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# Is Data Literacy a Catalyst of Social Justice? A Response from Nine Data Literacy Initiatives in Higher Education

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**Abstract:** Is education and more specifically, data literacy initiatives in Higher Education, an appropriate instrument to promote social justice in a context of datafication? Education is (and has been) at the center of the debate over the achievement of social justice as a desirable quality of the human society. However, which type of educational interventions should be promoted to deal with a complex, multi-layered, emergent problem, such is the case of datafication in society? Since the problem is heavily entrenched with a shifting socio-economic model (the so called "surveillance capitalism") and the technological infrastructures connected to it, educational approaches could be diversified and even contradictory in their purpose of heralding the skills to live in a datafied society. This paper explores nine initiatives in Higher Education aimed at developing the literacies to deal with data in society. Their efforts are concentrated in promoting freedom of choice, awareness, and agency. Though their original intention is not promoting social justice, the analysis is carried out on the theoretical basis provided by Martha Nussbaum on social justice. The initiatives span educational activities with open data as open educational resources, to more formal data literacy activities such as educational engagement with students' data and students' personal and educational data. There emerges a still fragmented panorama in responding to the need of promoting social justice in a context of datafication. Given this fragmentation, the article provides a conceptual scheme to address further pedagogical reflection and practice with the aim of supporting social justice against datafication.

**Keywords:** data literacy; datafication; educational projects; social justice

## 1. Introduction

In the technological infrastructures (or "techno-structure") of the contemporary society, the massive amounts of digital data tracked allow very few agents to control the Internet traffic and to extract high value from the behavioural, emotional, and cognitive patterns observed through data and by the development of specific algorithms [1,2]. As a result, data have become an exchange value, a situation that can be obscured according to the social condition [3]. Recently coined concepts such as "data slavery" (the personal freedom constrained by the algorithms built over our interaction with the techno-structure) and "dataveillance" (the continuing tracking of our wired lives with personal data) highlight the fact that we are paying a high price in the digital interaction [1,4–6]. This phenomenon, with its mostly negative connotations, has been called "datafication" and introduces a clear concern relating to social justice. The overall search of social justice in several contexts of economic change, innovation or crisis is not new. The concept was born as a revolutionary slogan embodying the ideals of progress and fraternity, the struggle against human-labour exploitation, and the more recent search for freedom and self-determination of cultures in several contexts, including participation and

engagement in the digital space. Datafication, as a particular and recent phenomenon in the digital techno-structure, is generating tensions that impact directly on social justice, as a driver of well-being, equality, and individuals and collectives' expression [7,8].

Against the dystopian perspective, there is a counter-culture of activism which aims at the achievement of social justice. Indeed, this movement has been associated with the Open Government Data and Open Science [9–11], as well as with independent collectives reacting to the oppression of surveillance, leading to forms of disconnection or "hacking" the system [12,13]. However, these activisms require advanced technical skills and civic engagement that go well beyond the actual opportunities in situations of marginalization and global inequities [3]. In this regard, there are emergent practices in the field of education. However, the most refined training offered by massive open online courses, continuing training and higher education, have mostly addressed the technical side of data engagement, encompassing business-oriented, positivistic approaches, as has been documented through the analysis of data literacy models [14,15].

In sum, several social actors have reacted to datafication, opening diversified spaces for achieving skills, knowledge, and understanding needed to dig into the data structures. But can these educational (both formal and informal) efforts address the need of social justice in a datafied society?

Since Paulo Freire opened the debate, education has long been connected to social justice throughout the endeavour of generating spaces for the development of essential skills required in civic engagement and activism [16–18]. However, educational systems have been deeply criticized for their inability of dealing with inequities, or in Bourdieu's terms, for "reproducing" power and inequities [19]. Moreover, in the most technocratic tradition of educational systems, the latter has also been criticized by its lack of effectiveness to cover the skills required in the labour market [20]. Educational researchers have dealt with such criticisms emphasizing the relevance of lifelong learning as a continuum between formal, non-formal, and informal experiences of learning as a personal educational pathway [21,22]. Therefore, whether education can be a response to promote social justice in the peculiar context of datafication is a matter of the pedagogical strategies designed and implemented.

This paper attempts to explore how educational interventions and more specifically, data literacy initiatives, could be an appropriate instrument to promote social justice in a context of datafication. The leading question is: Are data literacy interventions a specific educational approach, i.e., a catalyst of Social Justice in a context of datafication?

In order to answer this research question, the present study explores nine interventions generated in the context of Higher Education aiming at developing forms of data literacy as a specific set of skills which could promote active and agentic engagement with data infrastructures. While it can be assumed that in this way social justice in the datafied context could be achieved, the effectiveness and impact of such interventions should be explored.

The initiatives span educational activities with open data as open educational resources, to more formal data literacy activities such as educational engagement with students' data and students' personal and educational data. There emerges a still fragmented panorama in the responses to the need of promoting social justice in a context of datafication. Given this fragmentation, the ultimate goal will be to provide a conceptual scheme to address further pedagogical reflection and practice with the aim of supporting social justice against datafication.

## 2. Background

Social inequalities have been a matter of concern in the recent history of humankind. The debate has become more and more relevant with the development of democracy as an ideal form of control over institutional power and of civic engagement. In the last fifty years, equal possibilities of access to wealth and more recently, of opportunities for personal development, have become cornerstone [23]. However, the social privileges of certain social groups have been purported by political theorists, philosophers, and activists, generating movements such as feminism, post-colonialism, diverse abilities, etc. [7]. A paramount voice in this debate is that of Martha Nussbaum through her capabilities approach.

Nussbaum developed her approach while working for the United Nations on a new approach to measure human development instead of just the wealth of nations, considering the disparities within the same rich countries relating disadvantaged peoples' quality of life. Her philosophical work with women and disabled people inequalities brought new light to the problem of defining social justice on the basis of rationality and the social contract between equals. Upon these basses, she asked "How much can (a person) access the needed resources?" or "To what extent is she satisfied?" to a new question at the kernel of life quality: "What is a human being able of doing or being in a specific context of life?" Central to this question is agency or the real possibility of one person to shape her life, in spite of being passively driven by the world around her [24]. In Nussbaum words',

> "...the idea of social justice is inherently bound up with at least minimal sentience (the capacity to experience pain, especially) and with the accompanying capacity for striving and some type of agency..." [25] (p. 185).

Therefore, as crucial elements, she points out the fact of being alive and the fact of having one's own unique direction for life. Cultivating capabilities endows human beings to develop the possibilities to go in the desired direction and to realize their full potential within a specific context.

Relating the digital techno-structures of our contemporary society, the initial claims of injustice were connected to the issue of the digital divide [26]. Digital abundance, in terms of availability of open and digital resources, was early considered as a promise of access and growth for all, but later contested [27]. The cases of Open Educational Resources and Massive Open Online Courses (MOOCs) were particularly flagrant: launched with emphasis on the potential of such approaches offering opportunities for all, close empirical research demonstrated the pitfalls, such as white males, well-educated students as the most benefited users of such open resources [28]. Power issues and privileges seem to replicate at all levels, encompassing missed opportunities to reach social justice. The COVID19 crisis brought to the fore this situation: while middle class, knowledge workers and citizens protected themselves by adopting rapidly all digital facilities, the poorest remained even more excluded from basic services such as education due to the lack of technological infrastructures (devices and connection) or the lack of skills to deal with the several forms of connectivity imposed by the pandemic (such as home-schooling). They were also more exposed to a concrete risk of illness due to their role as "essential workers" (having to go to work physically) [29].

Actually, there is profuse literature attempting to redress the problem of the reproduction of social privileges in online education and the overall digital world, which has increased with the pandemic. In this regard, Nussbaum's capabilities approach was considered a conceptual lens. As a matter of fact, Alan Tait [17] proposed to review the fervent discourses of the mission to cater education for all in large distance teaching and open universities. He also considered the misalignments of digital education and the theories of development and social justice. In this work, Tait introduced the missions of 12 open, fully online universities. While analysing such missions, Tait observed how deeply embedded in them was the discourse of social change politics. This element also connected personal fulfilment and agency to the possibility of triggering social and technical innovation in the contexts of work and life. Tait hence addressed the discussion to a concrete set of instruments and institutional policies on access and recruitment, programs of study, as well as learning, teaching, and student support. Finally, the author considered these elements as drivers of the capabilities approach catered through the university's mission, as part of its engagement with social justice perspectives. The message was clear: social justice in Nussbaum's terms does not happen because of the technological features in education but because of a concrete and much focused institutional effort.

The rationale above can also be applied to the social and technological problem of datafication. The wealth of data available in the society has generated very quick polarizations and dystopias connected to data use, privacy, bias, and other actions that deepen what has been called the data divide [30]. Several authors have argued that the differences between an elite able of mining, aggregating, sharing, and converting data into visualizations or recommendation systems would be in

a power relationship relating those whose data is extracted without any control. This type of power would end in the manipulation of disadvantaged groups, in circles of data extraction, and application of the technologies of data to reproduce inequalities [3,5,31,32]. A number of authors have promoted ways to deal with the problem above, advocating for data justice [33], data activism [12], resistence and agency [34]. As in the case of the digital divide, a means to promote social justice in the age of data, amongst new regulatory frameworks and private companies' control, could be education.

*Is Data Literacy a Catalyst of Social Justice?*

The literature on data literacy increased in the last ten years, at all educational levels and across disciplines, connected mostly to science education and technology, but also to media and civic education [35]. Overall, data literacy has been addressed as technical competence lying behind academic skills to deal with information, closely connected to statistics. However, digital technologies have encompassed faster and more complex statistical analysis leading to skills coming from the field of informatics [36]. Maybee & Zilinski [37], on the basis of a literature review, describe a seven axis framework for data literacy, including eight dimensions. Seven of them refer to data handling, elaboration, and presentation, and one refers to data ethics in terms of understanding the social contexts of data extraction. For Gummer & Mandinach [38], the ability to understand and use data effectively for decision-making is also crucial for data-literate citizens and workers. In the Digital Competence Framework released by the European Commission [39], the concept of data literacy was introduced in 2017 alongside with the information literacy dimension as an ability to search, read, and interpret data in several daily and academic contexts of communication.

In Higher Education Institutions, some authors have pointed out the need of innovating at both the curricular and learning design levels, adopting a research-based learning approach to promote the sub-settings of skills needed for being data literate [40]. Moreover, considering the use of students' data along with their academic activities and their transformation in "learning analytics" connected to the analysis of learning and teaching processes, data literacy could be linked to pedagogical literacy [41].

Overall, the most relevant issue portrayed in the literature mentioned above is the ability to adopt data, with little questioning over the methods for data collection and analysis and eventual power issues behind the algorithms applied to enact data in digital environments. More recently, several researchers have posed questions connected to social and "data justice" such as: Who mines and writes the code to analyze data? Whose interests are covered when dealing with data? [14,35]

This nascent strand of research is pointing out the importance of critical, socio-technical, feminist, post-colonial, and fair approaches to data [29,32,33,42]. While not explicitly, each of these works introduces the persisting idea of addressing social justice along the technological use and more specifically, the use of personal and institutional data.

For Pangrazio & Selwyn, for example [14], students and educators in personal, professional, and social activities engage, use, and produce data and information; therefore, their media and data literacies go beyond the technical to embrace the ethical and political levels. Also, these same authors [42] point out in another work that there are three broad areas of critical understanding of datafication in youngster lives: the production of digital data, how they are processed, and how they are reused with social, economic, and cultural consequences. In the same vein, according to Ball [43], students' data collection could be extracting resources from education to provide data for a metrics market, in which the constant collection of metrics feeds the university league rankings. These rankings have been criticized for turning universities into commercial entities that are in constant competition to position their brands in the top, fostering competitiveness not only amongst universities but also within departments [44]. Thus, quality models and HE rankings could be aggressively pushing teachers and students to feed the model with their own data, generating data structures of surveillance in universities [45].

Very recently, there have been concrete efforts to link the debate on data literacy and the achievement of social justice, as is reported in the recent recollection of cases by Matuk et al. [46]. The authors

introduce 12 educational interventions spanning classroom to museum contexts, and environmental to social sciences domains. Therefore, they attempt to illustrate research and practice approaches for engaging learners with data as a means to purport an emancipation.

All in all, these works pinpoint the elements that should be considered to support the development of critical data literacy, particularly for undergraduates as future knowledge workers and intellectuals.

According to Barghava et al. [47], educators need to discuss "data literacy as an emerging concept within a much longer historical narrative of literacy promotion", pointing out that "History sheds light on how defining and promoting literacy—who was literate and who was not—has often been entrenched with the constructs and perpetuation of power structures within societies—at odds with the notion of literacy as a necessarily empowering and enlightenment force" [47], p.iv. In line with these claims, instead of being an instrument of emancipation, education could be a superimposed structure generating the reification of power through the promotion of literacies connected to the market interests, such as the technical skills to become a worker in the new pacing machine of data science.

In effect, while data handling, elaborating, and sharing could be crucial operations embedded in data activism or for more agentic practices around the wealth of open data and big data, the problem of datafication would require critical literacies to deal with the "dark side" of data [48]. The critical perspective on data literacy encompasses skills that place data science in a specific context of development, emphasizing Freire's idea of literacies for liberation. But above all, this perspective views data as a technology of power, which the several collectives must appropriate and enhance according their own needs [49,50].

If education is to play a key role in this sense, which models of educational intervention are needed to promote such skills? And, not less important, how should faculty be prepared for this challenge?

In fact, educators and faculty development preparing for the implementation of data literacy programmes could be a decisive factor at the time of achievement, considering education as a driver of social justice. Despite the arguments displayed around critical data literacy, academic development in such perspectives seems far from implementation [35]. There is an increasing number of studies on teachers' data literacy relating teachers' skills to deal with school data, particularly to analyse school performance and supporting school management [51–53]. In a highly quantitative perspective of the way education should report outcomes, teachers' "Data-driven" decision taking is intended as the ability to collect or extract educational data to support institutional decisions relating the collective of students. In Higher Education, this perspective leads to educational data-driven practices or "learning analytics". This topic has followed a similar pattern of concern, with the attention put on academics' ability to handle students' digital data. Nevertheless, while the issue of data literacy to deal with learning analytics has been raised by some authors, [41,54] a comprehensive training over learning analytics and their implications for teachers and learners' data ethics seem to be far from the mainstream [55–57].

The state of art is hence highlighting an emergent situation that requires more accurate reflections, instruments, and practices. Considering the advancement of research on overall data literacy in the prior paragraphs, I assume that educational practices could be fragmented, spotting specific needs, but missing the big picture. The lack of a comprehensive view on the literacies needed to deal with datafication in societies and in education could be an impediment to implement institutional strategies and faculty development purporting social justice through appropriate data literacy approaches and interventions. Therefore, I will analyse a number of projects promoting implicit or explicit aims to support social justice in contexts of social or institutional datafication. The areas of coverage as well as the issues in covering such aims will be also highlighted, in an attempt to build a broader picture of the educational strategies needed to cultivate data literacy as a catalyst of social justice.

## 3. Methods

The research question leading this study was: Are data literacy programmes, as a specific educational approach, a catalyst of social justice in the context of datafication?

The background partially responded to this question, identifying different perspectives of data literacy, and raising concerns about the power of such partial perspectives to achieve social justice. Due to the emergent nature of the problem, an appropriate method to answer such research question should encompass the exploration of the existing literature and/or ideographic, qualitative methods to dig into the several discourses and practices [58]. The effort should be put in crystallizing constructs and consolidating research and pedagogical approaches. In this regard, the literature could not be mature enough to bring specific cases or report ongoing interventions. In fact, academic papers do not necessarily introduce live social interventions and practices, which are the engine of social transformation. These practices, in time, might be disconnected from theory. In this regard the rapid search of evidence from ongoing interventions reported in existing grey literature is also considered an appropriate method [59]. The so-called "Rapid Evidence Assessment", adopted in the clinical area but also extended to social sciences, allows researchers to carry out rapid reviews of existing documentation beyond academic papers.

The method requires the development of an explicit research question based on constructs that are explored. In our research question, in fact, the relationship between data literacy (as a specific educational approach) and the promotion/achievement of Social Justice in the context of datafication is explored. Moreover, the REA method as in the case of the literature review, implies the adoption of a thorough and reproducible search strategy. Across such a strategy, explicit selection criteria of the evidence are followed and transparent decisions about the level of information to be obtained from each study/documental evidence collected.

With the goal of understanding data literacy practices that address social justice in a context of datafication, in this section I will introduce nine projects generating interventions that promote formal or informal learning approaches supporting data skills, awareness, and understanding as evidence. The nine interventions are documented through public website information, videos, presentations, and open educational resources disposed as part of the projects' communication strategy. In the following, I introduce the procedure of projects' selection according to the REA components.

### *3.1. Intervention Sampling*

The evidence' units are represented by specific projects as educational interventions, not the institutions or groups promoting them. As for the selection, two phases were followed.

Phase 1. Screening of educational initiatives from the literature on the basis of an open, existing data resource. The mentioned open dataset [60] was used by the authors to conduct a systematic review of the literature, including 137 articles. This open dataset already contained a number of categories (reported in the first column of Table 1), which were used to screen the articles used in our study. In fact, from the several articles, those classified under the label Critical approach to data were considered the most appropriate due to the liaisons of critical studies and critical pedagogy with respect to social justice studies.

As shown in Table 1, very few papers (7 out of 137) followed a critical approach. Only these, seven in total, were selected for phase (b).

Phase 2. Snowball sampling approach starting from the articles screened in the first phase. The seven papers were read, and the snowball procedure, consisting of the search of specific documents or websites mentioned in one of the seven selected papers, was activated. Table 2 introduces the articles screened and the connected initiatives discovered through citations and references as well as authors' profiles within the institutional pages obtained during the snowball procedure. Specifically, Table 2 also displays the focus of the screened paper, the research method, and the initiatives reporting educational interventions on data literacy discovered. A geographical reference is also included.

At the conclusion of this second phase, it was observed that the initial mosaic of initiatives covered datafication and data practices in several forms (private, personal data, and open data), with a strong reference of most experiences to the theoretical perspectives of Media Education. Overall, there was lack of coverage of some of the problems detected in the background reported here, in reference to

the use of students' data and learning analytics. In the literature, however, this topic had also been regarded as part of the landscape of data literacy. Therefore, building on the background analysed, the topic of learning analytics was included as part of the theoretical sampling, to reach the saturation of categories [61].

In concrete terms, this meant a search of projects connected to students' data and learning analytics. Table 3 shows the final selection of initiatives, reporting initial categories of analysis related to the following:

1. Project's name.
2. URL where the project and relating materials were consulted
3. Timeline, referring to the starting date and duration of the project.
4. Place, referring to the geographic localization of the project's activities.
5. Educational Approach, indicating the level and type of educational intervention.

**Table 1.** Classification of the literature on data literacy and extraction of papers discussing critical pedagogical approaches.

| Categories | Educational Level | | | | | |
|---|---|---|---|---|---|---|
| **Definition of Data Literacy** | **Adult Learning** | **Higher Education** | **K12** | **Professional Learning** | **Teacher Education** | **Total General** |
| Critical Approach to Data | 3 | 2 | 2 | | | 7 |
| Data Hacking (technical) | 8 | 2 | | | 1 | 11 |
| Data in Education | | 4 | | | 1 | 5 |
| Data Safety/Data Management | 3 | 2 | 3 | 1 | 26 | 35 |
| Data Science | 1 | 37 | 18 | 18 | 4 | 78 |
| Unclear theoretical positioning | | 1 | | | | 1 |
| Total general | 15 | 48 | 23 | 19 | 32 | 137 |

### 3.2. Instruments of Analysis

As a further and final step to consolidate the REA process, a reference framework to analyse the nine initiatives was built. The framework was based on the key elements of an educational intervention: pedagogical approach (to data literacy as a specific case of educational intervention), instruments adopted to instantiate the pedagogical approach, and the eventual presence of faculty development as a relevant preparatory setting. Moreover, the perspective on social justice promoted by the educational approach was extracted from the analysis. The analytical lens applied to the interventions were hence:

1. Overall educational approach to data literacy: Presence and form of an expanded, critical, socio-technical vision of datafication
    a. Instruments: Presence and types of instruments offered for educational intervention.
    b. Faculty development methods: the initiative offers instruments/methods for faculty development to implement data literacy in HE.
2. Perspective on social-justice: the initiative encompasses a perspective on social justice in terms of access to data and forms of symbolic representation within data techno-structures (economical, cultural, gender, diversity, etc.)

Once each of the initiatives was analysed and classified according to this scheme, the thematic convergences were explored, leading to the construction of "Dimensions". The latter refers to conceptual categories that emerged along the inductive process of classification and transverse elements, particularly regarding the educational approach to data literacy.

**Table 2.** Papers discussing critical pedagogical approaches to data literacy leading to the discovery educational intervention/initiatives.

| Authors | Title | Year | Focus of the Research Study, Method, Connection with Interventions for Data Literacy |
|---|---|---|---|
| Atenas, J., Havemann, L., Priego, E. | Open Data as Open Educational Resources: Towards Transversal Skills and Global Citizenship | 2015 | Focus: Learning Processes, Faculty Development<br>Method: Conceptual Paper, no case study.<br>Intervention detected: "Teaching Models and Open Data"—Initiative Open Data Latin America—https://idatosabiertos.org/en/investigaciones-2/modelo-docente-y-datos-abiertos/<br>Where: Argentina, Uruguay (Latin America) |
| Chi, Y., Jeng, W., Acker, A., Bowler, L. | Affective, behavioral, and cognitive aspects of teen perspectives on personal data in social media: A model of youth data literacy | 2018 | Focus: Media Education<br>Method: Experimental activity<br>Intervention detected: Exploring Data Worlds at the Public Library: A Youth Data Literacy Project—https://leannebowler.info/research.html |
| Gray, J., Gerlitz, C., Bounegru, L. | Data infrastructure literacy | 2018 | Focus: Learning processes.<br>Method: Conceptual paper that makes the case of expanding the sense of data literacy.<br>Intervention detected: Data Therapy, MIT Media Lab—https://www.media.mit.edu/projects/data-therapy/overview/<br>Where: US |
| Laprise, J. | A state of constant war: Policy implications of data literacy | 2006 | Focus: Civic Education<br>Method: Conceptual paper.<br>Intervention case detected: None. |
| Pangrazio, L. & Selwyn, N. | 'Personal data literacies': A critical literacies approach to enhancing understandings of personal digital data | 2018 | Focus: Learning<br>Method: Conceptual paper not based on cases<br>It claims an extended focus on data literacy.<br>Interventions detected: Digital Data & Society Consortium—"Data Society" https://digitaldatasociety.wordpress.com/; https://www.de.ed.ac.uk/data-society<br>Where: Australia/UK |
| Barghava, R. | Beyond Data Literacy | 2017 | Focus: Learning, Media Education, Civic Education<br>Method: Case study<br>Interventions detected: Data Pop Alliance Training. https://datapopalliance.org/dataliteracy/<br>Where: Global |
| Ytre-Arne, B., Das, R. | An Agenda in the Interest of Audiences: Facing the Challenges of Intrusive Media Technologies | 2019 | Focus: Media Education<br>Method: Conceptual<br>Intervention detected: guides to the work "Datafication, Dataism, and Dataveillance: Big Data between Scientific Paradigm and Ideology." [58]; the Special Issue "Data & Agency" [34]; "Algorithmic affordances for productive resistance" [56] and the project "Big Data from the South" https://stefaniamilan.net/content/big-data-south<br>Where: Global |

**Table 3.** Final selection of initiatives (I).

| Initiative's Name | URL | Timeline | Place | Educational Approach |
|---|---|---|---|---|
| I1- Teaching Models and Open Data | https://idatosabiertos.org/en/investigaciones-2/modelo-docente-y-datos-abiertos/ | 2016 Unclear continuity | Global | Media Education, Informal and Non formal learning |
| I2- Data Therapy | https://datatherapy.org/ | 2011–Onwards | US | Media Education, Informal and Non formal learning |
| I3- Digital Data & Society Consortium | https://digitaldatasociety.wordpress.com/ | 2016–2017 Unclear continuity | Australia | Media Education, informal and Non formal learning |
| I4- Data Pop Alliance Training. | https://datapopalliance.org/dataliteracy/ | 2012–2013 Onwards | Global | Media Education & Faculty Development |
| I5- Big Data from the South | https://data-activism.net/big-data-from-the-south/ | 2017– Onwards | Western North/South | Political Activism, Informal Learning |
| I6- Exploring Data Worlds at the Public Library: A Youth Data Literacy Project | https://www.youthdataliteracy.info/ | 2016– Onwards | US | Youth Informal Learning |
| I7- Data Society | https://www.de.ed.ac.uk/data-society | 2018– Onwards | UK | Faculty Development |
| I8- SHEILA project | https://sheilaproject.eu/ | 2016–2018 | Europe | Learning Analytics—Faculty Development |
| I9- Stanford Students Data Carol Project | http://gsd.su.domains/ | 2016, unclear continuity | US | Institutional Policy, Faculty Development |

## 4. Results

Four dimensions emerged from the analysis of the nine initiatives: Dimension 1 including initiative 1; Dimension 2 including initiatives 2, 3, 6, and 7; Dimension 3 including initiative 5; and Dimension 4 including initiatives 8 and 9. These will be introduced along with the description and discussion of each of the initiatives in the remainder of this section.

The First Dimension relates to the usage of Open Data as a public good and encompasses educational interventions which support the skills to produce and re-use public (open) data across activities of civic engagement and participation. This dimension is composed by the sole initiative 1 (cfr. Table 3), which emerged in a context of several parallel initiatives on Open Data as a resource for governmental transparency, for skills achievement, and for new opportunities of civic participation. The initiative is based on an ad-hoc research group created by ILDA (Iniciativa Datos Abiertos América Latina, Latin American Open Data Initiative), which was fostered by networks with other Latin American institutions and the vision of some of the participants (same authors in the research and training activities) connected to the Open Knowledge Foundation (https://okfn.org/). Indeed, this last institution launched the "School of Data" as a space to "empower civil society organizations, journalists, and citizens with the skills they need to use data effectively in their efforts to create more equitable and effective societies" (https://schoolofdata.org/). The project "Teaching Models and Open Data" aims at providing support to university teachers in planning interventions based on Open Data. Not surprisingly, the model is promoted by networks of organizations in connection with the government (public–private collaboration) in order to make use of the Open Data progressively released by public organizations. Early in the Open Data movement, it was observed the lack of adoption per se of Open Data, and the need to promote professional and organizational development. However, the idea of introducing Open Data as Open Educational Resources both at School and University levels required specific initiatives led by experts in the field of education. This is the case of this project. The authors come from rich experiences in promoting information over the usage of Open Data in Higher Education and effective projects at the school level (i.e., the project "A School of Open Cohesion" (https://ec.europa.eu/regional_policy/en/policy/communication/inform-network/asoc). The project has run a small number of workshops from 2016 onwards as a faculty development approach. As for the instruments, in this initiative it has been used a typical scheme of learning design, where the main resources are Open Data; it has provided technical skills to reshape, package, and offer Open Data through pedagogical activities to enact students' data literacy. The participants are further invited to present the learning units developed. The material showcased allows us to observe the relevance of this approach to promote the usage of local Open Data. While the initiative opens a clear perspective on faculty development through a formal strategy, the curve of skills development to make the approach institutionalized could be slow. Indeed, while the project is open, no open online courses of this kind were found in connection with the workshops. As for the educational vision, it could be deemed functional and pragmatic: to promote Open Data use; but the approach does not evidently discuss Open Data as technology: the available technologies and the positive development of skills should encompass effective usage. In this regard, the perspective of social justice is embraced by promoting local civic engagement and technical data literacy as capabilities which endow the participants to reach agency in their socio-cultural and political contexts. However, the perspective might not be always evident, for the emphasis is strongly connected to the technical abilities to deal with Open Data. This initiative embeds faculty and students 2019 engagement with local data, ensuring formal strategies to be incorporated in educational institutions.

The Second Dimension related to the presence of Data in the overall society, not only from public digital spaces, but mainly across private platforms. Initiatives 2, 3, 4, 6, and 7 comprised this dimension, showing a mix of consortiums (academia + civil society and think-tank organizations) or academic research bodies. These actors collaborate to respond to logics of civic and experts' engagement with datafication as an overall social problem. There is an evident effort to generate spaces of reflection about the emerging nature of the phenomenon of datafication, particularly considering

data extraction from apps and digital spaces people normally use for personal and professional purposes. In all the projects analyzed, the ongoing research is connected with dissemination activities such as workshops and academic talks (i.e., Initiative 2, https://datatherapy.org/speaking/; Initiative 3, https://digitaldatasociety.wordpress.com/partners/about/events/; Initiative 4 https://datapopalliance.org/dataliteracy/workshops/). The workshops are the face-to-face side of numerous sets of online resources, from courses to videos (e.g., Initiative 4, the Open Learning Hub https://datapopalliance.org/dataliteracy/open-learning-hub/), curated links to resources for educators (Initiative 6, https://www.youthdataliteracy.info/resources/), and specific academic events (Initiative 3, https://digitaldatasociety.wordpress.com/2017/05/15/the-social-life-of-data-symposium/). The resources and training activities depend on the coverage of the interventions. Some activities relate to complex initiatives which treat several topics through all forms of academic engagement (workshops, online resources) while other are smaller and promote specific events (particularly Initiative 6). Furthermore, there is a group of initiatives relating broader institutional projects (Initiative 2, 3, 4, 7). Interestingly, the research projects attempt to produce educational resources and interventions to promote informal and non-formal learning. Initiative 2 (Data Therapy) entails adults' education through critical pedagogical approaches which are open to students' engagement as observers and trainers, while working on their own educational projects in HE. Initiative 6 (Exploring Data Worlds . . . ) generates non-formal spaces for learning, reshaping the role of Public Libraries in the approach to data for young learners. The most complex initiatives 4 (Data Pop Alliance) and 7 (Data Society) cover several research topics by offering a wide arrange of offline and online resources and alliances contributing to several geographical contexts. While initiative 4 is more focused on the issues of "dataveillance", data justice, data appropriation, and the debate around the usage of Big Data, initiative 7 appears to have the widest and most complex coverage of topics (including also projects on children and students' data and learning analytics).

Overall, initiatives 2, 3, 4, and 7 explore the frontiers of the so-called "data justice" as a form of social justice in the context of datafication. The capabilities promote related awareness of data manipulation and commodification; knowledge about the nature of algorithms commonly used across social networks and apps as common spaces of daily "life"; and some abilities to detach from too passive personal positions. The interventions work on several levels generating mostly informal and non-formal spaces of learning connected to experimental interventions and academic dissemination. The instruments adopted are resources for self-learning and the approach of educational intervention triggering the above-mentioned knowledge and awareness to promote taking action against datafication.

The Third Dimension introduced a focus on data which is not typically educational but supports informal learning to trigger political awareness and activism. From the nine initiatives collected, only intervention 5 yielded this new dimension due to its distinctive atypical informal education approach. The project aims at promoting specifically "data justice". Digging into the narratives of data use, it attempts to reveal a post-colonial vision of data, critiquing the "coloniality of data relations". The approach is that of social and political sciences research dissemination to raise awareness towards a more conscious political action and civic engagement. There are no evident educational resources or pedagogical perspectives adopted to promote this vision, despite a convergent critical vision in the social problem of data use in specific social contexts. A number of blogposts report several project activities informing "BigDataSur" perspectives, such as discussions over COVID data and the related exacerbation of inequalities; the need to use COVID data at a global level in a responsible way; the resilient use of the media in times of crisis, etc. Also, this project has promoted academic activities engaging researchers and university teachers, promoting the South as a "plural, multi-layered place of (and a proxy for) resistance, subversion, and creativity". The workshops covered the development of awareness and the debate of key concepts for media education and activism against datafication. Therefore, different from the eight other projects, the political and social analysis embraces post-colonial theories with accuracy, opening a vision of social justice which takes to the forefront the cultural and geopolitical issues embedded in data usage. The informal educational approach (providing information

and promoting activism) supports the development of capabilities to engage in social transformation particularly regarding cultural factors as a means of social justice.

The Fourth Dimension related educational data extraction and use for pedagogical, educational, and academic purposes. It was comprised of initiatives 8 and 9, which brought interventions connected with institutional strategies and faculty development as well as student engagement in data usage at the level of educational institutions (particularly Higher Education). In this regard, the SHEILA project (8) was separated from intervention 7, for it was a specific line of data literacy connected with educational data mining in teaching and learning processes. The SHEILA project was a European initiative which aimed at defining a learning analytics policy framework based on participatory actions, engaging all stakeholders in discussing the metrics, the data used, and the services and actions connected to analytics. The project's idea was generated by an active group connected to the Society for Learning Analytics' Research (https://www.solaresearch.org/) for the implementation of learning analytics in higher education; many of the engaged institutions, with relevant visibility at the EU level, had already been collaborating with the DELICATE project to define a policy connected to LA (http://www.laceproject.eu/ethics-privacy/). As it reads on the project's website, the approach is "in line with the criticism of classical, top-down and expert-driven approaches to policy development, as they do not reflect sufficiently the complexity of modern pluralistic societies and as such decrease the chances of success of new policies". The project adopted a "Rapid Outcome Mapping Approach" and through it gathered information relating learning analytics policies in place in the engaged institutions, showcasing innovations. The map included initial actions in the political context and identification of stakeholders, which would have shaped the technicalities of the analytics. As a final result, the project produced an MOOC (https://www.edx.org/course/moving-towards-systematic-adoption-of-learning-analytics-in-higher-education) for faculty and overall staff development, which was successfully delivered with global participation. The project has had continuity in Latin America (the LALA project, https://www.lalaproject.org/).

As for initiative 9, placed in the prestigious context of Stanford University, the project aims to cover, at an institutional level, a space for reflection on the responsible use of students' data, avoiding their characterization as a commodity. As the website points out, "Responsible use of data in educational environments entails commitments to honour the integrity, discretion, and humanity of students. It also obliges instructors and organizations to improve practice in light of accumulating information and knowledge". Similar to all other initiatives hereby introduced, it is based on research activities connected to students' data ("to build basic knowledge"), application ("for educational improvement"), and representation ("of learning and accomplishment"). Across the three activities, the focus on intervention relates to Stanford students, and the social justice perspective is the ethical approach to deal with enrolled students' data. The diversity of students is acknowledged, but the tension is towards finding a balance between institutional change and tradition: "This working group agreed that higher education in America stands out for the diversity of the students it serves, as well as for the diversity of the organizations that serve them. The current transcript is successful in part because it has been able to balance the need for standardization with the need for local variation required to knit the American higher education patchwork together into a unified and reasonably coherent national bureaucratic entity". Therefore, in this case, data usage relates the concern of bridging academia with the labour market and further economic development. Overall, the resources are based on a single activity in 2016, where the attempt was to launch a debate on the pathways to adopt data for institutional innovation and development.

Even if the two initiatives within dimension 4 belong to the sphere of students' data use to support pedagogical practices and educational/academic models, the perspectives on social justice differ, as well as the advancement of instruments for faculty development. The two initiatives report the ethical concerns of using students' data without consent and transparency as relevant issues. However, the first initiative emphasizes more clearly the social process of construction behind data structures, with its entrenched contextual cultural factors in defining the use of data, more than the expected

institutional or labour market outcomes. In this regard, initiative 8 embraces a perspective of social justice in setting the spaces for institutional strategies which allow the stakeholders to become aware of (and even participate in) the data-driven practices connected to academic and learning analytics. This opens a space of freedom which encompasses fairer data practices. As for the instruments for faculty development and eventual educational interventions, both projects offer them, but the first project has generated formal training (MOOC) for faculty and staff development which entails a more structured scheme of action in developing capabilities supporting agency practices which in time can generate a space for social justice.

Table 4 introduces a synthesis of the findings across the four dimensions identified.

**Table 4.** Synthesis of findings.

| DIMENSION | Vision | Instruments | Faculty Dev Methods | Perspectives on Social Justice |
|---|---|---|---|---|
| DIMENSION 1: I1(Teaching Models and Open Data) | Open Data as Open Educational Resources | Resources for Learning Design and Open Data Exploration, bridging formal and informal spaces for learning | Formal workshops | Access and appropriation of data as public resource. |
| DIMENSION 2: I2 (Data Therapy) I3 (Digital Data & Society Consortium); I4 (Data Pop Alliance); I6 (Exploring Data Worlds at the Public Library: A Youth Data Literacy Project) I7 (Data Society); | Data in the Society, across private and public platforms. | Research-based information and curated resources to intervene in raising awareness. Bridging formal, non-formal and informal spaces for learning | Face to face workshops, Online learning activities, videos, webinars for self-paced learning. | Expanding knowledge and awareness to face the problem of dataveillance and bad practices in data use. |
| DIMENSION 3: I5, (Big Data from the South) | Data from a post-colonial perspective in the relationship North-South | Research-based information to raise political and socio-cultural awareness | Weblog Information | Promoting knowledge for political and socio-cultural activism towards data justice in the global society. |
| DIMENSION 4: I8 (Stanford Students Data Carol Project) I9 (SHEILA project) | Ethical Use of Educational Data, supporting pedagogical and academic institutional development | Research-based information to promote policy making in connection with educational data management and learning analytics | Website and Working Documents (Carol Project) Massive Open Online Course (SHEILA) | Promoting ethical and participatory approaches for educational data use. |

## 5. Discussion

So far, the nine initiatives introduced institutional projects, developing data literacy in terms of awareness, knowledge, and specific skills to live in a datafied society. Therefore, the projects are generated in HE and are oriented to develop internal strategies as interventions both into and with the society to combat the negative side of data usage across a number of social and institutional contexts. Four Dimensions captured the nuances across the nine initiatives. These shared the common intention of identifying the inequities and ethical issues behind data generation, tracking, and usage in current human activities. The literature consulted pinpointed that this emergent problem should be addressed by producing acknowledgement, engagement, and activism within several forms of informal, non-formal, and formal learning [35,47–49]. In diversified ways, the First and the Fourth Dimension purported a vision of data for good, which is common in the literature regarding Open Data (derived from Open Access and Open Government movements) [10,11]. Two other Dimensions (Second and Third) embraced relatively critical perspectives with respect to the existing forms of data usage, which can be connected with emerging literature on the ethical and power issues relating to the form in which data are collected and manipulated in the techno-structure [29–32]. The fourth dimension, which could be linked to the research strand just mentioned, was placed in a separate area due to its specific nature relating data usage in education [56,57]. In this sense, some authors advocate for smart data usage in higher education, taking the form of learning analytics and its impact on students' self-regulation, drop-out prevention, personalization of learning, and informing learning design [41,54]. However, the results in this dimension shed light on the downsides of students' data usage. In fact, naïve or even unethical data use might affect privacy/safety/well-being, producing injustices [45,57]. All in all, the four dimensions displayed complex learning ecosystems nurtured by projects where the technologies of big and open data are blended with civic engagement, or institutional participatory approaches, with the less frequent presence of formal training (clearly present in dimensions 1 and

4). As a result, formal education could still be deemed an instrument to promote capabilities, but it requires the accompaniment of non-formal and informal perspectives where participation and activism are enacted. Such a complex, ecosystemic capabilities approach is needed to promote social justice as was purported by Martha Nussbaum [25]. In the specific case of data literacy, the emerging literature aligns with the exploratory directions taken by the nine initiatives here considered in requesting broader, critical approaches to the understanding of data-driven practices as a form of empowerment later connected with data justice (namely, uncovering how algorithms work [32,48], understanding data visualization as a semiotic and even political process [47], and avoiding the commodification of personal data [42]). In fact, dimension 2 was the biggest based on the number of initiatives, the international/global coverage, and the size of the projects included. In this dimension, the negative effects of data in the society require civic participation, and data literacy embraces all forms of social interventions promoting mostly informal spaces for learning. In time, these could be the base of authentic learning experiences for undergraduates' engaged in several forms within them.

Across the four dimensions, social justice can be placed at the crossover of ethical concern over data use, participation, and engagement to design data systems and their algorithms, as well as unveiling cultural implications of data usage. Not all the initiatives cover social justice up to this point. The ethical concern to use private data does not automatically encompass agentic practices by those engaged in the social structures [42], in the same vein, the appropriation of Open Data does not always entail critical perspectives on the shape, the provenience, and the impact of the data used, as one reads in the enthusiastic initial claims of the Open Government Data movement [11]. Moreover, in the background I screened a number of articles which focus on data literacy more strongly connected to the achievement of technical skills to dive into big and open data structures [36,37,39] as well as for institutional management and decision making [38].

Nussbaum's question addressing social justice, "What is a human being able of doing or being in a specific context of life?" applied to the unfair conditions generated by datafication seems to require capabilities to thrive and participate in contemporary society. As shown across all nine initiatives, the political and ethical concerns trigger stakeholders engagement in the processes of data structure design (digital infrastructures for data collection and use). In this regard, the full appropriation of owned data and the benefits of data as public good rely on the pragmatic care of social justice (adoption of ethical guidelines). However, it is also relevant to promote the participation supporting cultural/political representation to ensure symbolic representation and identity on the basis of discourses and practices.

Nonetheless, while it is clear that all nine initiatives advocate for forms of visibility of the data structures, the interventions analysed raise two type of concerns with respect to the faculty development. As said, university teacher and researcher preparation is a key intervention to promote accurate and effective data literacy initiatives framed into a vision of social justice.

The first concern is that the fragmented nature of the analysed phenomenon (datafication) encompasses several focuses of reflection and activity connecting data literacy with social justice, which lead to sparse interventions. No hierarchical or logical connections supporting fair data cultures are fully put into place, a fact that would entail eventual contradictory discourses and practices. Namely, the I8 related to students' data collection to improve existing institutional models (as fair practice within the institution) could collide with the claims of I5 in uncovering post-colonial tensions across data tracking and usage (as a vision of social justice considering the Global South). As a matter of fact, the data from élite students could end up in better services of placement and or career development, as the opposite could be the case for the poorest or diverse students. Moreover, the lack of a revised and agreed theoretical framework connecting data literacy with social justice could hinder institutional development strategies.

The second concern, in tight connection with the first, relates to the fact that all nine initiatives arise from emergent research and deploy resources for self-determined learning. The only exception is I9 where an MOOC introducing a structured scheme for practice/transformation was deployed.

These spaces for debate attempting to bridge the non-formal and informal with the formal are necessary and effective, but they remain spots of innovative pedagogical practice. Since the social problem of datafication is recent in the literature, the fragmentation in educational practices is still understandable, though it requires attention. Nonetheless, the lack of a mainstream practice would prevent effectiveness in achieving social justice through educational means.

In an attempt of conceptualisation which aims at wrapping up the findings towards further educational interventions linking data literacy with social justice, I introduce a scheme in Figure 1. The scheme contains the four dimensions identified in relation to the types of data literacy developed under each dimension. The four dimensions are accommodated taking into account the levels of intervention and conceptualization: at an institutional level (D4); at the civic level (D1); at the overall society level (D2), and at a global geopolitical level (D3). Social justice in educational practices in the era of data, to this point, builds over the four forms of intervention dimensions and their products, the four types of literacy. Namely, more participants could engage in more agentic practices if they understand and also act upon the data structures and the symbolic representation they exert. Therefore, educational interventions should be seen as a continuum integrating the four forms of data literacy, if the final aim is to achieve and promote social justice against datafication.

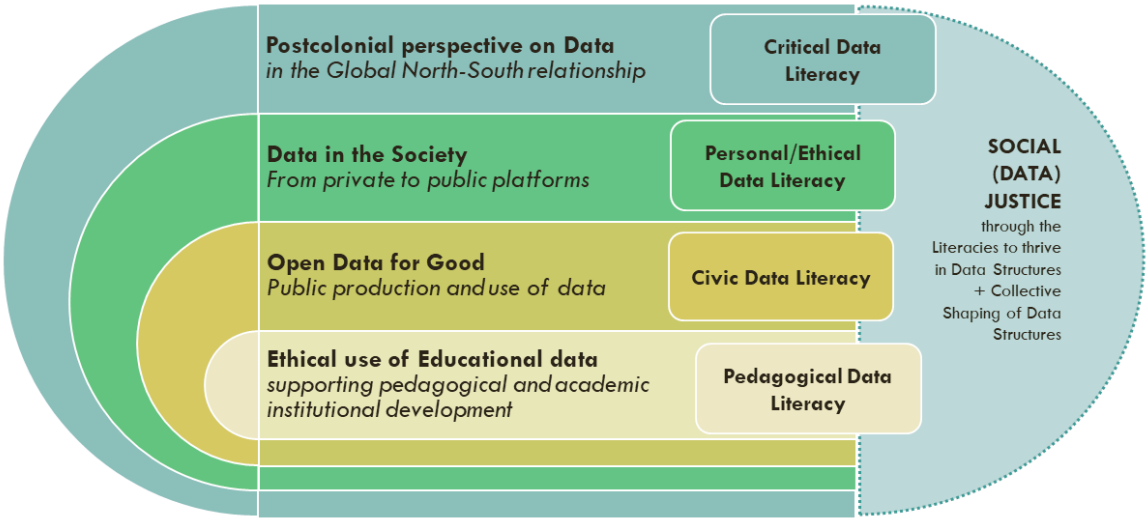


**Figure 1.** Integrated representation of the four dimensions and the data literacies in connection with a social justice's vision.

Such a scheme would support educators in curriculum development, the selection of resources or strategies as part of learning design, or team working in specific educational projects on data literacy connected to the promotion of a vision of social justice. It is relevant to argue here that social justice is an abstract concept. As discussed by Martha Nussbaum in her foundational work [24], her approach was preceded by other theories driving their attention to resource access. Instead, Nussbaum advocates for social justice as the capacity of feeling, becoming aware, understanding as means for striving and some type of agency. Data literacy can be deemed a relevant educational strand supporting knowledge, awareness, and minimal skills to strive in the context of datafication. However, as shown here, not all the forms of data literacy can disentangle unfair data practices. A complex and integrated perspective is required to address an individual's agency in terms of social justice.

I expand now the levels within each dimension placed in the scheme to understand their relationships. The Fourth Dimension (Ethical use of Educational data enhancing pedagogical and academic practices), can be deemed a specific case in the field of education. However, it is a crucial step in reflecting data in the society, bridging the several forms of data literacies (as the data in education could be restricted or open) to invite teachers and students to take part in a scenario of transformation, in the making of education. It follows the First Dimension, which presents the specific

case of open data clearly connected with the conception of data as public good. The literacy needed in this case is technical, to be able of recognizing valuable opportunities in open data and enacting forms of appropriation and usage. Nonetheless, critical and civic awareness comes after the ability to browse, retrieve, analyse, and use open data, but this data type must be placed in the overall context of closed forms of data and private data restrictions. Therefore, the following Dimension (Second, Data in Society) has been placed at an overarching level for the data literacies promoted at an overall awareness on the emergent data structures, which can deal with data more as a commodity than a good for all. Finally, the Third Dimension was implemented related to the other three for it brings a theoretical perspective to critically revise data structures and practices, triggering political engagement and activism.

## 6. Conclusions

In this article I explored the possible relationship between data literacy interventions in Higher Education and the promotion of social justice. Given the level of abstraction of social justice and the relevant theorisation of it, the conceptual approach of Martha Nussbaum was considered. In such an approach the key element is the continuous effort to generate spaces for the expression of human agency, through the development of capabilities as forms of awareness, knowledge, and skills which the individual chooses to put into action according to the circumstances as well as her own sense of fulfilment. As expressed in the reported literature, there is no possibility of promoting social justice in a space where the phenomenon of datafication constrains the individuals to a passive (and somehow unaware) use of the techno-structure. In this regard, data literacy, as a specific educational intervention, expands the space of possibility connecting the development of awareness, skills, and knowledge with agentic forms of interaction: creative and productive public data usage (Dimension 1); participatory design of the techno-structure (data labelling, data collection, algorithms, etc.) or reaction against forms of manipulation (Dimensions 2 and 3); and engagement in the decisions to use data to inform the pedagogical processes (Dimension 4). As a result of such exploration, I attempted to build a conceptual scheme addressing a more integrated picture of data literacy interventions which could actually contribute to achieve social justice against the problem of datafication. After a screening of practices based on the rapid evidence search, I analysed nine projects as efforts to push into the direction of generating such spaces of social justice. Through an inductive process, I used an interpretive lens focusing on the pedagogical approaches, instruments, and the social justice perspective built using Martha Nussbaum conceptualization. It was hence possible to categorize and group the projects into four overarching dimensions characterised by the perspective on data usage in the society and therefore, they promote diversified forms of formal, informal, and non-formal learning addressing the generation of awareness, skills, and knowledge around the problem. As the main implication for future research and for educational practice (both curriculum development and learning design) these four different lens could open more integrated programmes to develop data literacy as a catalyst of social justice. While social justice is an ultimate endeavour in society, data literacy could contribute to the efforts to cherish spaces of opportunity and expression for all forms of human diversity. Nonetheless, a programme in Higher Education could encompass activisms preventing the ill-defined (even harmful) data systems which are becoming more and more visible in our daily society. As a matter of fact, digital literacy/competence has become a cross-sectoral activity in most universities, leading to interdisciplinary activities to develop the literacies needed to work in digital environments. Data literacy should be considered not only as part of an undergraduate programme connected to data science but also as a debate around a social or political problem as part of a course (such as "data ethics" or media education). As a result, the technical, ethical, aesthetical, and political requirements needed to understand data usage across the private and the public sphere could be placed strategically across the curriculum and through specific interventions which also take into account the "big picture" of data practices, as purported in our scheme. The educational activities in Higher Education could consider the overall platforms' usage, i.e., open data within open government and

open science frameworks; personal data and the forms of quantification of the self; and educational data, as the most direct experience of the students' experience of data usage for/against their interest. In each of these initiatives, the integration of the components would lead to a complex understanding of the phenomenon, avoiding the eventual tensions or contradictions revealed in our exploration (such as the more positive connotation of data usage in some movements against the rather negative connotation of some critical movements).

These conclusions deal with the clear limitations of this study, yet have further impacts. As for the limitations, it is important to point out that our exploratory study has been carried out using public and available information, and the initiatives cannot cover, by no means, all the existing, local initiatives. Since the topic is receiving increasing attention, very recent initiatives could be mapped at the time of publication of this study. These were not included for a matter of time/space/focus constraints, but I have ensured the presence of relevant voices and visible experiences, all of them institutionally funded, addressing the more complex educational approaches to data literacy which capture/promote forms of social justice. However, the assumptions made would benefit from further interviews, focus groups or other forms of qualitative and design-based research activities connecting the dots of data literacy and social justice. This is a future strand of research which the conceptual scheme generated in this article could support.

As for the further impacts of the study, one important issue relates to how faculty development must be shaped to prepare the pedagogies dealing with datafication in the society and in higher education. I observed across the nine initiatives that there exist at least four strands of research that might converge up to a certain point, but can also take separate pathways. As in Dimension Four and consistent with the literature [54,62], academics should be prepared to take a professional and ethical position with regard to learning and academic analytics. In this regard, more focused and strategic institutional programmes should be implemented [63]. However, as observed in dimensions 1 and 2, faculty should also be invited to reflect on data and datafication as content. They could be hence invited to introduce a critical, political, and interdisciplinary perspective of data in society. Authentic learning based on Open Data [40,64] as well as engagement with civic data literacy projects could be an approach [46]. Methods for faculty development should also be considered. While academic development in ICT adoption has been developing in the last 30 years, and data literacy could fall, as expected in the EU model, within digital competences, there are several issues in terms of effectiveness and quality that still need to be addressed overall. Active as well as self-paced approaches are desirable [65], and showcase practices are crucial [66]. These approaches are present in all four dimensions explored. However, as Phuong et al. suggested [67], academic development programmes must foster academics' research on pedagogical practices as part of their endeavour in university teaching, so the efforts should go in the direction of providing coaching to implement data literacy programmes and to analyse and evaluate their impact. This practice, as explained above, requires more institutionalized instruments and strategies, as well as a frame of reference. This does not mean that all the dimensions mentioned should cover all forms of intervention, but faculty development of data literacy for social justice should embrace the bigger picture to hence focus on the specific area of practice. All in all, as Wayman & Jimerson [68] stated, data literacies need to be contextual, coherent, resourced, and also need to be sustainable and supported in the long term. In line with this, as Ebbeler et al. [69] suggest that professional development for educators' data literacy should be implemented throughout a structural approach grounded on collaborative learning and problem solving, not only as information or resources for self-paced activities. The participants' interests should be cherished, but expert support and active involvement with colleagues with mid-/long-duration interventions should be considered. Needless to say, this form of intervention requires a coherent, integrated vision of what data represent to society, transformed into an institutional strategy. Furthermore, activism, beyond the institution and within informal learnings networks, should be acknowledged by the institutions, with no intention of control or instrumentalisation. The several initiatives displayed the potential to trigger such an

approach in the future, but joint, integrated spaces for reflection are necessary if data literacy is to be considered a real catalyst of social justice in our contemporary society.

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