Chasing Frankenstein's monster: Information literacy in the black box society

Journal:	*Journal of Documentation*
Manuscript ID	JD-02-2019-0035.R1
Manuscript Type:	Article
Keywords:	Information literacy, Algorithmic culture, information literacy education, sociocultural theory, Theory, algorithmic literacy

Structured Abstract

Purpose: To introduce and examine algorithmic culture and consider the implications of algorithms for information literacy practice**.** The questions for information literacy scholars and educators are how do we understand the impact of algorithms on agency and performativity, and, how do we address and plan for it in our educational and instructional practices?
Design: Algorithmic culture and implications for information literacy are conceptualised from a sociocultural perspective.
Findings: To understand the multiplicity and entanglement of algorithmic culture in everyday lives requires information literacy practice that encourages deeper examination of the relationship between the epistemic views, practical usages, and performative consequences of algorithmic culture. Without trying to conflate the role of the information sciences, this approach opens new avenues of research, teaching and more focused attention on information literacy as a sustainable practice.
Originality: the concept of algorithmic culture is introduced and explored in relation to information literacy and its literacies**.**

Keywords: Algorithmic culture, information literacy

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Introduction

The incorporation and acceptance of algorithms into everyday life has implications for the practice of information literacy. This premise is based on the view that the ubiquity of algorithms intersects with everyday life with the potential to reshape practices and culture. Subsequently, algorithms, should be viewed as a feature with the potential to create or remake the conditions for everyday life by enabling and/or constraining conceptions of reality, agency, and performativity (Roberge & Seyfert, 2016). The question for information literacy scholars and educators is how do we understand the impact of algorithms on agency and performativity and how do we address and plan for it in our educational and instructional practices?

To be clear, this paper is not about data literacy defined as "the component of information literacy that enables individuals to access, interpret, critically assess, manage, handle and ethically use in data" (Prado and Marzal 2013, 124-125). It is about the foundational concept of information literacy which establishes the theoretical foundations from which media, digital and *data* literacies are referenced (Lloyd 2017).

The theory of information literacy that has been proposed (Lloyd, 2017) states that information literacy is a practice that is enacted in a social setting. It is a suite of activities and skills that reference structured and embodied knowledges and ways of knowing relevant to the context. Information literacy is defined as a way of knowing. We are entangled with information through sites of knowledge from which we draw to create our information landscapes. The information sources in those sites of knowledge may be social (local, nuanced or tacit), physical (embodied, corporeal, referencing the experience of doing), epistemic (grounded in rules and structures and explicitly expressed), digital and/or analogue, or embedded in the workplace, education or community; they may require knowledge of technology and online formats and may be written or presented in other visual forms. What matters is how we draw from our entanglement with information and how we practise information literacy. How we understand and express our agency and our capacity to reflexively understand how information and knowledge is shaped, including the practice, activity, and skills we use in the creation, production, circulation, and evaluation of information.

An emerging interest for information literacy research therefore should be the insidious creep of algorithmic culture into the corners of our everyday life. For example, increasingly, people knowingly or unknowingly delegate slices of authority to algorithms e.g. when they search for information, accept recommendations for music, confer with medical recommenders online to find out if they have the symptoms of 'X'. While there can be positive aspects to this interaction (when they yield their agency), there is also the potential for their information landscapes to narrow and deemphasise the socially nuanced and embodied ways of knowing, thus transforming, reframing, and reconfiguring the nature of our agency. This is not a new focus, but one that has become more important with human enmeshment with digital living and is critical to understanding the implications for information literacy practice (for pedagogy and practice) going forward. The immersion of algorithmic culture into everyday life has the potential to shift how decision making is enacted and agency is performed, in addition to what knowledges and ways of knowing are privileged. Increased recognition of the power of algorithms to shape and remake the everyday activities of people, makes this an artefact of interest to information literacy researchers and educators.

The opacity of algorithms creates a *wicked* problem for librarians and archivists who have a vested interest in equitable access, informed citizenry, and the maintenance of public memory. While algorithms are generally viewed in terms of their capacity to address and order information systems, there is the potential for algorithmic culture to create a shift in our understanding of how culture is accessed, practiced, experienced, understood (Striphas, 2015) and represented. Vesting authority in algorithms and legitimising their social power, can present challenges in terms of social inclusion, social justice, and equity, as Pasquale (2015, p 8) notes "values and prerogatives that the encoded rules enact are hidden within black boxes". The proprietary nature of algorithms and the complexity of delineating the decision-making elements of algorithms, makes them difficult and tricky to analyse in-depth or as isolated objects.

The approach taken in this conceptual article is sociocultural in that algorithmic culture is viewed primarily in the context of social relations which exist between humans and non-humans. Algorithms are analytically represented (Roberge & Seyfert, 2016) as referencing a practice, that is, a *routinised and routine ways of doings things* (Reckwitz, 2002). By this account algorithms (and technologies) represent a site of social cultural production, where values are "enacted, produced, shared, reified, represented, and reaffirmed" (Dourish and Bell, 2011 p.78).

Conceptualising algorithms from this perspective allows researchers to approach the study and analysis from a register which does not focus on the concerns of computer scientist but references the dimensions of social and cultural life scaffolding understanding in social terms (Beer, 2017). From an information studies perspective, it allows us to direct our focus on the conditions that enable and or constrain the orchestration of information dissemination and the capacities to develop information literacy practice that is robust and agile in its responses to the digital future of which algorithmic culture is a predominate feature.

This paper will explore the relationships between algorithms and information literacy. It responds to the questions about what we need to attend to when considering algorithms and how do we provide information literacy education that provides resistance to the expansionist claims of algorithms, while at the same time ensuring that people harness the power of this culture to their advantage.

Algorithmic cultures

Introduced by Stiphas, 2015 (after Galloway 2006), the concept of algorithmic culture has been described as representing an emerging intellectual shift in understanding how culture is practiced, experienced, and understood (Striphas 2015, p. 395). Traditionally, the ascription of culture has been the work of humans, but is now increasingly being delegated to computation processes, which trawl through big data to categorise, hierarchize people, places, objects, and ideas, suggesting a more taxonomic view of culture is again in operation, leading to a reassembling of the social (Latour 2005). Stirphas (2015), who has an interest in keywords, points to examples such as the Amazon deranking of gay romance books (p. 396), other examples include Twitter topics feed, Facebook 'friends' recommendations as evidence of the shift in the work of classifying culture.

Algorithms have taken a central place in life[1] and in the process of that positioning, challenge our long held understanding of culture and what constitutes truth and trust. Definitions of

[1] Life- the term life in this paper references everyday life, including work, education, community aspects

algorithms are constructed in various ways according to the register of the researcher, suggesting that how they are viewed and defined and what aspects are considered important are dependent on the approach and register which positions the researcher i.e. a computer scientist will take a different focus than a social science researcher. Dourish (2016) suggests definitions of algorithms are produced through an emic (insiders views) which defines the social boundaries of the practice bound by a specific discourse and set of practices (Dourish, 2016; Seaver, 2017). Dourish describes this emic view in the following way:

> When technical people get together, the person who says: "I do algorithms" is making a different statement than the person who says: "I study software engineering" or the one who says: "I am a data scientist" and the nature of these differences matters to any understanding of the relationship between data, algorithms, and society" Dourish (2016, p. 3).

From an insider register, in areas such as computer sciences, Kowalski's (1979) definition "Algorithm= Logic + Control constructs a taxonomic register of an algorithm as operationalised in systematic and unbiased ways. Logg, Minsion and Moore (2017, p. 15) conceptualise and construct algorithms as a series of mathematical calculations. Algorithms are also defined in the broadest sense "as encoded procedures for transforming input data into a desired output, based on specific calculations' (Gillespie 2014, p. 167).

A sociological register challenges the emic approach by arguing against definitional 'hygiene' which isolates algorithms and sets them apart from practice (Seaver 2017, p. 3) highlighting that "the creation of an algorithm happens *in consort* with a wide array of "techniques and understandings" (Seaver, 2017, p.5). This view is clarified by Seaver (2017) who states that:

> the technologist who insists that his facial recognition algorithm has no embedded politics and the critic who argues that algorithmic music recommendations is an exogenous threat to culture both rely on an a priori distinction between culture and technical stuff. (Seaver, 2017, p. 5)

From this social approach algorithms are often described as existing within a black box and as such are lacking in transparency (Willson, 2017). This opacity makes them tricky objects to work with analytically because on one level they represent codes or operations such as prioritising, sorting, recommending, deciding, while on another they represent the "realisations of social relations between various actors and actants (Beer, 2017; Roberge & Seyfert, 2016, p. 13; Willson, 2017). When we search for information, when we use a calendar, program, online map, our GPS, check our health symptoms online or allow music recommender to select the music (which will influence our mood), or accept recommendations about accepting friends or groups into our social networks or the potential people we might hook up with, we are engaged in a *relation* with an algorithm.

From the sociological register, algorithms are conceptualised as having the capacity to influence and enact performances of people in all corners of life (i.e. health, working, education and employment opportunities). Willson (2017) conceives of algorithms in terms of relationships and interactions, as "delegated task or process", which impacts upon those things, peoples, and processes that it interacts with - with varying consequences" (p. 139). Gillespie advocates for melding of humans and computational processes by suggesting that algorithms represent socio-technical assemblages. While Beer (2017) argues that an algorithm is not a "detached actor" (Beer, 2017, p. 3) are part of coding practice. This author

makes the point that algorithms cannot be separated from the social world, because the creation of code is not without reference to social power and position. Furthering this argument, Beer (2017,p.4) suggests that "Algorithms are inevitably modelled on visions of the social world, and with outcomes in mind, outcomes influenced by commercial or other interests and agendas"

Consequently, definitions of algorithms are constructed in various ways according to the register of the researcher, meaning that how they are viewed and defined and what aspects are considered important are dependent on world view in which the researcher operates i.e. a computer scientist will adopt a different perspective than a social science researcher resulting in definitions which will focus on the position and concerns of the researcher.
To argue that we are shifting to an age where our practices are being reshaped by algorithmic culture (Galloway, 2006) suggests that algorithms represent a plurality, as one form of culture within many. This implies that, in this moment, we are involved in a *serious cultural* exercise that is influenced by non-human actants which are transforming the world through automation and largely within a black box of privatisation (denying the public access and scrutiny to that which shapes) leading us to a position where we must strive to understand how algorithms are both performative and meaningfully rooted in "reality and agency" (Roberge & Seyfert, 2016, p. 4).

Issues and questions of credibility and trust surround algorithms and searching. Questions have been raised by Introna, (2011; 2016); Halavais, (2009) and Noble (2018) in relation to issues of representation; knowledge bias, power, issues of marginalisation. In discussing the search engine society Halavais (2009) argues that the centrality of search engines in helping to resolve uncertainty have led to our trust in them becoming "an object of faith" (Halavais, 2009, pp.1-2)

The ubiquity of algorithms and their capacity to operate in a semi-autonomous way has been taken up by Willson (2017) whose interests focus on how algorithms are shaping the everyday and shifting our conceptions of everyday agency and power. Willson draws attention to everyday practices related to searching, communicating, purchasing. This author, drawing from Latourian concept of delegation (Johnson. (1988) argues that an algorithm "is a delegated task or process and the way it is instantiated and engaged with in turn impacts on those things, people and processes that it interacts- with varying consequences (p. 189). The potential for algorithms to narrow human agency was described by Postman (1993), who suggests that algorithms reference early Taylorist principles of scientific management and culture, by reducing human agency to a distillation of six principles that focused on efficiency, relegation of human judgement and subjectivity as obstacles to clarity, valuing of measurement and the role of experts. These principles have been cited as the underlying tenets of Google's intellectual ethic (Carr, 2011).

Upon this view, algorithms and their creation can be understood as being entangled within culture, and reference the enactment of specific practices (Mol, 2002). Consequently, any examination of algorithms needs to acknowledge and consider the cultures which brings the objects into being, including the cultural discursive, material economic and social political dimensions that shape algorithmic culture and by reference, the practices of people whose practice they are entangled with.

Implications of algorithmic culture "Power, discourse and agency

Algorithms are not produced in a vacuum but are part of the practice of meaning making through which discourse is replicated; social and technical performances are enacted, and their outcomes experienced and understood. Because an algorithm is a thing or part of a larger sequence of code, made by people, it is unavoidably - sometimes unconsciously and sometimes consciously - subject to cultural biases representing, privileging and prioritising certain truths while negating others, for example social media feeds, search results represent forms of decision making about what to present or (re)present (Beer, 2017; Striphlas, 2015; Willson, 2017). This prioritising references historical decisions, which operate through the algorithm and have future consequences because they shape outputs and have the potential to influence agency in relation to the limitation or delegation of decision making.
In this respect, algorithms can be ascribed social power which can influence the distribution of human agency (Neyland & Möllers, 2017).

A useful way to view and analyse social power is through a Foucauldian lens (1978; 1980) where truth is focal to an analysis and subsequent understanding of the 'how' of power, suggesting that the creation and circulation of algorithms produce a discourse of truth that may not be refuted because the thinking behind them are not made available. The capacity of algorithms to produce or direct a version of truth is described by Beer (2017). Firstly, through material interventions (directing search, prioritising outcomes) the algorithm creates certain truths around areas such as health, risk, taste, lifestyle choice, and capacity to repay finance (Beer, 2017, p. 8). Secondly, through truthmaking which references a type of "discursive intervention" (Beer, 2017, p. 8) the algorithm is enclosed within specific types of truth, which is then circulated, reproduced, and maintained, ensuring that social power is embedded in the renewal of specific types of discursive truths. In describing discourse, knowledge and power, Foucault's interest in discourse lies not in the meaning of the discourse, but in the conditions that the enable, constrain, and transform the discourse. Foucault in discussing discourse states that he has no interest in:

> silently intended meanings, but about the fact and conditions of their manifest appears; not about the contents which they may conceal, but about the transformation which they have effected; not about the sense preserved within them like a perpetual origin, but about the field where they co-exist, reside and disappear (Foucault, 1991, p. 60).

Foucauldian thinking when applied to algorithms, alludes to the role of social power as an object of analysis which moves the analytical register away from the taxonomic view towards an analysis of algorithms from a generative cultural perspective that focus on how algorithms enmesh and interact with the decisions required in everyday life, and the implications of this enmeshment in terms of reproduction, maintenance and prioritisation of cultural bias and positioning. Added to this view is the construction of information, knowledge and ways of knowing.

While it is important to acknowledge that algorithms make a significant and positive contribution to human existence, it is equally important to highlight the social consequences of algorithmic culture on the fabric of social life. Left unexamined, algorithms have the potential to produce an unbalanced view by creating the conditions which privilege certain discourses and encouraging discursive practices over others, and as a consequence, enable and constrain human agency, as Beer (2017, p. 7) suggests that "when thinking about how algorithms classify and order, we must…think of the way that algorithms repeat patterns and thus close down interaction to those that fit existing patterns". This leads to questions about

how discourses which underpin algorithmic culture feed into the coding or shaping of outputs. Other authors argue that it is not the algorithm but the effect/outcome of the algorithm which requires careful attention. This point emerges in the work of Neyland and Mollers (2015) who argue that as algorithms are deeply relational, careful research needs to focus on the "if, then process" to understand the "associations, dependencies and relations that facilitate those algorithmic processes and their outcomes" (Beer, 2017, p. 7).

Viewing algorithmic culture from a sociological register, has the potential to highlight issues of social justice, inequality, and social exclusion, which left unexamined, can result in positions of precarity and information poverty. Herein lies a role for information literacy, which in turn provides the warrant for the interest of librarians, and educators.

Algorithms and information literacy:

To employ the term algorithmic culture is to therefore position the researcher and the research focus towards an understanding of what constitutes practice and culture that surround algorithmic construction, and within these elements, information, and knowledge. This has implications for a socio-cultural approach to information literacy research.

To view culture, algorithmic culture to be specific, in the taxonomic sense (as processual, ordering) creates the conditions whereby humans accept opacity as a condition beyond the control of human agency, which results in the acceptance of information and the orchestration of its dissemination. This is highlighted through research into the rise of misinformation (e.g. Lewindowsky et.al 2012 work on climate deniers). As Sundin (2017) recently noted in discussing algorithmically filtered searches:

> Is the problem the difficulties to distinguish facts from opinions, or rather that we cannot control what kinds of facts and opinion we meet in our algorithmically filtered search research and social media feeds? Is the solution more focus on developing abilities for critical assessing credibility of mediated information or is it rather somethings else? (2017, np).

In this paper, culture is viewed as generative in that it constructs a lens through which to interpret, make meaning and understand how everyday life happens. Culture is complex and messy and while it may give the impression of being systematic (and therefore able to be represented in lists, processes, or organised steps inherent in the 'if then, then that' process), it is subject to emotional and embodied experiences which are viewed through cultural scripts and cultural understandings that help people make sense. The primacy of emotion in experience is highlighted by Dourish and Bell (2011) who suggest "critically, then, such putatively private aspects of experience such as emotion are always already cultural; cultural aspects of interaction are prior, not consequent, to perception and action" (p. 58). Subsequently, to view algorithms as contributing or remaking culture, has implications for the practice of information literacy (as a social practice) because current versions of algorithmic culture create a register which resist emotional and embodied views of being in the world and with this resistance, negate the sources of information that inform and are informed by the lived experience.

Information landscapes and algorithms

The ubiquitous enmeshment of algorithms in daily living, has implications for the remaking and reshaping of culture and this in turn has implications for how people practise information literacy and how information landscapes are shaped. By association, there are also

implications for librarians and educators in terms of information literacy pedagogy and archivists in relation to memory practices. The recent focus on algorithms as social expressions of enablement and constraint (and therefore power) has implications for information landscapes and acts as a catalyst for them to problematised.

Information landscapes are constructed through our action and interaction with information, people and material objects and reference larger information environments (e.g. health, education, workplaces, faith) and are referenced through our agency. For example, ambulance officers, draw from larger information environments related to medical contexts and from professional practice to create their information landscapes (Lloyd, 2009). In doing so they also work with material objects which reference and name their situated practice. Similarly, refugees reconstruct information landscapes that have been fractured through forced migration, by interacting with the information environments of their receiving countries, through relationships with people, and by observing how everyday life happens in their receiving countries (Lloyd 2017).

Information landscapes enable the discourses of a society or setting to be materialised (Barad, 2007) and people are spoken into existence and evolve through interaction with other people, material objects and the embodied performances of a specific setting (Lloyd, 2006) that reflect enterprises and performances of people engaged in collective action. Through the intersubjective space we inform our subjectivity and our agency (Lloyd, 2012).While landscapes have been described in terms of their 'construction' and enabling qualities, little attention has been paid to what constrains or redefines agentic performance. Understanding the relationship between the social power of algorithmic culture and agency has implications for information literacy pedagogy and for research into this topic in library and information science field.

How do algorithms impact on the development of information landscapes? While landscapes draw from a range of modalities in their construction, it is the epistemic/instrumental modalities, which are primarily expressed and articulated through text (analogue and digital), which may influence the expressions of agency in the early stages of learning a practice (e.g. we may be driven by rules to act in specific ways, following normatively agreed procedures). This may occur through searching for information online or through more formal expressions of social ordering such as catalogues. Textual sources have the capacity to influence what types of knowledge are valued and reference norms and values and can reduce complex thinking by minimizing other forms of information and knowledge, i.e. embodied, corporeal, social. This can have implications in relation to marginalisation, control, bias, representation and result in a loss of agency and narrowing of performativity.

Dark arts of the social: Information literacy, literacies of information and algorithmic culture

For researchers interested in the *dark arts of the social* what is at stake or of interest is less to do with technology and learning accomplished by AI (algorithms specifically), and more to do with the impact of algorithms on social and cultural dimensions of human life. Upon this line of thought algorithms represent situated artefacts and generative processes (Willson, 2017, p. 142) which reflects a *dual agency* whereby algorithms simultaneously construct meaning, and reference the meaning making involved in their own shaping (Roberge & Melançon (2015, p. 3).

A sociological perspective focuses on social life in relation to practices, enactment, and performativity, coupled with an information perspective, the area of specific focus rests upon the interactional space that is created between people and algorithms and the implications of that interaction in terms of constructing information landscapes, meaning making, power and agency. In an online space, algorithms exert agency in relation to information seeking and retrieval, the way search results are filtered, how information is presented or prevented and how it archived or stored. This situation can lead us to question our daily practices, decision making and performance (regardless of context they occur in) to ensure they are driven by our capacity to take critical consideration of our circumstances, rather than through the operationalising of algorithms which in effect reflect a specific algorithmic culture. Consequently, the social power of algorithms needs to be subject to scrutiny as part of our information literacy practices primarily because algorithmic culture represents an attempt to implement human agency over human/non-human agency given that algorithms reference work undertaken by humans but implemented via technology.

Information literacy and algorithmic cultures

How do we provide education about the way an algorithm works, where they are in operation, what assumptions and biases are inherent in them, and how do we prepare students to address the challenges of opacity?

Academic and school-based information literacy programs, which focus on information skills, run the risk of creating the circumstances which limit intellectual growth in students, when information literacy education is focused on the operationalisation of skills rather than developing a deeply critical and reflexive approach to understanding and critiquing the conditions which scaffold the operationalisation of information. Similarly, teaching practice which does not pay sufficient to algorithmic culture and continues to focuses on measuring the primacy of skills (particularly in the context of digital literacy) face the risk of maintaining a status quo in terms of research findings. This is supported by research reported by PEW research centre (Rainie and Anderson, 2017) into the 'algorithm-ization of life' leading to a conclusion that there is a need for people to develop the capacity to question and to understand the orchestration and stewardship of information that is both human and non-human (not only in an academic sense, but in relation to workplace decision making, health and life in general).

In this respect an emphasis on being able to describe the conditions that shape algorithms and impact on our agency, becomes central to understanding algorithmic culture and affording the opportunities to critically examine social power and address issues of opacity.

Teaching information literacy in the context of algorithmic culture

How do we teach information literacy to ensure that agency and practices such as reflexivity are highlighted and advocated in ways that scaffold the questioning of results and automated decisions? While information literacy is the foundational core supported via the literacies of information, (defined here as the contextualised forms of information literacy – media, digital, visual etc) incorporating and developing awareness and knowledge of algorithmic culture becomes key to interrogating how increasingly complex socio-technical interactions with technologies, algorithms other artefacts, challenge or refocus agency in contemporary life.

Critical literacy and critical pedagogic approaches have the capacity to broaden thinking around information literacy (as an object of teaching and learning) and to interrogate the role and implications of algorithmic culture in learning to become an informed user of information. Examples include earlier work such as Kapitzke's (2003) post structuralist

account of information literacy which called for critical exploration of the conditions for knowledge creation, and later by Elmborg, (2012) who highlighted the complexity of discourse. Trewell (2015) has advocated teaching to encourage more reflexive approaches about socio-political power structures which underpin production and dissemination and our ability to understand and evaluate the results of searching (p.25). Most recently, work by Haider and Sundin (2019) which focuses on searching for information (a central activity of information literacy), has demonstrated that teachers rarely identify search as problematic and it subsequently remains invisible as an object of learning. This invisibility deemphasises the need to teach critical evaluation, leading these authors to suggest that evaluation of information is not grounded in an informed understanding of the workings of search engines" (2019, p.111).

In extending approaches to information literacy pedagogy and research into the practice, focus should move beyond issues of access, searching and evaluation of information to include an examination of algorithmic culture. While information literacy should be viewed as a socially situated practice, the enmeshment of algorithms into everyday life, should lead us to question how algorithmic culture *travels across settings*, e.g. via tools such as search engines and the implications for our understanding how information and knowledge are shaped and reshaped.

Upon this account, the concept and practise of reflexivity becomes an important aspect of information literacy and can focus our attention on how algorithms are expressed and operationalised (through our actions and interactions with interfaces and programs) and the conditions, assumptions and biases that are inherent in their production and operationalisation. Sundin (2017) has described this addition to the suite of literacies of information as algorithmic literacy.

To build a critically reflexive approach to algorithms into information literacy pedagogy, key concepts such as bias, trust, credibility, opacity, diversity, and social justice, commensurability (how algorithms interact with us to shape and reshape knowledge and agency) and performativity, should be incorporated to supplement and deepen concepts such as search, and the core activities associated with current information literacy practice. In this respect, algorithmic literacy, differs from digital literacy, which focuses on core information literacy skills in the digital context, because it requires examination of culture (in both analogue and digital spaces), as a generative proposition, and the construction of algorithms should be viewed as a practice which influences other aspects of social life. By this account the construction of an algorithm is a practice that is nested within other practices and influenced by specific views of the world.

Conclusion

While algorithms have been working away quietly for many years, the sudden rise in big data, complex social interactive sites, interest by business, and their invasion into everyday life through accelerated mediation of technology, mean that these pieces/strings of code have also risen in people's consciousness. This rise invokes many questions for information literacy researchers and educators about power, agency, reflexivity, and trust.

To fail to question and interrogate the rise of algorithmic culture is to run the risk of diminished intellectual growth - where the provision of information or decision making is based on the lowest common denominator. Without critical approaches to information and its literacies we are in danger of forfeiting or at least allocating responsibility for our agency

and for the socially nuanced and embodied ways of knowing, which often makes actions and interactions, messy, complex, difficult to decide upon, time consuming, but above all - human.

To assess algorithmic culture as part of our information literacy practice we need to develop understanding of multiplicity and entanglement; learn to recognise epistemic views, practical usages, and performative consequences. Without trying to conflate the role of the information studies field, this approach opens new avenues of research, teaching and more focused attention on information literacy as a sustainable practice.

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