021, and aimed to understand the levels of and variations in UK citizens' data literacy. In particular, we sought to explore the extent of citizens' understanding of the use of their data by industry, government and third sector. In the four years since the project was initially designed much has changed. The focus of

concern around online harms has shifted from privacy and data exploitation to dis-/mis-/mal-information (Carmi et al., 2020). The project consisted of three stages (see Yates et al., 2021 for full details):

1. A review of current research
2. A nationally (UK) representative survey
3. Citizens focus groups

The survey followed a similar methodology to that employed in our recent studies of digital inequalities (Yates et al, 2020a, Yates et al, 2015; 2019; 2020b; Yates and Lockley, 2018). We used Latent Class Analysis to identify six groups according to their use of digital systems and media:

1. Extensive political users – likely to undertake most activities measured.
2. Extensive users – likely to undertake most activities measured but not political action.
3. General users – some use across most activities.
4. Social and entertainment media users – low use apart from SNS and entertainment media.
5. Limited users – low to very low use across all measures.
6. Non-users – not online.

We conducted focus groups during Autumn 2020 and Winter 2021 via community digital literacy centres across the UK (more on the methodology of focus groups during a pandemic see Carmi et al. (forthcoming 2022)). Groups were divided according to their data literacy levels as listed above and their age. This chapter uses findings from both the survey and focus group work.

Digital and data literacy

The term 'digital literacy' is ubiquitous but often goes undefined in discussions of digital media use. The idea builds on multiple prior concepts including media literacy (see Mihailidis & Thevenin, 2013), data literacy (see Crusoe, 2016; Grillenberger & Romeike, 2018) and information literacy (see Carlson & Johnston, 2015). The theoretical examination of ICT use as a form of literacy has a long heritage (e.g. Finnegan, 1989) and there is a much deeper history tied to broader theories of literacy (see Street and Street, 1984). Importantly, such social, political and cultural understandings of literacy are rooted in the idea of literacy practices and their "uses" by citizens and communities (see Hoggart, 1957). It is important to note that the idea of digital literacy is not simply one of making an analogy between a skill set needed for 'written' texts and one for 'computer systems'. Writing is itself a technology and written literacy and digital literacy fundamentally intersect today as the majority of text consumed by citizens is provided via digital media and systems. As Danet noted in 1997:

"In perhaps 50 years' time, our understanding of the nature of literacy and of the social functions of texts will have so radically changed that few will be alive to attest to 'how things were' at the close of the 20th century" (Danet, 1997, p. 7).

Literacy is therefore always about the use of the communication technologies at the time, though it is of course a highly social and culturally differentiated set of practices. Importantly, certain literacy practices are deemed more worthy or useful – in other words - there are notable **normative** assumptions in play around what types of behaviours and knowledge citizens should have. These points all hold for use of digital media including the normative assumptions about what is 'good' digital literacy (Arora, 2019). To this set of ideas, we bring the concept of 'data literacy'. This is not just 'numeracy' under another guise but reflects the fact that the use, interpretation, and manipulation of data are key components of citizens' engagement with digital systems and with the digital society. Data misuses, privacy breaches and role of algorithms

require that citizens be equipped not only with technical but also critical skills to make sense of and manage the data they generate online (see: Andrejevic, 2014; Selwyn, and Pangrazio, 2018; Hintz & Brown, 2019; Zuboff, 2019).

Digital and data literacy are key to citizens' ability to understand and manage the content and algorithmic ordering they encounter online. According to OfCom's (the UK media regulator) adults' media use and attitudes report from 2021, there are many gaps in UK citizens knowledge when it comes to critical understanding of digital media. For example, some internet users were unaware of the potential for inaccurate or biased information online; 3% of internet users believed that all information they find online is truthful, 30% thought most is, and more worryingly, 24% didn't even think about whether the information they find is truthful or not. When it comes to trust and misinformation, the report argues that a majority (65%) of search engine users were aware that some websites that appear in their search results could be inaccurate or biased, but 18% thought they would all have accurate and unbiased information, and a further 10% did not consider this at all. According to the report, younger search engine users (aged 16-24) tended to be less media-literate in interpreting the accuracy of search results; 31% thought that if they had been listed by the search engine, these websites would have accurate and unbiased information. These findings match others in the past years that indicate that many people lack an understanding of how the digital media and systems they use everyday work and, importantly, what the consequences are for them in their lives.

As part our project we developed a Data Literacies framework we call 'Data Citizenship' that contains three dimensions:

1. Data Doing: Citizens' everyday engagements with data (for example, deleting data and using data in an ethical way).
2. Data Thinking: Citizens' critical understanding of data (for example, understanding data collection and data economy).
3. Data Participating: citizens' proactive engagement with data and their networks of literacy (for example, taking proactive steps to protect individual and collective privacy and wellbeing in the data society as well as helping others with their data literacy).

We would therefore argue that digital and data literacies have many, if not all the same features as written and media literacies:

- They are technology dependent.
- They have clear social, cultural and political elements - including normative assumptions.
- They are complex and consist of a range of practices that combine into different literacies.
- Different literacies and literacy practices often correspond with specific social contexts or groups.
- Lack of or limited literacies can have significant material, physical, emotional and mental impacts for citizens.
- *Literacies are often heavily dependent on citizens' social networks.*

It is this final point, the ways in which data and digital literacy are dependent on citizens in-person and digital social networks that we explore in this chapter. Our focus group data points to a version of the 2-step-flow model of influence, originally conceived by Lazarsfeld and Katz (Katz, 1957), in citizens networks of literacy. Though falling out of fashion as an approach in the later parts of the 20th century - in part due to the difficulty in empirically testing the model - 2-step-flow patterns are notably present in social media interactions and digital networks (Choi, 2015; Hilbert et al, 2017; Sofer, 2021). We would point to two areas where this structure - has a role in citizens networks of literacy. First, as evidenced in other work (Choi, 2015), the dissemination of (dis)information is often via key 'leaders' or 'influencers' within broader digital

and social media networks. Second, and closer to home, citizens rely on key individuals within their local social networks both digital and in person (Hilbert et al, 2017) to verify information or gain advice on using digital media and systems. This is complicated further by the role of algorithms in the dissemination of information and creation of links in digital networks (Sofer, 2021). Therefore, in the following section, we present some of our project findings and argue that citizens' *networks of literacy* are key to how they navigate data, information and content.

Citizens data literacy networks

We explore citizens' social networks in two ways. First, how they rely upon their networks to understand and verify digital media content. Second, we examine how they support others to understand and use digital media.

Verifying information

From our survey work we found that most users only trust some of the content they encounter online (Yates et al, 2021). We therefore asked respondents to indicate which methods for checking content they used as set out in Table 1.

Table 1: Social media and web search checks

Social Media Checks	Web search checks
Check if it was by an organisation I had heard of	Check if it was from an organisation I had heard of
Check if it was by an organisation I thought was trustworthy	Check if it was from an organisation I thought was trustworthy
Look at how professional the content looks, e.g. are there spelling mistakes, do the images or videos look high quality	Look at how professional the website/ app looks, e.g. are there spelling mistakes, do the images or videos look high quality
Think about what the article is about to see how likely it is to be true	Look at how credible the site/ app looks (e.g. check the web address, the links to other sources etc.)
Check to see if the same information appears anywhere else	Think about the content to see how likely it is to be true
Think about whether the person who shared it was someone you trusted	Check to see if the same information appears anywhere else
Look at the comments/ what people have said about the article	Think about whether you trust the author(s)
Check the information with another person (friend, family member, colleague) and see what they think	Look at the comments/ what people have said about the website/app
Something else	Check the information with another person (friend, family member, colleague) and see what they think
	Something else

In relation to social media, on average, respondents are using less than 3 of these checking methods (Figures 1 and 2). With most common actions being to check if the information was provided by a known or trusted organisation. Our 'Limited' users and our 'Social and entertainment media' user group are far less likely to verify content at all (Table 1). They are also more likely than other groups to use checking methods that rely on other people (trust in the person that posted the content, check with friends, check comments on post) than evaluate the content itself (Table 2).

Table 2: Likelihood (%) of checking social media content

Checking social media percentages	EP	E	S&M	G	L
Don't check	20	16	38	40	78
Some checks	80	84	62	60	22

$\chi^2(4, 1322) = 259.152, p = 0.000, \text{Cramer's } V = 0.443$

Medium effect size

Table 3: Proportion (%) of checks depending on others or evaluating poster

Checking social media percentages (people based)	EP	E	S&M	G	L
Percentage of checks	20	20	24	19	23

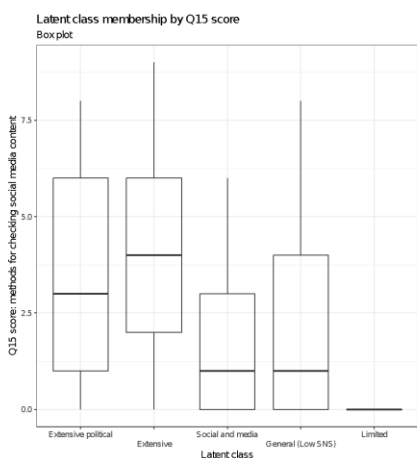


Figure 1: Box plot of the range of checking of social media content by user types

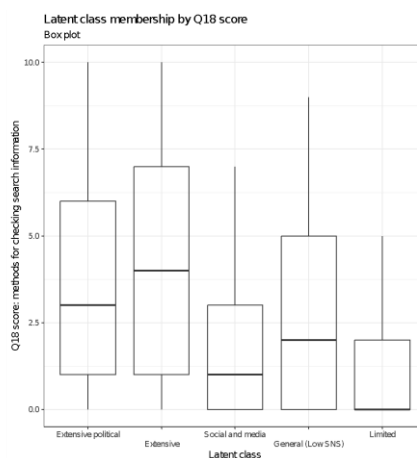


Figure 2: Box plot of the range of checking and search engine content by user types

Looking at search engine use, we find a similar pattern (Table 3). Here there is a big difference in the extent of checking between our two types of 'Extensive' users and the rest of the respondents.

Table 3: Likelihood (%) of checking search engine results

Checking social media percentages	EP	E	S&M	G	L
Don't check	16	20	39	31	55
Some checks	84	80	61	69	45

$\chi^2(4, 1322) = 102.414, p = 0.000, \text{Cramer's } V = 0.278$

Medium effect size

These results highlight two things. First, a significant proportion of citizens, between 16% and 78% depending on user types and media, do not check or are not aware of the veracity of social media or web content. Second, the overall 'depth' and variety of basic checking of the veracity of social media and web content is low across all citizens. Third, where there is checking, those likely to have lower digital and data literacies are more likely to depend on checking with friends or evaluating the 'person' rather than the content itself. We would, therefore, argue that for many citizens their in-person and digital social networks are key to understanding how they interact with and manage dis-/mis-/mal-information in digital contexts.

In our focus group discussions, we also found that the overall range of checking was low across all groups. In fact, a majority of our participants indicated they use Google search to verify information and trusted the results they found without any critical assessment. Where we do find evidence of verification and assessment of content it was tied to older participants who had older media literacies. They articulated this in terms of broader media literacy and discussing how they cross checked information online with that found in broadcast media. This was clearly articulated by Participant G7:

Well, the Times, Telegraph, maybe the Spectator, but I wouldn't give any of them 100% clearance as to the truth because they're all politically biased and you just have to look at the people who own them to realise that so I think when you get to our age you tend to use a lot of common sense and not believe everything you read or hear. On the BBC App you do get fact checks on certain things that have appeared in the press or in the media which at times is quite illuminating so I tend to take those with more belief than the general stories that come out (Participant G7: M; 78 years old; post-18 education).

However, for the majority of focus group respondents' verification of information and content came via digital or personal networks. For example, when asked how they verify things Participant E2 said:

I think nowadays I just google it, YouTube it, anything like that just to find something out whereas historically I would've used books I would've gone to a library or bought a book and gone to a bookshop and looked something up or you would've spoken to somebody like a tradesperson and you'd have used directory enquiries to get a phone number, but you just don't need to do that anymore it's basically obsolete because anything and everything you want to find out is somebody's done a video on it for you (Participant E2: F; 45+ years old, no post-18 education).

Ironically, therefore digital media are now a primary location for the verification of content found online. Such a position is reasonable where there is evaluation of the reliability of sources as noted above. Unfortunately, we only found evidence for this in relation to our two types of 'Extensive users' in our focus groups and survey responses. However, as we presented above (Figures 1 & 2) the overall range of checking methods used is low across all respondents in our survey and focus groups. Though it is very low, if not absent for our 'Limited' and 'Social Media and Entertainment' user groups. Reflecting the survey findings, more limited users spoke mainly of checking or verifying information with their immediate social network or friends and family. Though some respondents would also go beyond their immediate social network and reach out to their digital social networks. As Participant F1 stated:

I Google it put in whatever the words are to see if it comes up and then I might go on WhatsApp to the group and ask them if they know of this and I do sometimes go on Facebook and put it up and ask if anybody has experienced this or done that what the results have been which I found has been pretty good way of getting a cross section of answers, I don't always trust the BBC or the news because it can all be manipulated to fit the facts as we all know so I tend not to believe everything that comes on the news or anything else, I'm very cynical about it I try and find out other facts if I can before I accept stuff (Participant F1: F; 45+ years old; no post 18 education).

Though this does not mean that everything encountered online is accepted. Interestingly, we find differentiation between content from respondents' own networks (friends and family) and content from outside that network. Here H4 describes not trusting social media content from a 'random person', and the need to assess this against broadcast media:

If I got something through on Facebook, I'd check the news sites first rather than just believing some random person that's put a cure for Covid or something I wouldn't just take that at face value I'd look on the usual news websites, I know there's a bit of bias on

some things but they're generally accurate... The main ones like BBC ITV Sky that kind of thing I wouldn't just take someone on Facebook especially if I didn't know who it was. If someone posted something major had happened in the area on Facebook, I'd just go on Manchester Evening News and see if it said anything on there (Participant H4: F; age not provided – retired; no-post 18 education).

In line with our survey findings, focus group participants who fall into our “Extensive users” groups describe quite complex processes for assessing content based on multiple factors rather than relying on others. Participant N5 provides an example of this:

If I'm uncertain, I suppose maybe I'd Google it and see if there are other articles that are saying the same thing but I would say that I've probably become quite used to making a decision about whether an article's legitimate or not based on how they present themselves so if I think it looks a bit click baity or a bit gimmicky I might not trust it or if in the URL it doesn't have one of those padlocks I might not trust it or I think if it's a bit sensationalist I might not trust it. So I think I've become quite attuned to knowing what looks legit and what doesn't but if I'm unsure then I'll Google and cross reference (Participant N5: F; 26 years old; undertaking post-18 education).

What this shows is that people’s data and digital literacies, here when it comes to verifying information, depends on their background – socio-economic status, education attainment and also age.

Being helped and helping others with digital and data literacy

In our survey we asked respondents about activities such as supporting each other and using data to support their community. We call this *Data Participating* – the way people use data with others, for the benefit of their communities. We found that our ‘Limited’ and ‘Social and entertainment media’ user groups, who are least likely to have undertaken such activities. The most common activity for all groups has been to verify, via the internet, data or information pertinent to ongoing interactions with friends, family or colleagues (Figure 1).

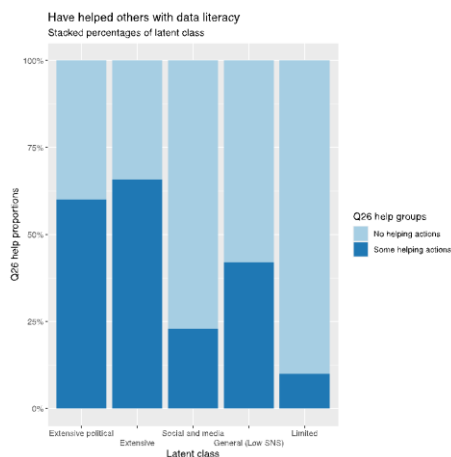


Figure 3: Data Participation - helping others

We also explored the extent to which respondents had used data and digital skills for personal, community or civic activity. Once again ‘Limited’ and ‘Social and entertainment media’ user groups show almost no use of data for any of these activities. Even our ‘Extensive’ user groups average just three of the eight activities surveyed. Looking at the spread of activities, work and personal uses are the most common. Overall, we conclude that a limited number of our respondents actively support others in their social networks with their data and digital activity.

An even smaller number use their data and digital skills to support their community or engage in civic action.

What then about the reverse? Where do citizens go for support and help when they need it. There are many examples in the focus group discussions of respondents drawing on and overtly establishing social networks to support their digital activities. As with checking content this is very often based around close family as Participant E5 notes in relation to getting help:

I've got a 6 year old who's a right whizz so you know but also I've got a boyfriend who works in IT and he's very helpful in fact I've got two friends both work in IT so I ring them up and say so how do I do this? and they explain over the phone how to do it (Participant E5: F; 45+ years old, no post-18 education).

Again, as with checking content, social media themselves, of course, can support this behaviour as they are often one of the main means by which people rapidly connect across their social networks. L4 describes how they seek out knowledgeable friends and family in tier network:

I do a bit of that on WhatsApp if I'm not sure about something I'll get in touch with someone who knows a bit more than I do so just to give me that bit of reassurance as to what's going on so we can discuss it... I've got a couple of friends and I speak to my son all the time on WhatsApp so just little things in general just to get some reassurances, so if you're not sure about something it's always best to ask or talk to someone about it isn't it?" (Participant L4: M; 57 years old; no post-18 education).

This quote also points out a key feature of these networks as routes to “reassurance” or “confirmation”. It might seem at first contradictory that a limited number of respondents engage in support of others – be that friends, family, or local community - yet many respondents talk about having ‘go to’ people for help or reaching out to close network members. We interpret these results as indicating that there are a limited number of key members of most networks of literacy (in person or online) who act as help and reference points for data and digital literacy support. We see evidence here of a form of ‘two-step flow’ in which digital media content may often be filtered and mediated by key actors in citizens networks.

Consequences and future directions

Networks of data and digital literacy

In relation to both checking of data and digital content and in giving or receiving help with data and digital activities we find that citizens are very dependent on local networks (as in close social network ties). We would argue that these networks of literacy, operating on different scales and with different levels of skill and knowledge among their members, are in fact key to citizens' data and digital literacy. They provide a basis for their navigation of digital content, their acquisition of skills and knowledge, their verification of information and support their community engagement. They, therefore, underpin and cut across all three of our Data Citizenship three dimensions. They support citizens in “doing” things with data, they support their “thinking” about and with data, and they underpin their data participation. As a result, if many citizens' ability to verify information relies on accessing key people in their social networks, then their ability to assess misinformation is also highly dependent upon the membership of these networks.

As evidenced by both our survey and focus group work, citizens are split in their levels of digital and data literacy. Those with lower levels of digital and data literacy (Yates et al, 2021) are far more likely to depend on members of their social and digital networks when they seek to assess online content. Yet, as is well noted elsewhere, the value of social networks lies in their extent

and diversity. We have demonstrated elsewhere (Yates et al, 2020a, Yates et al, 2015; 2019; 2020b; Yates and Lockley, 2018) that citizens levels of digital media use and likely levels of digital and data literacy are tied to their levels of social, cultural and economic capital (Bourdieu, 1997). It is also well documented that lower social capital, effectively less diverse and extensive social networks, constrain and limit citizens ability to critically examine online content. Similarly key markers of cultural capital, such as levels of educational attainment, are also found to correspond with low data and digital literacy (Yates et al, 2021). The converse is also true and we find evidence of our “Extensive” users having both greater knowledge but also more diverse networks. As Granovetter (1973) demonstrated, ‘weak ties’ in extended social networks have a value for citizens far greater than might be expected. Put simply, knowing a doctor on a Covid ward provides a route to assessing the veracity of posts about the pandemic. Where citizens’ social networks lack this diversity, these wider ‘weak ties’, then resources to assess digital content will also be lacking.

Conclusion

Citizens depend on their networks of digital and data literacy as a resource to help navigate our datafied society. These are built on their existing social networks (both digital and personal). Where strong and diverse, they provide citizens with a resource to help navigate dis-/mis-/mal-information. Conversely, where they are more limited and weaker, they are likely to limit, constrain or potentially hamper effectively navigating the stream of information online. As we noted earlier this sets up specific friends or acquaintances, key individuals online, or specific social and digital media sources to act as key mediators of citizens' interactions with digital content. To address the social and political challenges created by dis-/mis-/mal-information requires a much deeper understanding of the networks upon which many citizens’ data and digital literacies depend. We would therefore argue that further work is needed to explore the everyday networks and everyday practices of citizens if we are to provide solutions to these issues. Whether these come in the form of enhanced data and digital literacy for citizens, technology changes or the regulation of digital platforms.

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