Critical Data Literacy in Higher Education: Teaching and Research for Data Ethics and Justice

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Abstract

Navigating the turbulent waters of data and algorithms, in order to participate in today's datafied society, requires a series of transversal skills. Educators, students and citizens need both technical abilities and a set of literacies, interwoven with a critical approach, to understand the socio-political and cultural mechanisms governing, shaping, and transforming our lives. Our chapter will reflect on the impact of datafication in society and address some questions about embracing the concept of ethics as a method for working with data towards addressing bias, ensuring that the demands of data justice are adopted in teaching and research. Our open and critical pedagogic approach calls for educators to explore data issues from a social justice perspective and through research-based learning activities. To exemplify our model, we showcase an academic development programme piloted in Uruguay which was part of a bigger research project, *Understanding data: politics and praxis*. As part of the project, we have developed a critical pedagogic approach to support academics in teaching critical data literacies. This approach bridges research and real-world problems, using open data as open educational resources (OER) to support learners and educators to co-create knowledge in an interdisciplinary manner through research-based learning activities. Our curriculum provides academics with a data ethics framework and solid theoretical background, alongside analytical tools, and activities to develop lifelong learning. This approach enables participants to understand and challenge datafication and support informed and transformative democratic practices and dialogue, empowering citizens to address social justice concerns.

Keywords

Open Data, Open Educational Resources, Critical Data Literacy, Ethics as method, Co-creation

Introduction

Navigating the turbulent waters of data and algorithms, in order to participate in today's datafied society, requires a series of transversal skills. Educators, students and citizens need both technical abilities and a set of literacies, interwoven with a critical approach, to understand the socio-political and cultural mechanisms governing, shaping, and transforming our lives. Data, now 'bigger' than ever, is produced at an unprecedented rate due to increased computational power that enables continuous automated processing, as well as production. This phenomenon of datafication has driven what is sometimes referred to as a 'data revolution' (Taylor, 2017), but it is not one which has seen the oppressed claim power. The expansion of computational power and data-intensive systems has promised a number of benefits: faster and better decisions that are facilitating improved outcomes in health, agriculture, urban planning (Naef et al. 2014; Kshetri, 2014). Less is said by proponents of this revolution about its impacts across long-standing social, political, economic and cultural issues and inequalities (D'Ignazio & Klein, 2020; Taylor, 2017). But there are a growing number of concerns about emerging negative effects: loss of privacy, discrimination, and growth in inequality (Spratt & Baker, 2015; Taylor & Broeders, 2015). These are the sociocultural equivalents of seismic shifts, which require interdisciplinary focus in higher education research, teaching and learning.

Fundamental to an understanding of datafication is knowing that whatever "data are generated, and how they are produced, handled and used, is the result of choices and decisions by people" (Kitchin, 2021, p. 5). Thus, data-driven systems are not neutral machines that operate in a vacuum; they are socio-technical systems. That is, they are the products of the combination of social relations and human values and biases with scientific knowledge and technology (Gebru, 2019; Mohamed, Png, & Isaac, 2020). Data-intensive technologies are hence political thus their impact on society implies hidden social structures and power dynamics. Approaching the world of data, therefore, demands a political stance.

As more dimensions of social life play out in digital spaces, data feeds powerful machines to generate inferences and insights into different aspects of human life; data has therefore acquired a different dimension and is imbued with more power than previously. Data has been transformed into a manufactured material that intrinsically has value. Given this scenario, it can be inferred that data has a new sociality (Kitchin, 2021). This requires a reappraisal of previous ways of thinking about data. In what we might now call 'traditional' discussions of data, we often refer to the idea of data 'collection', which misleadingly suggests that data is pre-existing, like a text already written and simply waiting to be 'read' in the collection process. Therefore, by extension, it might be assumed that such collections (datasets) are simply a reflection of reality. But in order to have data, it must be produced; in order to make knowledge claims deriving from data, it must be analysed, interpreted, and communicated.

It is becoming clearer that these processes and purposes of data generation, communication and use cannot be assumed to be transparent nor benign in their intent or effects. However, the idea of data as something 'natural', that was there waiting to be discovered, rather than constructed by human beings, persists – as does the related idea of the inevitability that data *must* be collected and exploited in order to improve, enhance, optimise, and most of all, profit. As Zuboff (2015) notes, the production and uses of 'big data' are often presented to us as "the inevitable consequence of a technological juggernaut with a life of its own entirely outside the social" (p. 75). This veneer of inevitability and elision of the role of human (and, indeed, corporate) actors plays a vital role in enabling the business model of

'surveillance capitalism', which is unprecedented and thus unrecognisable for many people (Zuboff, 2015, 2019). Others, meanwhile, are increasingly aware that companies are putting personal data to mysterious or concerning uses, but consider that there is no 'opt-out' from such surveillance, that it has simply become a fact of life (Lupton & Southerton, 2021).

Scholars including Eubanks, (2018), Kleinberg, Ludwig, Mullainathan and Sunstein (2018), and Benjamin (2019) urge us to become aware about how algorithms are structured by an intersection of inequities and biases inherited from the labels people have been given due to their heritage, race, gender or socioeconomic background. Such biases, inherent in the data as well as how it is used, then feed into the decision-making processes of automated systems which potentially impact employment, healthcare, housing, prison sentences and education. Now that an array of ways we interact with and make sense of the world are mediated through data-driven systems and data-intensive technologies, it becomes essential that educators are able to explore with students how to recognise these phenomena and their core mechanisms, and consider implications for our social life and, more poignantly, for the future of citizenship and democracy. We need to be aware that the data feeding these systems and technologies are not pre-existing and not simply reflecting reality objectively.

In such a challenging socio-political context, we consider that higher education (HE) has a key role to play in raising awareness of this situation and its consequences, and empowering a new generation of professionals and citizens to actively participate and challenge digital discrimination (Raffaghelli & Stewart, 2020). Such a mission calls for a critical pedagogical approach that combines practical and technical data skills and information; and media literacies together with an understanding of ethics and social justice, if students are to challenge the socio-political and cultural mechanisms operating in this datafied and surveilled society (Atenas, Havemann, & Timmermann, 2020).

In our view, the aim of taking a critical approach to data literacy is to support the process of imagining that the world of data can be addressed otherwise, and of acting ethically within it, taking into consideration questions of social justice and pluralistic values, and working towards mitigation of pervasive social injustices. Our advocacy for a critical approach to data literacy is based upon a conviction that while a more practical level of literacy may enable us, as Freire (1972a) argued, to 'read the *word*', we may yet fall short of 'reading the *world*', and therefore risk becoming objects of history, known and acted upon, rather than subjects who know and act. In today's world of data and algorithms, part of being a critical, active, world-reading and participating subject is to be aware of the streams of data, most of the time invisible, intangible and abstract, flowing unnoticed over our heads and under our feet and yet profoundly affecting our lives. Yet, we must not underestimate the significant teaching and learning challenges involved. With this in mind, we suggest that curriculum design should link the interrogation of data with the sociocultural context and the possibility of socio-political action, using an interdisciplinary approach to efforts to develop activities using evidence, problem, and research-based learning approaches grounded on co-creation of knowledge and participation (Markham et al., 2018; Mandinach & Gummer, 2016; Atenas, Havemann, & Timmermann, 2020; Kitchin, 2021).

Our pedagogical approach is grounded in critical theory (Bohman, 2005; Bronner, 2009; Foucault; 1980; Kellner, 2011; Young, 2011), critical pedagogy (Freire, 1972a, 1972b; Giroux, 2010; Hooks, 2014; Zembylas, 2013) and open education (Weller, de los Arcos, Farrow, Pitt, & McAndrew, 2015; Havemann, 2016; Cronin, 2017). In the sections which follow we are going to discuss some areas that our project *Understanding Data: Praxis and*

Politics explores, in order to provide educators with some of the knowledge and tools that could enable them to understand the datafied world and, together with their students, design pathways to challenge the so-called 'data revolution', but at the same time harness that which can support initiatives that can contribute to the social good.

From datafication to data justice

Datafication is driving social issues and inequalities, thus, we advocate for pedagogic approaches founded on critical open and civic pedagogies with a lens of social justice and social participation (Reggi & Dawes, 2016; Kuhn, 2019; Charitonos, Albuerne Rodriguez, Witthaus, & Bossu, 2020; Cronin, 2020) with a view to building capacities in data for educators and students to understand the power structures that govern data and challenge them (D'Ignazio & Klein, 2020). Through such approaches, educators can bring greater awareness of the structural dimensions of power imbalances and their self-replication through different capacities to use data. While awareness can only get us so far, it is a necessary first step towards data justice (Kuhn, 2021). Criticality must therefore be the beating heart of education in data practices, rather than an addendum.

The concept of data justice, according to Dencik and Sanchez-Monedero (2022) "draws from a range of long-standing traditions that have concerned themselves with the social justice implications of the nature of information and communication systems, ranging from debates on ethics and human rights to the orientation of activism and social movements" (p. 2). As for Dencik *et al.* (2016) "Data justice is a response to prominent and rather limited perspectives on the societal implications of data-driven technologies that have tended to focus on issues of efficiency and security on the one hand and concerns with privacy and data protection on the other" (p.874). Thus, It can be understood as the social justice and data ethics practices that are put in place for safeguarding people and communities from oppressive practices such as surveillance and algorithmic discrimination, challenging, the often invisible structures of oppression of data-driven technologies and systems (Dencik, Hintz, & Cable 2016; Johnson, 2014; Kuhn, 2021; Taylor, 2017; Heeks, 2017; Dencik, Hintz, Redden, & Treré, 2019; Dencik & Sanchez-Monedero, 2022). It thereby aims at identifying controversial data practices and developing solutions to alleviate the injustices brought by the questioned forms of data use and collection.

Current social realities may aggravate data injustices. The growing data literacy divide is creating power imbalances in society (Johnson, 2014; Atenas & Havemann, 2019), as those who cannot engage with data will likely remain or become further marginalised, ultimately only playing the role of data points, to be studied 'from above' (Atenas, Havemann, & Timmermann, 2020). This is related to the intersectional nature of the different social structures of oppression such as gender, class, 'race', and ethnicity, as well as differential access to quality and lifelong education, leaving groups of individuals misrepresented and culturally and legally misrecognised (Fraser, 2008). The failure to recognise some forms of injustice as such, particularly when they affect already disadvantaged groups, originates as much from class hierarchies as from status and political ones. Thus, discrimination and oppression are not only a consequence of the (mal)distribution of material wealth in society, but also failure to acknowledge the problems of the disadvantaged and sometimes even their very existence.

Datafication is impacting people and communities in different areas of their lives and in very different ways, and therefore is challenging to pin down, to make visible, graspable,

understandable and thus, addressable. There still tends to be a strong belief that data is benign, objective, and neutral; that views data as the evidence which points to universal truths (Kitchin, 2021). In order to challenge the assumptions that describe data as neutral and simply 'collected', we must engage with the nature of data and its sociality, that is, its social character. In so doing we aim to provide a rationale for a more critical than technical approach to data literacy that would include, amongst other things, elements of data activism as described by Milan and van der Velden (2016). Data activism, the authors suggest, "indicates the array of socio-technical practices that challenges the fundamental paradigm shift brought about by datafication." (p. 1).

Data activism is founded on the premise that data is political, and thus, the 'life cycle' of data is imbued with human choices, politics and praxes; it is embedded in a socio-technical context with its own politics and power dynamics. These praxes, politics and choices have effects not only on the data that is collected and processed but also on the decisions that are taken in the deployment of the different inferences that result from the data-driven systems that use these processed data, adding yet another layer of complexity (Kitchin 2021; Milan & van der Velden, 2016, 2018; Lehtiniemi & Ruckenstein, 2018).

Data justice cannot be established by *ex-ante* processes alone and requires continuous activism to ensure that those in power do not abuse the system and that data collections do not automate the erasure or disadvantaging of oppressed or minoritised groups of people. The belief that engineers and computer scientists can ensure fairness or engineer discrimination-aware data mining and machine learning through responsible design overlooks the complexity described above and has dangerous implications for society. One of them is that we end up with technical solutions that are overly simplistic and ill-equipped to accommodate the complexity of social life, and also reinforcing power imbalances between technologically privileged groups and communities using these technologies, exacerbating pre-existing forms of social injustice and discrimination. While techno-centric approaches may be well-intentioned, technology developers must accept the need to work with a variety of social actors in order to make data practices just.

While proposing that education is the space in which awareness, criticality and resistance to surveillance and datafication can be fostered, it must also be acknowledged that education is subject to the same forces which are altering society more widely. Education is being transformed by data and data practices, and in this context, datafication involves the collection and use of data in every stage, space, and activity of an educational setting, with the aim of measuring (and 'improving') performance (Jarke & Breiter, 2019; Lupton & Williamson, 2017; Raffaghelli et al., 2020; Selwyn, 2015). For Spence (2019) an increasing metricisation of student and staff activity is justified by an apparent need to quantify and enhance productivity (including learning), as for Kuhn (2019) " A big part of what HE is interested in is to be able to gain access to student's data, data relevant to matters of engagement or at least what they call 'engagement'" (p.6), thus it is transforming students, educators and learning activities into data-producers and data-points. Producing the right numbers has become core in new performative data-driven educational systems, at the risk of jeopardising complex and critical student-centred pedagogies (Roberts-Holmes, 2015), and potentially coercing digital participation in order to ensure data are gathered (Barassi, 2019). In short, critical data awareness and activism are no less needed within the education space itself, than in the supposedly more real world beyond.

We see an overlap between the concept of data activism and critical pedagogy. Data activism can serve as a heuristic tool for the analysis of new ways of civic engagement through political participation thus it has the potential to contribute to fostering proactive citizenship. In Freire's (1972a) understanding of education, the central aim is to practice what he calls *conscientização*, translated as critical consciousness, which entails the problematisation of the social reality, the need for resistance, and the process of radicalisation, as he argues that critical and emancipatory consciousness develops through critical praxes that demand the participation of the individual as cultural subjects of the world.

Building a pedagogical perspective

Solid democracies are characterised by citizens capable of developing constructive criticism and participating in public forums and discussions. Thus, the role of HE in building democracies must not only be to develop competencies for the labour market, but also to create a critical citizenry capable of evaluating information related to social problems. As for Giroux (2010), education must develop and improve people's ability to recognise and challenge power dynamics (Foucault, 1980), enabling them to become a committed citizenry that expands and deepens their participation in the promise of substantive democracies (Evans & Nation, 1993; Soder, Goodlad, & McMannon, 2002; Deakin Crick & Joldersma, 2007; Fischer, Rohde, & Wulf, 2009; Atenas, Havemann, & Timmermann, 2020).

Educators can, and should, play an important role in the development of critical socio-technical pedagogic approaches to understand and analyse the different dimensions of data that will contribute to improve students' ability to negotiate and read data with a political perspective. Freire (1972b) suggests that educators prioritise strategies that encourage individuals to be able to organise themselves reflexively for action rather than remaining isolated and passive. Our approach consists of enabling spaces for critical analysis of social issues, working with an interdisciplinary and collaborative approach including organisations of the civil society, the government and other sectors that need to address challenges driven by data in an ethical and fair way, helping students gaining a better understanding of the social structures and practices in which uneven power dynamics have arisen.

As Pangrazio and Selwyn (2019) argue, individuals do not only need to develop emancipatory perspectives on data literacy, but also to gain skills in the technical dimension to negotiate data and data-driven systems through critical reflection about the social meaning of datafication, by intercepting social problems and interrogating them, questioning commonsensical understandings of how data is collected and processed, who is included or excluded in the collection but more importantly, who is excluded and in the interest of whom (Kuhn, 2019), as for Van Es & Schäfer (2017), "students need to be educated to become critical data practitioners who are both capable of working with data and of critically questioning the big myths that frame the datafied society" (p.12).

We draw on Milan's and van den Velder's (2016) idea of activism as a proactive interception of real problems that people are facing 'out there', in real life, to support students to become more aware of what does the reality of datafication implies and to find methods to resist some of the aspects of datafication and its implications. Hence, our critical pedagogical perspective resonates not only with the purposes of citizenship education, but also with the concepts of open pedagogy and open educational practices which aim to promote innovative

pedagogical approaches, and empower students as co-producers of knowledge, often in conjunction with the use, repurposing or production of open educational resources (OER), which are understood by UNESCO (2009) as:

teaching, learning and research materials in any medium – digital or otherwise – that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions.

The use of open data as OER to link learning activities with lived realities can catalyse discussions of social justice, becoming what Havemann & Atenas (2018) describe as an Open Pedagogy of Citizenship to foster critical and active participation in society.

Open data as OER

To establish links between educational processes and society, it is necessary for students and teachers to relate to contemporary social problems. However, the HE sector is facing two problems: the current trend to educate in response to the needs of the job market overlooks and conceals the real and pressing issues that society is facing; and in addition, the overreliance on commercial textbooks that do not include real and up to date social problems. The combination makes students stay disconnected from their social reality; hence little criticality or civic participation can be fostered.

Open data is often described as a vital 'accessible' source of public information, but less attention is paid to the question of the literacies required to make sense of what is accessed and build knowledge from it (Gurstein, 2011), and consequently it is not frequently cited as an (open) educational resource; however, it can become a learning material when used strategically in teaching contexts. Data, used as a pedagogical tool, offers multiple opportunities to develop transversal, civic, literacy and numerical skills. Building knowledge through the analysis of information in various sources and formats contributes to the development of critical thinking and it fosters the civic skills so necessary to participate in a democratic society.

We consider this has become an urgent educational need in a context of surveillance capitalism, defined by Zuboff (2019) as "an expropriation of critical human rights that is best understood as a coup from above: an overthrow of the people's sovereignty" (p. i). Much of the data which is extracted and processed for the purposes of surveillance capitalism is, of course, not open (much less the algorithms and analytics used in processing), which might call into question the relevance of studying open data. However, we make this case based on both critical and practical considerations. First of all, open data is generally produced and made available by governments and researchers, as there are now widespread mandates to release such datasets in the public interest. As such, this data provides students with a window into what researchers and governments are concerned with knowing about, and which becomes the basis for recommendations, policies and actions (Atenas, Havemann, & Priego, 2015; Atenas & Havemann, 2019).

Securing such mandates has been rightly celebrated in the open data community but there have also been calls to consider the extent to which 'the public' are in a position to interpret this data, let alone take any relevant action. Furthermore, like any other form of data, openly released data must still be understood as the product of social, human actors whose agendas may not be transparent, even if the data they have produced is accessible. These issues highlight the need for improved skills and criticality in working with open data. Secondly, on the practical level, a key advantage of working with open data is its openness, which allows its

reuse. Open datasets are critical to enabling research- and scenario- based-learning activities, as they support students to develop information, statistical, scientific, media, and political literacies. In addition, working with real-world data students can develop research skills and can apply analytical, collaborative and citizenship skills while investigating real-world problems.

This idea of using open data in education is recognised in the sixth principle of the International Open Data Charter, on open data for inclusive development and innovation, which states that it is key to "[e]ngage with schools and post-secondary education institutions to support increased open data research and to incorporate data literacy into educational curricula" (ODC, 2015). Despite this recognition, it is unclear how much emphasis and effort countries are making to support the use of open data as OER in educational contexts. Another advantage of including open data as a pedagogical element in programmes of study is that it encourages students' interaction with their socio-political reality in a critical and participatory way. In doing so, it generates pedagogical spaces for critical problem solving, be it working collaboratively with different programs of civil society or communicating the results of their research in written and multimedia format to establish a formative dialogue with the communities.

The key skills which can be developed through the use of open data as OER can be seen in the rubric below.

Skills/Level	**Basic**	**Intermediate**	**Proficient**	**Advanced**
Critical thinking	Students understand basic concepts of critical thinking	Students can use data to verify information from the media	Students can analyse phenomena from their region using data and write reports critically analysing solutions	Students are able to develop and present complex evidence-based arguments in key academic formats
Data analysis skills	Students can analyse data using quantitative and qualitative methods	Students gain experience in using popular software for data analysis such as SPSS or Nvivo	Students use proficiently software for data analysis which are relevant for their own disciplines	Students can present complex reports based upon data analysis in the form of research papers or posters
Data curation skills	Students can organise datasets in simple folders	Students can identify different sources of datasets and organise them in databases	Students can use electronic tools for data curation and share it with others	Students can develop databases and automate the process to organise and merge datasets, and embed metadata into the files to facilitate

				access to the resources
Data information management skills	Students can identify datasets from different sources	Students can select datasets from different portals in different formats	Students can extract, filter and compare data from different data sources creating a single dataset	Students can filter and format data in different formats analyse it creating complex datasets
Data Mining skills	Students can locate CSV files on the internet	Students can extract datasets from PDFs	Students can extract datasets from different sources	Students can use complex methods for developing datasets
Data visualisation skills	Students can create graphics and charts	Students can use online software to develop simple infographics	Students can use graphic design software to develop infographics	Students can use data visualisation techniques to present their findings using complex statistical modelling
Research skills	Students understand the scientific method and are familiar with the concepts of quantitative and qualitative methods	Students can structure their research and apply different techniques to obtain results	Students can replicate experiments and studies following research methods explained in the literature	Students can compare data and information from different data sources and research papers and replicate experiments and studies to produce new research findings
Statistical skills	Students can perform basic statistical operation including averages, media and median	Students can perform statistical operations using clusters, standard deviations, significance, chi square, correlation or regression analysis	Students can use data modelling techniques for different statistical methods such as forecasting to predict future events	Students can write queries in order to perform complex statistical analysis functions and create models and complex graphs and visualisations

Atenas, Havemann & Priego, 2015 - Rubric of data skills

Access to open data and information by citizens as a democratic guarantee is key to achieving the ideal of a just society. Data literacy, following Timmermann (2018) and Sarin (2021) becomes thereby a critical element for the realisation of three principles of a just society: i) the right to self-determination, which requires an informed decision, ii) the right to participate in science and cultural life, which in turn needs meaningful access to data and iii) contributive justice, to facilitate an environment that encourages the development of individual and community capacities, in a transversal manner.

UNESCO (2015) has defined transversal skills as critical and innovative thinking skills, interpersonal skills, intrapersonal skills, and critical and global citizenship. To develop these competencies, it is necessary to link educational processes to social issues that affect society such as human rights, economy, transparency, migration, environment and sustainable development, and for that, the use of Open Data can be a tool that facilitates the interaction between teaching, research and society. Facilitating this interaction is critical for HE in their endeavour of developing critical citizenship and in doing so HEIs are connecting society, industry, innovation, and ethical research (Manca, Atenas, Ciociola, & Nascimbeni, 2017).

Ethics as method

In the context of developing critical data literacies in HE, we argue that ethics needs to be considered a core and transversal element, rather than an adjunct or administrative formality. Thus, we propose to understand ethics as a method, as a procedure, and as a set of overarching perspectives and principles that guide decisions concerning the study and analysis of data. We consider that research methods courses and data literacy programmes need to ground the teaching of ethics, in the context of data collection or retrieval, beyond informed consent. Therefore, we suggest that ethics should take centre stage in any critical studies of data, furthermore and as advocated by Markham (2006) and Markham, Tiidenberg, and Herman (2018), ethics itself must be considered a research method. In addition, and complementing these ideas, Marco and Larking (2000), Simon (2015) and Nielsen (2016) argue for a praxis of ethics as a way of knowing and acting, making ethics actionable knowledge.

We consider that doing research with human data is a privilege, not a right, thus, collecting, reusing, analysing, preserving, publishing and reporting data needs to be done using ethics as a method in research projects. First, people need to be aware of the multiple issues that are raised by using data with today's technologies and foreseeable developments which involves an ethical assessment of data practices at three stages (i) *ex ante:* how data is being used and could be used when new technologies become available s, (ii) *intra*: the impact of data at different levels of technology design and development, and (iii) *ex post* the impact of data once their use becomes widespread (Reijers, et al. 2018; Bonatti, et al. 2018; Decuypere, 2021). Second, people need to become aware – gain *conscientização* – of the current social circumstances and vulnerable situations many people face. Third, they need to gain a wider idea of the manifold values defended in ethics and the multiple demands of social justice. This involves gaining acquaintance with various ethical principles, such as beneficence, justice, autonomy and nonmaleficence, and demands of data justice, to different approaches to ethics, such as ethics of care, to specific challenges, such as decolonization and intersectionality, to key rights embraced by human rights law. Fourth, people need to understand that they are co-responsible for change and working towards a better world, as data activists claim.

Adopting ethics as a method enacts an ethical approach to the research practice, converting abstract concepts into action shaping not only the research but the attitudes of the researchers affecting the whole research cycle, from the design of the research until the publication of the results, embedding ethical principles such as beneficence, justice, autonomy and nonmaleficence. In the light of these insights, we believe that curriculum and activity design need to begin asking: how do we DO ethics? The literature showcases several ethical issues related to conducting research in terms of data collection, and consent of data provision in terms of working with vulnerable populations, breaching privacy, putting people and

collectives at risk and thus preventing people to become data points thus, objects (Johnson, 2014; Yang, 2021).

In summary, we consider that data literacy should be developed using a critical lens, placing the wellbeing of individuals and groups at the centre and before the research aims and data collection processes. Thus, data ethics cannot be a mere tick-box exercise, but instead becomes a praxis in its own right that includes elements of participatory and inclusive research design, involving those who will provide data and be affected by the results of the research.

A case study - A critical approach to data in academic development

The experience we present here has been coordinated by the Understanding Data: Praxis and Politics (also known as datapraxis) project team, along with the Department of Academic Technical Support (Education Sector Commission) and the Núcleo REA (Centre of Open and Accessible Resources) from the Universidad de la República (Udelar), Uruguay. The objective of the project was to create a didactic space for training university teachers, whose catalyst is a collection of open educational resources (OER) to promote a critical approach to data. The datapraxis project was a transnational collaboration between a central team and four strategic partner institutions across three continents: Tangaza University College Business School (Kenya), the Education Department at the Open University of Catalonia (Spain), the Centre for Open and Inclusive Education Universidad de la República (Uruguay), and the Business School at the University of Surrey (UK).

The datapraxis experience with the Núcleo REA Uruguay, built upon their prior work and history of collaboration in academic development for Open Educational Practices and capacity building initiatives in open data in education. In 2016, they hosted a course: *Open Data as Open Educational Resources - An Academic Development Training Model for Latin America* aimed at providing strategies for multidisciplinary work focused on open data as tools for developing critical thinking using techniques from data journalism and civic monitoring (Atenas & Ciociola, 2016). In 2019, this was followed by *The potential of Open Data in University Teaching*, which was aimed at presenting teachers with the potential of open data produced by both national and international agencies, to create collaborative pedagogical activities, allowing their students to work in an interdisciplinary way and in conjunction with civil society and/or researchers (Atenas et al., 2019).

The latest course, *Data, society and politics: A critical approach to data* (Podetti et al., 2021), in association with the datapraxis team and held in 2021, was offered as a postgraduate certificate in academic practice, and delivered online, thus, open to academics from throughout the LATAM region, recruiting scholars from 14 countries. The course was held in two stages, first an introductory one called *Open Data as Open Educational Resources*, which had 200 teachers registered and 100 that completed the course. Of these 100, a group of 78 progressed to the second stage or 'main' course.

The main course (*Data, society and politics*) was designed using a critical pedagogy approach, taking as its starting point the social reality in which those who participated were immersed. During the course, sessions were facilitated by experts, but designed as spaces for debate rather than lectures, where the guests exchanged their experiences and knowledge. In

addition, a series of workshops that approached various topics associated with data and its relationship with open educational resources, transparency and openness of governments, science, artificial intelligence, innovation, development, privacy, ethics and inclusion, as well as access to public information and data journalism were held, to provide participants with hands-on experience in using data in an educational context.

The assessment of the course consisted in the elaboration of a final group work, aiming at developing critical collaborative work with data to take to the classroom. The exercise was designed with an open practice ethos in mind. We created a toolkit to support participants in their group work which was an OER itself, as was designed with a mixture of original content and openly licensed materials from various sources. The assignment was influenced by the data feminism principles (D'Ignazio & Klein, 2020), asking participants to reflect on the politics of data and the intersection of different social dimensions such as race, gender, ethnicity and itdrew upon resources adapted from NESTA; the Open Data Institute; TacticalTech and the Data Justice Lab amongst other organisations.

The project was designed using a research-based learning model. Participants were asked to critically define a problem related to data and propose a possible solution, based on the content learned during the course. We encouraged the appropriation of open data to foster social change and empowerment of those involved in the solution, using an ethics as method approach throughout. The evaluation process included a review of the projects which were guided by the course team and presented in a final meeting to showcase the results with their peers and guest subject experts, receiving feedback from us and the audience.

Feedback from the course participants was overwhelmingly positive. Amongst the things they mentioned is how much they valued the quality of the curricular design and open content, the curated resources and practical case studies, the selection of the activities to take to the classroom, the collective reflection activities and the bibliography. They highlighted the participation of the specialists in the different talks and workshops that were held during the first two weeks of the course, which guided them in learning about the social realities of different countries and to motivate and support the engagement with such a complex and difficult subject. The support and guidance of the course team and invited subject experts. was critical for the participants' learning, they said. Below we share some comments of the course participants:

For me the world of open data was totally unknown, so that already speaks for itself of the value that this course had for me. A few things that I knew about, like Creative Commons licences, were part of very frayed things, so systematising them also helped a lot.

The methodology applied by the excellent teachers, facilitated the understanding of the topics that was reinforced with the talks by experts and the videos from speakers from other countries to illustrate the situations presented.

The talks by experts, the flexible and dynamic modality of the coordinators' orientations, in a clear and direct language, favoured the understanding of the instructions to carry out group work. This experience of working with participants from different countries and cultures was very enriching

I want to CONGRATULATE ALL THOSE INVOLVED in the realisation of this course! It has been one of the MOST MEANINGFUL courses I have ever taken! A WHOLE LEARNING EXPERIENCE! Congratulations!

The organisation seemed great to me, dynamics were developed in which group work and interaction with classmates were achieved, the closeness of the teachers was felt, something in my previous experience never achieved in a 100% virtual modality course.

Conclusion

In this chapter, we argue that given the new sociality of data and the increasing unequal power it wields in society educators and students need to be equipped with more than technical data skills, namely with critical data literacies, which must include an ethical and social justice lens. We consider that the most commonly technical skills taught in data literacy programmes such as collecting, handling, processing, analysing, storing, and sharing data, and those quite specific, such data storytelling are still insufficient to work critically with data Instead, we argue that critical thinking, an understanding of data ethics, and a thorough comprehension of social justice are an essential complement to the technical skills that will enable educators and learners to see beyond the numbers and stories told by and with data.

Our educational approach includes three key elements: a critical approach to pedagogy, the use of open data as OER and the embedding of ethics as a method of inquiry. This combination allows educators and students to connect teaching and learning to real social issues, and in doing so, the process of *conscientização* (Freire 1972a) is encouraged. There is still a long way to go so that a critical approach to data literacy is fully integrated in learning and teaching strategies and programmes in HE, but the journey has already begun. There is an awakening to the social reality we are facing, and we also perceive a new kind of solidarity coming from the margins to the centre. This solidarity, we argue, is worth harnessing so that in a joint effort, we can find approaches to empower educators and students to see more clearly how the logic and effects of datafication can be questioned, understood, and challenged.

References

Atenas, J., Havemann, L., & Priego, E. (2015). Open Data as Open Educational Resources: Towards Transversal Skills and Global Citizenship. Open Praxis, 7(4), 377-389. http://dx.doi.org/10.5944/openpraxis.7.4.233

Atenas, J., & Ciociola, C. (2016). Datos Abiertos como Recursos Educativos Abiertos: Modelo de formación docente para América Latina. *Documento de trabajo*. ILDA, Montevideo. https://doi.org/10.5281/zenodo.4307882

Atenas, J. & Havemann, L. (2019) Open Data Sectors and Communities: Education. In T. Davies, S. Walker, M. Rubinstein, & F. Perini (Eds.), *The State of Open Data: Histories and Horizons.* Cape Town and Ottawa: African Minds and International Development Research Centre. https://www.stateofopendata.od4d.net/chapters/sectors/education.html

Atenas, J., Belbis, J., Pane, J., Bonina, C., & Casanueva, J. M. (2019). Estado abierto a través de Datos abiertos. In *Estado abierto a través de Datos abiertos* (p. 133). Iniciativa

Latinoamericana por los Datos Abiertos y Banco Interamericano de Desarrollo. https://doi.org/10.5281/zenodo.3243389

Atenas, J., Havemann, L., & Timmermann, C. (2020). Critical literacies for a datafied society: academic development and curriculum design in higher education. *Research in Learning Technology*, 28. https://doi.org/10.25304/rlt.v28.2468

Barassi, V. (2019). *Coerced Digital Participation, Child Data Citizen*. Retrieved from: http://childdatacitizen.com/coerced-digital-participation/

Benjamin, R. (2019). Assessing risk, automating racism. Science, 366(6464), 421-422. https://doi.org/10.1126/science.aaz3873

Bonatti, P. A., Bos, B., Decker, S., Fernández, J. D., Kirrane, S., Peristeras, V., ... & Wenning, R. (2018). *Data privacy vocabularies and controls: Semantic web for transparency and privacy*. In SW4SG@ ISWC. https://openreview.net/pdf?id=98A2Vi9dZO

Bohman, J. (2005). Critical Theory. In E. Zalta (Ed.), The Stanford Encyclopedia of Philosophy (Spring 2021 Edition). Retrieved from https://plato.stanford.edu/archives/spr2021/entries/critical-theory/

Bronner, S. E. (2009). Critical theory. In The International Encyclopedia of Revolution and Protest. https://doi.org/10.1002/9781405198073.wbierp0418

Charitonos, K., Albuerne Rodriguez, C., Witthaus, G., & Bossu, C. (2020). Advancing Social Justice for Asylum Seekers and Refugees in the UK: An Open Education Approach to Strengthening Capacity through Refugee Action's Frontline Immigration Advice Project. *Journal of Interactive Media in Education*, *2020*(1). Retrieved from https://www-jime.open.ac.uk/articles/10.5334/jime.563/print/

Cronin, C. (2017). Openness and praxis: exploring the use of open educational practices in higher education. *The International Review of Research in Open and Distributed Learning*, 18(5), 15–34. https://doi.org/10.19173/irrodl.v18i5.3096

Cronin, C. (2020). Open education: Walking a critical path. In *Open (ing) Education* (pp. 9-25). Brill Sense. https://doi.org/10.1163/9789004422988_002

Decuypere, M. (2021). The topologies of data practices: A methodological introduction. *Journal of New Approaches in Educational Research*, 10(1), 67-84. https://doi.org/10.7821/naer.2021.1.650

D'Ignazio, C. & Klein, L.F. (2020). *Data Feminism.* Cambridge, MA: MIT Press

Deakin Crick, R., & Joldersma, C. W. (2007). Habermas, lifelong learning and citizenship education. Studies in Philosophy and Education, 26(2), 77-95. https://doi.org/10.1007/s11217-006-9015-1

Dencik, L., Hintz, A., & Cable, J. (2016). Towards data justice? The ambiguity of anti-surveillance resistance in political activism. *Big Data & Society*. https://doi.org/10.1177/2053951716679678

Dencik, L., Hintz, A., Redden, J., & Treré, E. (2019). Exploring data justice: Conceptions, applications and directions. *Information, Communication & Society*, *22*(7), 873-881. https://doi.org/10.1080/1369118X.2019.1606268

Dencik, L. & Sanchez-Monedero, J. (2022). Data justice. Internet Policy Review, 11(1). https://doi.org/10.14763/2022.1.1615

Eubanks, V. (2018). Automating inequality: *How high-tech tools profile, police, and punish the poor*. St. Martin's Press.

Evans, T., & Nation, D. (1993). *Reforming open and distance education: Critical reflections from practice*. Routledge.

Fischer, G., Rohde, M., & Wulf, V. (2009). Community-Based Learning: The Core Competency of Residential, Research-Based Universities. In J. M. Carroll (Ed.), *Learning in Communities: Interdisciplinary Perspectives on Human Centered Information Technology* (pp. 75–110). Springer. http://doi.org/10.1007/978-1-84800-332-3_12

Foucault, M. (1980). *Power/knowledge: Selected interviews and other writings 1972–1977*, edited by C. Gordon. Pantheon.

Fraser, N. (2008). Scales of justice: reimagining political space in a globalising world. Polity Press.

Freire, P. (1972a). *The pedagogy of the Oppressed.* Penguin

Freire, P. (1972b). *Cultural Action for Freedom.* Penguin

Gebru, T. (2019). Oxford handbook on AI ethics book chapter on race and gender. Retrieved from https://arxiv.org/pdf/1908.06165.pdf

Giroux, H. (2010). Rethinking Education as the Practice of Freedom: Paulo Freire and the Promise of Critical Pedagogy. *Policy Futures in Education*, 8(6), 715-721. http://doi.org/10.2304/pfie.2010.8.6.715

Gurstein, M. B. (2011). Open data: Empowering the empowered or effective data use for everyone? *First Monday* 16(2). https://firstmonday.org/ojs/index.php/fm/article/view/3316

Havemann, L (2016). Open Educational Resources. In: Peters, Michael A. ed. *Encyclopedia of Educational Philosophy and Theory: Living Edition*. Springer Singapore. https://doi.org/10.1007/978-981-287-532-7_218-1

Havemann, L. & Atenas, J. (2018). Enacting critical civic education through the Open Government Partnership commitments. *OER18: Open to All*. Retrieved from https://oer18.oerconf.org/sessions/enacting-critical-civic-education-through-the-open-government-partnership-commitments-1911/

Heeks, R. (2017). *A structural model and manifesto for data justice for international development*. Development Informatics Working paper, 69. Retrieved from

https://hummedia.manchester.ac.uk/institutes/gdi/publications/workingpapers/di/di_wp69.pdf

Hooks, B. (2014). *Teaching To transgress: education as the practice of freedom*. Routledge.

Jarke, J., & Breiter, A. (2019). The datafication of education. *Learning, Media and Technology*, *44*(1), 1-6. https://doi.org/10.1080/17439884.2019.1573833

Johnson, J. A. (2014). From open data to information justice. *Ethics and Information Technology*, 16(4), 263-274. https://doi.org/10.1007/s10676-014-9351-8

Kellner, D. (2011). Cultural studies, multiculturalism, and media culture. In: G. Dines & J. M. Humez (Eds.), *Gender, race, and class in media: A critical reader* (pp.7-18). Sage.

Kitchin, R. (2021). Data lives. How data are made and shape our world. Bristol University Press.

Kleinberg, J., Ludwig, J., Mullainathan, S., & Sunstein, C. R. (2018). Discrimination in the Age of Algorithms. *Journal of Legal Analysis*, 10, 113-174. https://doi.org/10.1093/jla/laz001

Kshetri, N. (2014). Big data′ s impact on privacy, security and consumer welfare. *Telecommunications Policy*, 38(11), 1134-1145. https://doi.org/10.1016/j.telpol.2014.10.002

Kuhn, C. (2019). Whose interest is educational technology serving? Who is included and who is excluded?. *RIED. Revista Iberoamericana de Educación a Distancia*, 22(1). https://doi.org/10.5944/ried.22.1.22293

Kuhn, C. (2021). Data Justice. In Kuhn, C.; Atenas, J. & Havemann, L. (Eds.), *Understanding Data: Praxis and politics.* https://doi.org/10.5281/zenodo.5137475

Lehtiniemi, T., & Ruckenstein, M. (2018). The social imaginaries of data activism. *Big Data & Society*, 6(1). https://doi.org/10.1177/2053951718821146.

Lupton, D., & Southerton, C. (2021/in press). Beyond Wicked Facebook: A Vital Materialism Perspective. In McKenzie, J. and Patulny, R. (editors), *Emotional Landscapes, Dystopia and Future Imaginaries.* Bristol University Press. Available at: https://www.researchgate.net/publication/345643662

Lupton, D., & Williamson, B. (2017) 'The datafied child: the dataveillance of children and implications for their rights', *New Media & Society*, 19(5), 780–794. https://doi.org/10.1177/1461444816686328

Manca, A., Atenas, J., Ciociola, C., & Nascimbeni, F. (2017). Critical pedagogy and open data for educating towards social cohesion. *Italian Journal of Educational Technology*, 25(1), 111-115. https://doi.org/10.17471/2499-4324/917

Mandinach, E. B. & Gummer, E. S. (2016) 'What does it mean for teachers to be data literate: laying out the skills, knowledge, and dispositions', *Teaching and Teacher Education*, vol. 60, pp. 366–376. https://doi.org/1016/j.tate.2016.07.011

Marco, C. A., & Larkin, G. L. (2000). Research ethics: ethical issues of data reporting and the quest for authenticity. *Academic Emergency Medicine*, 7(6), 691-694. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1553-2712.2000.tb02049.x

Markham, A. N. (2006). Method as ethic, ethic as method. *Journal of Information Ethics*, 15(2), 37-55. https://annettemarkham.com/writing/markhamijie2006reprint.pdf

Markham, A. N., Tiidenberg, K., & Herman, A. (2018). Ethics as Methods: Doing Ethics in the Era of Big Data Research—Introduction. *Social Media + Society*. https://doi.org/10.1177/2056305118784502

Milan, S., & van der Velden, L. (2016). The alternative epistemologies of data activism. *Digital Culture and Society. 2*(2) https://doi.org/10.14361/dcs-2016-0205

Milan, S. & van der Velden, L. (2018). Reversing Data Politics: An Introduction to the Special Issue. *Krisis: Journal for contemporary philosophy,* 2018(1). https://archive.krisis.eu/reversing-data-politics-an-introduction-to-the-special-issue/

Mohamed, S., Png, M. T., & Isaac, W. (2020). Decolonial AI: Decolonial theory as sociotechnical foresight in artificial intelligence. *Philosophy & Technology*, 33(4), 659-684. https://doi.org/10.1007/s13347-020-00405-8

Naef, E., Muelbert, P., Raza, S., Frederick, R., Kendall, J., & Gupta, N. (2014). *Using mobile data for development.* Cartesian and Bill & Melinda Gates Foundation. Retrieved from https://docs.gatesfoundation.org/Documents/Using%20Mobile%20Data%20for%20Development.pdf

Nielsen, R.P. (2016). Action Research As an Ethics Praxis Method. *Journal of Business Ethics*, 135, 419–428. https://doi.org/10.1007/s10551-014-2482-3

ODC (2015). International Open Data Charter. https://opendatacharter.net/principles/

Pangrazio, L., & Selwyn, N. (2019). 'Personal data literacies': A critical literacies approach to enhancing understandings of personal digital data. *New Media & Society*, 21(2), 419-437. https://doi.org/10.1177/1461444818799523

Podetti, M., Rodés, V., Kuhn, C., Atenas, J., & Veiga, C. (2021). *Promoviendo una perspectiva crítica sobre los datos entre docentes universitario*s. Presented at the LACLO LALA JINIS, Perú. https://doi.org/10.5281/zenodo.5893456

Raffaghelli, J. E., & Stewart, B. (2020). Centering complexity in 'educators' data literacy' to support future practices in faculty development: a systematic review of the literature. *Teaching in Higher Education*, 25(4), 435-455. https://doi.org/10.1080/13562517.2019.1696301

Raffaghelli, J. E., Manca, S., Stewart, B., Prinsloo, P., & Sangrà, A. (2020). Supporting the development of critical data literacies in higher education: building blocks for fair data cultures in society. *International Journal of Educational Technology in Higher Education*, 17(1), 1-22. https://doi.org/10.1186/s41239-020-00235-w

Reijers, W., Wright, D., Brey, P. et al. (2018). Methods for Practising Ethics in Research and Innovation: A Literature Review, Critical Analysis and Recommendations. *Science Engineering Ethics*, 24, 1437–1481 . https://doi.org/10.1007/s11948-017-9961-8

Reggi, L. & Dawes, S. (2016). Open government data ecosystems: linking transparency for innovation with transparency for participation and accountability. *Lecture Notes in Computer Science*, 9820, 74–86. doi: https://dx.doi.org/10.1007/978-3-319-44421-5_6

Roberts-Holmes, G. (2015). The "datafication" of early years pedagogy: "if the teaching is good, the data should be good and if there's bad teaching, there is bad data". *Journal of Education Policy*, *30*(3), 302–315. https://doi.org/10.1080/02680939.2014.924561

Sarin, R.K. (2021). Just society. *Theory and Decision* https://doi.org/10.1007/s11238-021-09806-3

Selwyn, N. (2015). Data entry: towards the critical study of digital data and education. *Learning, Media and Technology*, 40(1), 64–82. https://doi.org/10.1080/17439884.2014.921628

Simon, J. (2015). Distributed epistemic responsibility in a hyperconnected era. In Floridi, L. (Ed.), *The Onlife manifesto: Being human in a hyperconnected era* (pp. 145–159). Springer Open. https://doi.org/10.1007/978-3-319-04093-6_17

Soder, R., Goodlad, J. I. & McMannon, T. J. (2002). *Developing democratic character in the young*. San Francisco: Jossey-Bass.

Spence, C. (2019). 'Judgement' versus 'metrics' in higher education management. *Higher Education*, *77*(5), 761-775. https://doi.org/10.1007/s10734-018-0300-z

Spratt, S., & Baker, J. (2015). *Big data and international development: impacts, scenarios and policy options*. IDS Evidence Report; 163. IDS. Retrieved from https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/7198

Taylor, L. (2017). What is data justice? The case for connecting digital rights and freedoms globally. *Big Data & Society*, 4(2), https://doi.org/10.1177/2053951717736335.

Taylor, L., & Broeders, D. (2015). In the name of Development: Power, profit and the datafication of the global South. *Geoforum*, 64, 229-237. https://doi.org/10.1016/j.geoforum.2015.07.002

Timmermann, C. (2018). Contributive justice: An exploration of a wider provision of meaningful work. Social Justice Research, 31(1), 85-111. https://doi.org/10.1007/s11211-017-0293-2

UNESCO (2019) Open Educational Resources. Retrieved from https://en.unesco.org/themes/building-knowledge-societies/oer

UNESCO. (2015). Transversal competencies in education Policy and Practice. (S. Strandberg, Ed.). Paris: UNESCO. Retrieved from http://unesdoc.unesco.org/images/0023/002319/231907E.pdf

Yang, S. (2021). *Feminismo, ética y datos geoespaciales. Una breve reflexión hacia su análisis conjunto*. J. Atenas y S. Fumega, eds. Documento de trabajo, ILDA, Montevideo. https://doi.org/10.5281/zenodo.4681033

Van Es, K., & Schäfer, M. T. (2017). *The datafied society. Studying culture through data*. Amsterdam University Press. Retrieved from http://www.oapen.org/search?identifier=624771

Weller, M., de los Arcos, B., Farrow, R., Pitt, B., & McAndrew, P. (2015). The impact of OER on teaching and learning practice. *Open Praxis*, *7*(4), 351–361. http://doi.org/10.5944/openpraxis.7.4.227

Young, I.M. (2011) J*ustice and the politics of difference*. Princeton University Press.

Zembylas, M. (2013). Critical Pedagogy and Emotion: Working Through 'Troubled Knowledge' in Post- traumatic Contexts. *Critical Studies in Education*, 54(2), 176-189. https://doi.org/10.1080/17508487.2012.743468

Zuboff, S. (2015). Big Other: Surveillance Capitalism and the Prospects of an Information Civilization. *Journal of Information Technology*, 30, 75–89. https://doi.org/10.1057/jit.2015.5

Zuboff, S. (2019). *Surveillance Capitalism.* Profile Books.