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# Developing and Delivering and Data Literacy

*Simeon Yates and Elinor Carmi*

## I INTRODUCTION

This chapter considers how to approach and develop training or community interventions designed to develop what we call *democratic education for data citizenship*. Such interventions can range from supporting citizens to understand the most basic ideas such as “what is data” and how platforms use it – for example, how Google search and web-cookies work – through to the complexities of UK and EU GDPR legislation, or how to unpick misinformation online. The goal of the chapter is not to provide a prescriptive list of “skills” nor a “one size fits all” solution. Our research (Yates et al., 2021; Carmi et al., 2020; Yates & Carmi, 2022) has demonstrated that concern about issues of data use and abuse in contemporary society is very high among citizens. At the same time awareness of the details and how to address these concerns are quite low. We also found that understanding, skills, and awareness varied greatly between different groups (Yates et al., 2021; Yates et al., 2020; Yates & Lockley, 2018; Yates

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S. Yates (✉)

University of Liverpool, Liverpool, UK

e-mail: [Simeon.yates@liverpool.ac.uk](mailto:Simeon.yates@liverpool.ac.uk)

E. Carmi

City, University of London, London, UK

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et al., 2015). As a result, the starting point for a journey towards democratic data citizenship varies by community and audience. Meeting citizens “where they are” is key here and therefore, and interventions need to start with an understanding of their audience. Our research also made clear that the specifics of citizens circumstances, the community they are part of, and their lived experience must be considered. This best understood by citizens and communities themselves and by those working with them.

Why have we taken this approach? Why not just provide a top ten “things to do guide”? This was, in fact, our intention at the start of the project. Designed shortly before the Cambridge Analytica Scandal broke our research project envisioned a simple guide to “data literacy” as a key output. As our research developed and identified the variation in awareness, as issues like Cambridge Analytica came to the fore alongside misinformation online, and as we talked to different communities and constituencies, it became clear the idea of a single “one-size fits all” solution or simple ‘top tips’ was a naive approach.

*Democratic education for data citizenship* is more than basic digital skills. Existing research and many interventions across the globe provide routes to the foundational skills and knowledge citizens need. Though of course our research points out that many citizens still lack these foundational components. Great resources for providing foundational digital skills and awareness, as well as context specific support (e.g. around health and finances), can be found in materials of our project partner the Good Things Foundation.<sup>1</sup> What we present here are our thoughts and findings on the design of interventions and educational activities to support *democratic education for data citizenship*. Section 2 below, sets the scene by explaining what we mean by Data Literacy and how this relates to ideas of Media Literacy, Information/Computer Literacy, and Digital Literacy. It also sets out the case for Data Literacy education – especially in terms of Digital Citizenship. Section 3 considers some of the key factors to take into account before designing or implementing an intervention – especially audience and appropriate learning resources. Section 4 then focuses on the areas of significant weaknesses in Data Literacy our research identified, and the concern citizens had about data and platforms. The key ones being:

<sup>1</sup><https://www.goodthingsfoundation.org/learn/learn-my-way/>; <https://www.goodthingsfoundation.org/learn/make-it-click/>.

- Understanding what data is and how digital media and systems use it to deliver services to citizens.
- Concerns about and a need to understand data citizens are sharing and ‘giving’ away as they use digital media and systems.
- Concerns about and a need to understand privacy in a digital and datafied society.
- Understanding digital and data rights as citizens of a digital and datafied society

## 2 UNDERSTANDING DATA LITERACY

### 2.1 *What Is Data Literacy?*

This section provides an overview of how we have developed the ideas of Digital and Data Literacy in our Nuffield Foundation funded project *Me and My Big Data* (Yates et al., 2021). It provides an overview of how these ideas link to related work around citizens understandings of media and information. There are, in fact, a lot of terms used to describe citizens’ ability to use digital media and systems. These are often overlapping and there are few if any absolute definitions. Key ones include:

- Literacy
- Media literacy
- Information literacy
- Computer literacy
- Digital literacy
- Data literacy

We will briefly look at each of these in turn. This also forms a short history of ideas about ‘literacy’. As we argue below, what is defined as ‘literacy’ is always about the use of the communication technologies available at a point in time. We conclude the section arguing that Digital and Data Literacy are two sides of the same coin. Taken in their simplest sense Digital Literacy addresses the nature of contemporary media systems and the skills to use them – akin to the idea of Media Literacy. Data Literacy addresses the data ecology and economy that underpins these contemporary systems – akin to the idea of Information Literacy. Hopefully the section provides you with a brief overview of how these ideas have developed and link together.

### *Literacy*

The idea of literacy is, of course, ancient – with evidence of writing going back many thousands of years. The modern conceptions of literacy stem from the post Victorian era of mass literacy. Ideas of literacy range from the basic skills of reading and writing though to the ability to work with complex texts, be they Tolstoy or technical academic science papers. Over the years, very complex social, political, and cultural understandings of literacy have developed. These are rooted in the idea of literacy practices – the “uses” of literacy by citizens and communities. It is important to note that the ideas of Digital and Data literacy are not simply one of making an analogy between a skillset 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:

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).

Literacy is therefore always about the use of the communication technologies available 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 *value judgements* made around what types of behaviours and knowledge citizens should have. These points all hold for use of digital media and systems including the normative assumptions about what is ‘good’ Digital and Data Literacy.

### *Media Literacy*

The idea of media literacy grew from applying the idea of literacy to non-print media, especially broadcast media. As digital communications technologies have come along, media literacy definitions have tried to include the breadth of broadcast and personal communications media. The UK media regulator OfCom defines Media Literacy as “the ability to use, understand and create media and communications in a variety of contexts”<sup>2</sup>. The Centre for Media Literacy<sup>3</sup> uses the following three-part definition:

<sup>2</sup><https://www.ofcom.org.uk/research-and-data/media-literacy-research>.

<sup>3</sup><https://www.medialit.org/reading-room/what-media-literacy-definitionand-more>.

- Media Literacy is a twenty-first century approach to education.
- It provides a framework to access, analyze, evaluate, and create messages in a variety of forms – from print to video to the Internet.
- Media literacy builds an understanding of the role of media in society as well as essential skills of inquiry and self-expression necessary for citizens of a democracy.

### *Information Literacy*

Ideas of Information Literacy often appear in relation to the use of organised information sources – such as libraries and databases. Very often they include an element of being a ‘citizen’ or of ‘citizenship’. The UK Chartered Institute of Library and Information Professionals (CILIP) defines Information Literacy as “the ability to think critically and make balanced judgements about any information we find and use. It empowers us as citizens to develop informed views and to engage fully with society.”<sup>4</sup>

### *Computer Literacy*

Computer Literacy is less clearly defined and is often broadly viewed as the ability to use ‘computers’. Different definitions can stress different aspects of computer use including:

- “understanding the basic processes of computers and technology and being able to use those processes” (Velliaris & Breen, 2016).
- “understanding of computer characteristics capabilities and applications, as well as an ability to implement this knowledge” (Yadollahi, 2015).
- “the comfort level someone has with using computer programs and other applications that are associated with computers”
- “the level of knowledge and skills about information and communication technologies and how to use it in your work and everyday life”

Some definitions of computer literacy are much closer to the CILIP definition of Information Literacy. Overall, definitions range from having the practical skills of keyboard and mouse use, to the ability to code, or use of all forms of Information and Communication Technologies.

<sup>4</sup><https://www.cilip.org.uk/news/421972/What-is-information-literacy.htm>.

*Digital Literacy*

In 1997 Paul Gilster (Gilster, 1997) defined Digital Literacy as “the ability to both understand and use digitised information”. Since then, there have been a wide range of definitions that overtly build on media, computer, and information literacy as well as civic or social engagement. For example, the American Library Association (ALA) defines digital literacy as “the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills”.<sup>5</sup> In the UK, AdvanceHE define Digital Literacies(s) – plural – as a set of “capabilities required to thrive – that is to be an effective and responsible participant – in a digital society”.<sup>6</sup>

*Combining These Definitions*

UNESCO<sup>7</sup> has proposed a combined Media and Information Literacy approach, to which they have added a set of digital skills (see Table 12.1). This framework underpins UNESCO’s approach to supporting organisations and countries to provide Media and Information Literacy education. Again, this definition and the supporting documentation focus on citizens “thinking critically and clicking wisely”.

*Digital Literacy*

We take Digital Literacy to include the majority of the components listed by UNESCO as Media Literacy but refined to incorporate digital media and systems. By digital media and systems, we mean the full range of digital devices, platforms and content that citizens encounter. This includes but is not limited to:

- Broadcast TV and Radio – mostly now produced and delivered digitally.
- Streaming platforms – for music, film, TV and other content.
- Web content and platforms of all forms – from static web pages to shopping sites, from newspapers to government services.
- Apps – that provide services and content via devices.
- Games – from mobile game apps to multi-platform blockbuster games.

<sup>5</sup> <https://literacy.ala.org/digital-literacy>.

<sup>6</sup> <https://www.advance-he.ac.uk/knowledge-hub/digital-literacies>.

<sup>7</sup> <https://en.unesco.org/news/media-and-information-literate-citizens-think-critically-click-wisely>.

**Table 12.1** UNESCO media and information literacy (note alignment of columns is not significant)

<b>Information literacy</b>	Locate and access information	Assess information	Organize information	Make ethical use of information	Communicate information	Use ICT skills for information processing
Define and articulate information needs						
<b>Media literacy</b>	Understand the role and functions of media, and internet communications companies in democratic societies	Understand the conditions under which media can fulfil their function	Critically evaluate media content in the light of media functions	Engage with media for self-expression and democratic participation	Review skills (including ICTs) needed to produce user-generated content	
<b>Digital literacy</b>	Understand digital identity	Recognize digital rights	Assess AI issues	Improve how to communicate digitally	Manage digital health	Practice digital security and safety
Use of digital tools						

Why such a wide definition?. A contemporary smartphone user might engage with all such systems within the space of a day on that one device. They might slip from news content via X (previously Twitter), to a film clip on Facebook, to booking a health appointment, to playing Wordle in the space of a few minutes. To have the *capabilities required to thrive – that is to be an effective and responsible participant – in a digital society* requires the ability to work with all these media and systems (Table 12.2).

### *Data Literacy*

We take Data Literacy to include the majority of the components listed by UNESCO as Information Literacy but expanded to incorporate the nature of digital media and systems. Information Literacy was defined when most information was well managed and curated by key gatekeepers – from librarians to publishers. Even in the early years of the internet, information remained managed by a more limited list of organisations. The process for creating information – as opposed to news or entertainment – was quite slow and deliberate.

This is no longer the case. Not only is content produced constantly on digital platforms, but the very acts of using platforms generate data and information that is then used by the platforms or others. Though many human and institutional gatekeepers remain, this mass of data and information is often created, collected, processed, and then affects citizens via automation and algorithms. This data economy underpins our contemporary digital society. Unlike other technologies such as print or TV where the content could be varied but was not itself interactive and dynamic. The ‘traditional platforms’ of print and TV did not in and of themselves monitor nor collect data on users. Nor did they make decisions in and of themselves about content to be delivered. Digital media and systems do work in this dynamic way and data underpins all that activity. Understanding the role of data and information – having Data Literacy – therefore needs to sit alongside understanding how to use digital media and systems. In the same manner that UNESCO placed Media Literacy alongside Information Literacy (Table 12.3).

We have developed this definition of Data Literacy from a range of prior works as well as our own research findings. We have tried to produce a coherent definition pulling in the various strands of these prior works. They do not offer one coherent definition and some focus very heavily on analytical data skills rather than citizenship. Table 12.4 details these sources and our reworking of them into our model can be found in (Yates et al., 2021).

Table 12.2 Digital literacy

<b>Digital literacy</b>	Understand the role and functions in democratic societies of digital media and systems	Understand the conditions under which digital media and systems can fulfil their social and personal functions.	Ability to critically evaluate the content and behaviour of digital media and systems in the light of their social and personal functions.	Ability to engage with digital media and systems media for self-expression, democratic participation and to achieve a life citizens value.	Understand their rights over digital media and systems as citizens of a digital society.	Understand how to use digital media and systems safely, securely, legally and ethically.
Ability to effectively use digital media and systems to generate content, communicate and achieve a life citizens value.	Understand the role and functions in democratic societies of digital media and systems and the organisations that own or control them.	Understand the conditions under which digital media and systems can fulfil their social and personal functions.	Ability to critically evaluate the content and behaviour of digital media and systems in the light of their social and personal functions.	Ability to engage with digital media and systems media for self-expression, democratic participation and to achieve a life citizens value.	Understand their rights over digital media and systems as citizens of a digital society.	Understand how to use digital media and systems safely, securely, legally and ethically.

**Table 12.3** Data literacy

<b>Data literacy</b>						
Define and articulate role of data and information in a digital society and articulate own data and information needs.	Be able to locate and access data and information they need as citizens of a digital society.	Be able to critically assess the provenance, veracity and reliability data and information.	Understand what data and information digital media and systems collect and the uses they and organisations make of it.	Understand how to manage and use data and information safely, securely, legally and ethically.	Understand their rights over data and information as citizens of a digital society.	Use digital media and system skills for data and information processing, manipulation and communication to achieve a life citizens value.

### 3 WHY SUPPORT, DEVELOP, OR TEACH CITIZENS' DATA LITERACY?

A simple reason for helping citizens develop data literacy could simply be that it is a good thing in and of itself and therefore worth doing! That is a valid reason. This chapter explores our broader reasoning as to why it is important to develop democratic education or interventions to support data literacy and citizenship. The arguments made here reflect our own take on this question. We hope they provide a case that others might use if they need to argue for supporting citizens to develop data literacy – be that with policy makers, within their organisation, or with communities.

A more cynical position might ask why do we need to teach Data Literacy? If people are happy using digital media and systems and not worried out their data – why do they need to know more? As the North Americans say, “no harm – no foul”. Sadly, it is clear there is harm. Even if we leave aside criminality in the form of hacking and online scams, there have been many cases of citizens’ data being used in ways that may be harmful to them. The Cambridge Analytica scandal is just one such case that many people – both researchers and the people we interviewed – refer to.

Our research found that Data Literacy knowledge and skills are low in the UK. We also found that many people were uncomfortable with digital media and systems using their data, tracking their activities, and sharing their data with 3rd parties. Such that words such as ‘creepy’ and ‘horrid’ were used (Yates et al., 2021; Carmi & Yates, 2023). Of course, not everyone is in the same position, we will shortly talk through our analysis of different ‘user types’ or ‘audiences’ for Data Literacy education. This

**Table 12.4** Definitions of data literacy

<i>Definition</i>	<i>Source</i>	<i>Type</i>	<i>Focus</i>
“Data literacy defined pro populo”	Crusoe, D. (2016)	Theoretical	Power relationships and control of data
Data literacy	Wolff, A., Gooch, D., Montaner, J. J. C., Rashid, U., & Kortuem, G. (2016)	Literature review and analysis	Use and analysis of data
Data literacy	Deahl, E. (2014)	Literature and case studies	Everyday awareness, use and analysis of data
Data information literacy	Carlson, J., & Johnston, L. (2015)	Empirical qualitative research and case studies	Data literacy for higher education
Data literacy	Mandinach, E. B., & Gummer, E. S. (2013)	Literature review and analysis	Data literacy for higher education managers
Data literacy	Grillenberger, A., & Romeike, R. (2018)	Literature and curriculum analysis	Data literacy for computer science in higher education
Data literacy	Vahey, P., Yarnall, L., Patton, C., Zalles, D., & Swan, K. (2006)	Quasi-experimental study of educational intervention	Data analysis skills development in school classroom setting
Youth data literacy	Williams, S., Deahl, E., Rubel, L., & Lim, V. (2014)	Participatory science project	Data analysis skills development in school classroom setting
Critical data literacy	Tygel, A., & Kirsch, R. (2015)	Theoretical	Critical data literacy for citizens
Racial data literacy	Philip, T. M., Olivares-Pasillas, M. C., & Rocha, J. (2016)	Qualitative case studies	Critical assessment of data analytics and data visualisation school teaching in relation to race
Personal data literacy	Pangrazio, L., & Selwyn, N. (2019)	Theoretical	Personal critical data literacies for citizens
Civic data literacy	Civic Switchboard Guide, (2019)	Guidelines for using civic data	Libraries and support for citizens using civic data
Creative data literacy	D’Ignazio (2017)	Review of case studies	Using creative practice to build data skills

analysis indicates that those with post-18 educations and higher levels of interaction with digital media and systems, have higher overall Data Literacy. However, even these groups can lack key knowledge or skills. So why do we need to address this gap?

We argue that citizens need a level of Data Literacy to function as active citizens in our contemporary digital society. However, our research shows that there is clearly a gap in the knowledge and skills that citizens need to address, both basic awareness and to develop responses. What happens to the data we generate about ourselves, others, family, and our community – how it is used and our rights over it – are fundamental issues for contemporary society. At no point in prior history has the state, institutions or businesses had such easy access to so much information about citizens, workers, or customers. This has developed in a very short space of time – only a few decades – and we are only just coming to grips with some of the implications. These developments raise important questions for democratic societies about how to respond to this change. Especially as much of the power lies with major technology companies. They both design the technologies and conduct much of the data gathering and processing.

In the UK and EU the 2018 General Data Protection Regulation (GDPR) legislation is often presented as an example of international cooperation to address this power imbalance and to give rights to citizens over their data. However, having data rights, understanding them, being able to exercise them and knowing how and where they apply, all depend upon understanding how the data is used in contemporary society. It requires a level of Data Literacy.

As our research has shown, even the most digitally active citizens may not have extensive or comprehensive levels of Data Literacy. Importantly, we have identified education as one of the key variables that determines the levels of Data Literacy that citizens have. We therefore argue that developing citizens data literacy is key to supporting their active participation in healthy contemporary democratic societies.

#### 4 DATA LITERACY AND CITIZENSHIP

As we have argued elsewhere, developing Data Literacy and Data Citizenship is about developing the digital capabilities (Nussbaum, 2002; Sen, 2009) of citizens (see Carmi & Yates, 2023).

- What does it mean to be a citizen in today’s ‘datafied’ society?
- Does it mean citizens only need to be able to send email, use social media, purchase things online and know basic management skills for their work?
- Is it the broader capacity to assess and understand how digital media and systems work, are owned, managed, and regulated?

The academic writers Engin Isin and Evelyn Ruppert (2020) argue that being a digital citizen is about the ability to make “digital rights claims”. This means having enough understanding to assert political and consumer rights claims over how digital media and systems work, how they use data, for what purposes as well as how they are owned, managed, and regulated.

... what makes a subject a citizen is the capacity for making rights claims [and] the citizen as subject of power comes into being through acts of making rights claims. *Conventions* are about instituting rights to govern relations between subjects and between subjects and *conventions*. By making rights claims, citizen subjects govern their relations with themselves, with others and with *conventions* (Isin & Ruppert, 2020, p. 39 emphasis added)

Whether we view data and digital citizenship more broadly, as an ability to engage in digital life, or more specifically, as an ability to make rights claims, citizens need to have both Data and Digital Literacy as well as broader critical skills. Basic Data and Digital Literacy skills might include accessing online information, contributing to online debates, or managing privacy settings. The critical skills include digital citizens’ abilities to analyse, understand, and respond to the socio-economic dynamics of the digital world and their possible impact on society (e.g. digital inequalities, surveillance). Therefore, digital citizenship might be viewed as an evolving, proactive process of social engagement, negotiations and challenges to the way civic action is enacted in a digital society.

Data is central to the digital society and, as we have argued above, Data Literacy is a converse or complimentary concept to Digital Literacy, that needs to be a key point of analytic focus. It is also central to the performance of citizenship, or the methods through which citizens are subject to the power of platforms. We would argue that there is a widening of the divide and power imbalance between *data subjects (citizens)* and *data processors (big tech)* (Carmi & Yates, 2023).

Data processors, being those who own and manage data subjects' data, can, as a result, capitalise on this widening divide (Hintz et al., 2017). These are largely private 'big tech', Internet service providers and the state. Technology companies hiding their data extraction behind complex, often opaque, and potential deceptively designed interfaces (Carmi, 2020; Carmi, 2021). It is also the case that the differentiation between citizen data (data from interaction with the state and civic action) and consumer data (our patterns of consumption) is becoming blurred (Cheney-Lippold, 2017; Barassi, 2019; Andrejevic, 2014; McCarthy, 2016; Hargittai & Marwick, 2016).

As we found out in our research, the sense of disempowerment around data, leads to citizens feeling confused and unable to identify, understand or respond to those who are in charge of their data.<sup>4</sup> Our review of the literature reveals a number of studies examining the notion of the 'privacy paradox' (Hargittai & Marwick, 2016) whereby citizens are worried about their data online, but continue to create it nevertheless. It has been found that young people feel they have no choice but to oscillate between their desires for digital participation and online information creation, and fears related to their online privacy. Moreover, there is evidence that through implementation of methods of forced 'digital compliance' (e.g. signing terms and conditions), some citizens decide to embrace the big-data divide as 'the new normal' (Lin et al., 2017).

The big data divide has an impact not only on citizens' self-awareness, but their entire web of interactions within society. Importantly, unlike common beliefs that this divide only applies to people who use the Internet, research suggests that even those who do not use the Internet or specific platforms are also subject to profiling. Data is often collected and distributed by people we know (e.g. a photo taken by a friend shared on social media) and organisations we interact with (e.g. social benefits agencies, municipality election registries). Smartphone users might have information collected when their devices or mobile applications are not in use. Citizens' data can be collected on a range of devices, which might include health apps trackers, smart-home technology or internet-of-things toys. In 2019 it was reported that 14 million users of a UK parenting platform had their personal data collected (without their explicit consent) through sources such as websites, mobile apps, merchandise – and from the hospital bedsides of new mothers. In this way, the big technology companies (*data processors*) who process much of our data hinder and constrain

citizens' ability to exercise their rights as citizens to freedom, autonomy, agency, choice, voluntariness, privacy, and self-determination.

Yet we do not want to paint a picture of citizens of digital and datafied societies as being solely defined by their data, nor absolutely constrained by the functioning of platforms or algorithms. We therefore see it as important that the conceptualisation of Data Literacy includes the capacity for citizens to question, assess, challenge, and make rights claims within a datafied society.

## 5 DEMOCRATIC EDUCATION AND DATA CITIZENSHIP

We argue that Digital and Data Literacy needing to be more than “basic digital skills” that turn people into better consumers or workers. There is a need to combine these with broader critical thinking and knowledge about the digital eco-systems in which citizens are now effectively forced to operate in. We have therefore brought the ideas of “democratic education” (Dewey, 1930; Freire, 1970/1996) into our model. Democratic education aims to equip citizens with skills and knowledge which enable them to exercise their citizenship. Democratic educators' objective is to empower citizens to critically examine their positions within the existing power structures in society, and to develop skills and understanding to take an active stand in the process of their individual and collective self-determination.

The parallels between teaching critical consciousness and Data Literacy education have been outlined by Tygel and Kirsch (2015) who proposed that data-centred democratic education should aim to enhance citizens' critical comprehension of data realities and encourage them to question the existing data-society norms. To achieve critical consciousness in the context of Data Literacy, Wolff et al. (2016) argue that “[data] learning experiences should be responsive to cultural differences that might affect an individual learner's view of the world”.

This guide therefore seeks to provide you with ideas and resources focused on this issue of **democratic education for data citizenship**. The goal is to provide advice on how to support citizens to think critically and carefully about what currently happens to their data and the data produced by their community, but also to think critically about what should happen to that data, what they think is right and just regarding the use and sharing of data in contemporary society. Therefore, it does not focus on basic digital and data skills, nor on complex data analytic skills, but rather

on the key issues of *data thinking* and *data participation* that other training interventions do not address.

Our definition of Data Literacy is much broader than basic skills and includes a focus on critical thinking that cuts across both data management and analytic skills. Looking at our definition in Table 3 and the ideas in these studies, we have broken Data Literacy down into specific activities (see Table 12.5) and grouped these into three everyday activities:

- “**Data Doing**” covers many of the practical data management and analytic aspects of data literacy.
- “**Data Thinking**” relates to both practical and critical use of data to understand, problem solve and to communicate with data.
- “**Data Participation**” covers activities that involve an active response to being a citizen in a datafied society. In particular, the critical

**Table 12.5** Elements of data literacy and citizenship

<i>Aspects</i>	<i>Data doing</i>	<i>Data thinking</i>	<i>Data participation</i>
Accessing	X		
Assessing	X		
Interpretation	X		
Data creation	X		
Data citation	X		
Data management	X		
Ethical use	X		
Data deletion	X		
Data visualization and manipulation	X	X	
Understanding of data collection	X	X	
Problem-solving using data		X	
Communicating with data		X	
Critical data analysis (e.g. data bias, cultural contexts)		X	
Data safety (e.g. skills to manage and control ‘digital traces’)		X	
Understanding privacy		X	
Awareness of data protection rights		X	X
Understanding data society		X	X
Participating in society using data			X
Engagement with data society debates			X
Data activism			X
Supporting others with their data literacy			X

assessment of the use of data, skills to assess, resist, and undertake activism to change and negotiate both technologies and systems of power in a datafied society. Importantly, we believe that this must include working with others, groups and communities and may involve the collection, repurposing, and use of data in such activism.

A comprehensive approach to Data Literacy education and training would cover all these activities. Our focus on democratic education sets up a requirement to assess these practical activities in relation to issues of politics, power, and social context. It is this critical awareness, critical thinking, and active citizenship element that we will focus on in this guide.

## 6 SEVEN PRINCIPLES FOR DEVELOPING CITIZENS DATA LITERACY

From our research (Carmi & Yates 2020; Carmi et al. 2020; Yates et al., 2021) we developed seven principles for developing interventions to support citizens Data Literacy. These are starting points for thinking about interventions. The goal of interventions has to be one of empowering digital citizens with good Data Literacy.

*Any educational intervention, awareness raising, or community engagement must:*

1. **Ensure citizens feel more empowered** and have practical and alternative routes to enact that empowerment.
  - Do not just make people scared of using digital media and systems – help them feel empowered to deal with them.
2. **Consider the design and practical challenges citizens face** in managing and controlling the data they share or “give off” whilst also being actively involved with others via the plethora of platforms in our digital society.
  - Citizens cannot just “stop using Facebook” – help them manage the risks and benefits.
3. **Make clear to citizens their rights – as citizens not just consumers** – to make claims in regard to data use, sharing and trading and also of digital systems and platforms.

- Remind them that they have rights under GDPR and that they can complain, flag up social media content, disable adverts on systems, etc.
4. **‘Meet citizens where they are’** in terms of their digital and social experience and context.
    - Know your audience.
  5. **Address the challenge that those adults most in need of support are very likely outside formal educational settings.**
    - People in education or who have had post-18 education are the least in need. Though everyone needs to improve their Data Literacy.
  6. **Support skills development but must be more than skills,** encompassing key elements of Data Participation.
    - Do not just focus on skills – in fact there is lots of help out there for skills – it is the critical awareness and proactive citizenship that are missing in most training and support.
  7. **Seek to provide deep critical consciousness the power relationships in our datafied society** and support them to exercise their right to challenge this imbalance and demand change.

### 6.1 *Audiences and Resources*

We would argue that there are two key areas to consider in putting together an intervention to support Data Literacy. These are your audience, and given that, the selection of appropriate resources. There is little point providing an academic reading list to people who have low levels of digital skills. Similarly, there is little point undertaking an activity on ‘what is data’ with a set of computing experts. That said, we would caution not to assume things about your audience. There tends to be an assumption that “digital natives” know everything, whereas in our research, we find many young people with low Data Literacy (Yates et al., 2021). We also found older people, with low digital skills, applying good Media Literacy ideas about bias to social media. Social context is also important. Younger people tend to use a different mix of social media than older people. Some communities or even family groups prefer one medium over another. For

example, one group might use a closed system like WhatsApp, whereas others may use more open platforms like Facebook. We also find that individuals and groups have ‘go to people’ for help with digital, what we call *networks of literacy* (Yates & Carmi, 2022), and these ‘go to people’ might be key to driving change in a community’s approach to digital. We will explore further how to assess and understand your audience in a moment.

In terms of resources, you need to think about the types of content your audience will engage with, in regard to both depth and relevance. Complex arguments about the legal use of scraped social media data may be of interest to activists in a protest group, but not people just getting to grips with using a smart phone. We have provided a list of potential resources on our project web site.<sup>8</sup> These resources might be journalism, academic research, or the outputs of activist groups. We believe that what is missing are developed approaches to move people from basic digital and data skills, through to the broader issues of digital and data justice, and citizenship. These are mostly discussed in academic and some media circles.

### *Audience*

So how to assess and understand your audience? In our Me and My Big Data project we developed a set of ‘personas’ for different types of ‘users’ of digital media and systems.<sup>9</sup> We would hope that these might work well as starting points for others to reflect on the circumstances of audiences they are designing for. These are very broad-brush descriptions and there are of course many social, cultural, and personal variations among these groups. We would strongly advise working with intended audiences to collect information and insight on them through individual or group conversations, or potentially some more quantitative information through short surveys. The key questions about your audience include:

- What are their levels of digital skill and competence?
- What are the main platforms they use?
- How actively do they use different platforms? (e.g. do they post or scroll?)

<sup>8</sup> <https://www.liverpool.ac.uk/media/livacuk/humanitiesampsocialsciences/meandmy-biddata/Developing,citizens,data,literacy,guide.pdf>.

<sup>9</sup> <https://www.liverpool.ac.uk/media/livacuk/humanitiesampsocialsciences/meandmy-biddata/Understanding,Citizens,Data,Literacies,Research,,Report,Final.pdf>.

- Do they use digital platforms in their work or study as well as everyday life?
- Do they already have a good knowledge of how data are used by platforms?
- Do they have good broadcast media literacy?
- Who do they rely on for help with platforms and data?
- What concerns do they have about data and how platforms use it?
- Are they engaged in digital or data activism or participation?

Getting answers to these kinds of questions will allow you to better select resources and plan activities for your participants.

### *Where to Find Resources*

Digital technologies, the platforms we use, and the ways we use them, are changing all the time. As are the concerns that citizens have about their use of these technologies. Our relationships with them and through them, to friends and family, are also changing. Choosing the right resources for a target audience therefore needs to balance their level of knowledge, topics of concern and the goals of educational or training activity. It is clear from our research that short video content, especially YouTube, is one of the key ‘go to’ sources of help and support for all types of users. For those with higher levels of digital and data literacy, we found media content such as news and documentaries and even films were drawn on to help understand platforms and the data economy.

There are three types of resources our respondents, other academic colleagues and we have found during our research:

- Journalism and media coverage.
- The work of Activist groups.
- Academic research and findings.

Very often these three groups work together. Journalism and news media coverage often provides quite digestible materials for discussions of the issues of Digital and Data Literacy. They range from YouTube videos to Ted Talks and from full blown documentaries to short media reports. Though some of these easily stand on their own as items worth watching, nearly all will need an appropriate educational or training ‘wrapper’ around them. This might consist of briefing notes on key issues, follow up discussions or self-assessed questions. Such resources will of course constantly

increase and change as new issues, new journalism and new media content develops. We suggest that anyone working to deliver Digital and Data Literacy development and training should maintain a list of such useful content. Activists and key organisations, web sites and major 3rd sector organisations, governments and activist groups maintain websites that seek to explain issues, provide training and development, or contain their own substantial education resources. OfCom and DCMS are the UK media regulators and have obligations to develop citizens Digital and Media Literacies. As noted above, UNESCO takes a similar role for the United Nations.

There is a great deal of academic, activist, and long form journalism that covers issues of digital and data literacy. We have listed below a set of books that we think are either key texts or provide an accessible route into key issues (alphabetic order):

- Arthur, C. (2021). *Social Warming: The Dangerous and Polarising Effects of Social Media*. Simon and Schuster.
- Athique, A. (2013). *Digital media and society: An introduction*. John Wiley & Sons.
- Baym, N. K. (2015). *Personal connections in the digital age*. John Wiley & Sons.
- Carmi, E. (2020). *Media distortions: Understanding the power behind spam, noise, and other deviant media*. Peter Lang International Academic Publishers.
- Cheney-Lippold, J. (2017). *We are data*. New York University Press.
- D'ignazio, C., & Klein, L. F. (2020). *Data feminism*. MIT press.
- Doss, A. F. (2020). *Cyber Privacy: Who Has Your Data and Why You Should Care*. BenBella Books.
- Eubanks, V. (2018). *Automating inequality: How high-tech tools profile, police, and punish the poor*. St. Martin's Press.
- Highfield, T. (2017). *Social media and everyday politics*. John Wiley & Sons.
- Isin, E., & Ruppert, E. (2020). *Being digital citizens*. Rowman & Littlefield Publishers.
- Kearns, M., & Roth, A. (2019). *The ethical algorithm: The science of socially aware algorithm design*. Oxford University Press.
- Kennedy, H. (2016). *Post, mine, repeat: Social media data mining becomes ordinary*. London: Palgrave Macmillan.
- Lupton, D. (2016). *The quantified self*. John Wiley & Sons.

- Lupton, D. (2020). *Data Selves*. Polity.
- Lyon, D. (2018). *The culture of surveillance: Watching as a way of life*. John Wiley & Sons.
- Rohlinger, D. A. (2019). *New media and society*. New York University Press.
- Véliz, C. (2021). *Privacy is power*. Melville House.
- Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. Profile books.

## 7 CONCLUSION

We have argued here that Data Literacy is key to digital citizenship. However, our research shows that levels of Data Literacy are low for many groups in the UK population, and we would assume also most other nations. In section six of this chapter, we laid out our seven principles for building and developing Data Literacy and Data Citizenship interventions. At the core of such interventions needs to be a deep understanding of target audiences and the selection of appropriate resources to support the intervention. As we noted above, when initial designing our “Me and My Big Data Project” – in the months before the Cambridge Analytica scandal broke – we had hoped to be able to recommend a set of specific educational materials and topics that would work of all citizens. Our surveys and focus groups made clear that internet users (and those offline) have varied understandings and starting points on their Data Literacy and Citizenship journeys. Interventions, therefore, need to be tailored to that starting point. Though we are very clear that such interventions need to include skills – but be much more than skills. They need to empower data subjects – citizens – to make and drive forward digital rights claims against those who current process and (ab)use our data.

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