Higher Education for Good

Teaching and Learning Futures

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21. Critical data literacies for good

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This chapter offers an illustrative and generative example of a local, social and pedagogical problem in a Global South context — students' engagement with open data for coming up with climate change solutions — to reflect on the importance of understanding the nuance and complex nature of data literacy, and to transform different aspects of their social reality. This, in turn, opens a discussion about how and why understanding the complexity of critical data literacy is the foundation of HE for good. Our work aims to contribute to demystifying the expectation that all solutions pre-exist the problems and that data literacy (particularly critical data literacy) stems from precise instructions or given frameworks that lead educational actions towards achieving data justice. The complex nature of critical data literacies asks for responsible action and concerted effort to deal with the unexpected and develop the expected through the best possible human condition in each context of life and development.

A vignette: Teaching and learning about climate change in Kenya

We begin this chapter with a story of a specific teaching and learning moment experienced at Tangaza University College in Nairobi, Kenya. A class of 32 students guided by Judith Pete, one of this chapter's authors, used open data to engage with the challenge of climate change in Kenya. In Judith's words:

I introduced a topic on models of social change in the 21st century for African organisations. I reminded the students what we have learned about open data for social innovation and open data as OER (open educational resources). One adult student interjected and asked: "Madam, can I suggest that we focus on simple models and strategies such indigenous tree planting campaigns, sensitisation of farmers about global warming to embrace modern agribusiness methods of farming etc. Such can help us reduce the impacts of climate change?" I immediately responded: "Sure, very good idea indeed". I then asked the groups to discuss local strategies they think could be implemented to help curb the climate change impacts in Kenya. This was the opportunity to use the skills they learned to work with open data to foster social change. The group presentations took place towards the World Open Data Day when a student shared that they all agreed, after doing their research, to buy 50 seedlings of indigenous trees to be planted as one of the simple but known strategies to reduce climate change impact in Kenya. This suggestion was supported by other groups, and we ended up planting 500 seedlings of different species of indigenous trees (see Figure 21.1). A list of names of various types of indigenous trees started, some in Swahili, and some in local languages. The student leader suggested the idea of educating the communities around Tangaza and beyond on the merits of planting these types of trees and what they can do to mitigate the effects of climate change. The decision was taken to transform this into an open educational resource further. I (Judith) learnt so much from this group and feel positively challenged by their catalytic approach to curbing climate change in Kenya. The spirit is still on in communities, and seedbeds with indigenous trees have been set up by some students in remote areas of the city.

Figure 21.1

Students undertaking a course on change management planted indigenous trees within the university and surrounding community, CC BY-NC

Who we are, and how this story came to happen

We are three female higher education educators with mixed backgrounds. Judith is a Kenyan with a passion for OERs, she has served in academic and regional non-governmental organisations in different managerial and leadership capacities for almost two decades. Juliana is an Argentinian living in Europe, her work has also been connected to education as an emancipatory instrument. Caroline emigrated to the UK from Venezuela, where she had experienced first-hand deep social inequalities. All three of us are educators widely interested in issues of social justice and equity. We believe that our backgrounds and concomitant values inform what we think is higher education for good.

In 2020, each of us was engaged in different activities dealing with openness in education, including the phenomenon of datafication. Our encounter was driven by a project, *DataPraxis*[1], whose goal was to foster educators' critical data literacy amongst four partner institutions including Tangaza University College, Nairobi, and in which we developed a critical pedagogical approach inspired by Freire's critical pedagogy principles and his ideas of problem posing, "critical consciousness", and generative themes (Kuhn & Raffaghelli, 2022). In the overall project, we learned that this critical pedagogical approach is powerful as it engages students in working on real problems in local contexts.

For Tangaza University College, with a longstanding trajectory in advocating for open education in Africa (Pete et al., 2017; Pete, 2019), the focus was on open data for social innovation and the extent to which the enthusiasm around this practice could become a catalyser for civic empowerment and innovation. We co-developed the materials and resources for the workshop.[2] We introduced the idea of data generated by local communities as 'post-academic' and 'co-liberational' as a generative theme, particularly reflecting on the work that has been done

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1   This project was an international collaboration with the University de La Republica, Uruguay; University Oberta of Catalunya, Barcelona; University of Surrey, UK and Tangaza University College, Nairobi.

The research team comprised: Juliana Raffaghelli, Leo Havemann, Javiera Atenas, Cristian Timermann, and Caroline Kuhn. The overall project can be accessed through https://datapraxis.net

2   https://datapraxis.net/chapter-narobi/the-open-data-for-empowerment-workshop-od4e/

already through the Environmental Justice Atlas initiative as a potential platform for them to explore. We consulted the participants to see if they could build their own maps of data. We were particularly interested in the possibility of addressing the problem of misrepresentation and misrecognition (Lambert, 2018; Onuoha, 2018), i.e. the "no-data'' case where some information is missed from the data set. As Onuoha (2018) reminds us: "unsurprisingly, this lack of data typically correlates with issues affecting those who are most vulnerable in that [particular] context".[3] Data relations are often power relations. It was precisely these power relations that we wanted to scrutinise and explore. Arguably having a robust critical approach to data literacies is key to data justice, by which we mean the intersection of datafication and social justice, to explore pathways that can advance social justice in a datafied society (Dencik et al., 2022; Taylor, 2017). In Figure 21.2 the approach of students as catalysers of social change is depicted. Students explore meaningful situations of data injustice in the community engaging with data or the absence of it. Situations pertaining to the community are ideally brought into the classroom for discussion.

Figure 21.2

One of the slides used in our workshop: Students as catalysers of social change. We invited participants to uncover the "no data" situations through collaboration with the students as catalysers of social change

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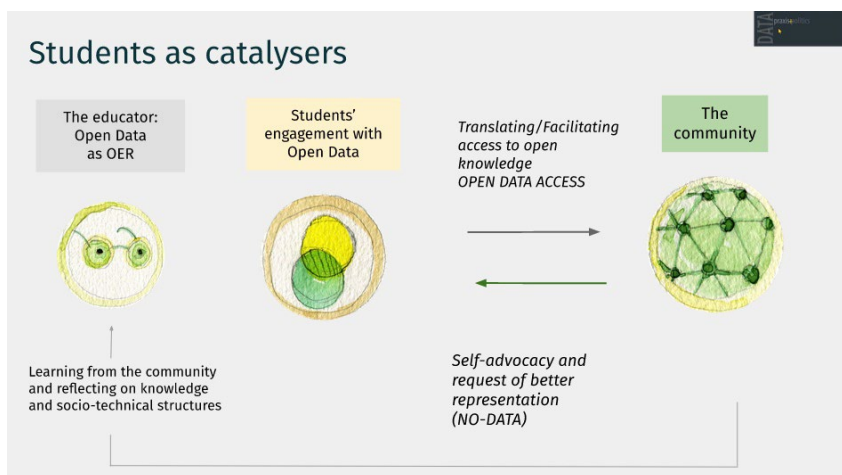
3   For more details of Onuoha's work go to: https://mimionuoha.com/the-library-of-missing-datasets

In the remainder of this chapter, we explore critical issues related to data justice using the example of the vignette we have shared: the importance of local educators in identifying and engaging with urgent social issues, the need for meaningful participation, access, and the need to consider the material component of data literacy.

Local educators identify and engage with urgent social issues

In a recent report, UNESCO (2021) argues for a new contract for education where the purpose of education is defined as a common good involving everyone coming together to repair a damaged planet. UNESCO (2021) argues that to achieve this, a new social contract:

> grounded in human rights and based on principles of non-discrimination, social justice, respect for life, human dignity, and cultural diversity, is needed. It must encompass an ethic of care, reciprocity, and solidarity. It must strengthen education as a public endeavour and a common good (p. iii).

We see this new social contract aligned with the relational and communal values held by African thinkers (Biko, 2004; Mbiti, 1970; Fanon, 2005). This relational conception extends the notion of community agreeing that all human beings are related beyond the links of kinship and community by ties of reciprocity grounded on the interdependence of all human beings. Mbiti's maxim "I am because we are; and since we are, therefore I am" (1970, p. 141) is eloquent. Mbiti also talked of moral perfection as an understanding of what is good and evil leading to harmonious living in which the community's scarce resources are to be distributed equally at all times (Mbiti, 1970). We also see this social contract in line with our views and hopes for a more equal and inclusive HE system.

What struck us in this illustrative vignette is the fact that students selected the climate crisis to demonstrate change, the importance of access to information, and the urgency of action that takes into account not only the local university community but also students' rural communities. It is very real when, as we finalise writing this chapter, at least 18 million people in East Africa are food insecure due to one

of the most severe droughts in recent history (Bechman, 2022). People needing humanitarian help are estimated to be 7 million in Ethiopia, 4 million in Kenya, and 5 million in South Sudan. In Kenya, the drought has impacted 20 out of 23 counties. Subsistence farmers are at risk of losing their cattle due to lack of food, as well as taking on debt and/or fleeing to displacement camps. On a different scale, the increase in living costs and the lack of water that people used to rely on from the rainfall is confusing farmers, making them feel disoriented and helpless. They have no idea what to do or where to find guidance, as this reality feels very different from the one experienced by previous generations. Therefore, taking action is perceived as a considerable challenge despite the situation's urgency.

Returning to the issue of the alleged 'global' nature of the climate crisis, it is startling and revealing to read the same global drought observatory (GDO) analytical report (Toreti et al., 2022)about northern Italy's drought. In northern Italy, the reported impacts are not about millions of people being food insecure and needing humanitarian help, but how the ongoing drought is affecting the energy storage in the Italian hydropower system and the agricultural impacts in terms of the reduction of yield potential. It becomes clear that the consequences are not evenly distributed. On the contrary, the research shows that low and middle-income countries are highly climate vulnerable, and thus experience the worst collateral effects of climate change. For example, Kenya contributes less than 0.1 per cent of global greenhouse gas (GHG) emissions annually. The UN has warned of a "climate apartheid" as wealthy nations pay to escape hunger, overheating and conflict while the rest of the world, like Kenya, is left to suffer. A striking reminder is that fifty per cent of the global population (approx. 3.5 billion people) live in countries most vulnerable to climate change, bearing the impact of a crisis they did not cause.

Equitable critical data practices rely on access

The above example brings us to think about the benefits of accessing data, but at the same time, we reflect upon the fact that access is not a given; it is political. When we talk about access to data or information or knowledge the main feature is that it is openly accessible, usable, editable, and can

be shared by anyone for any purpose, even commercially. Furthermore, open data and content must be in the public domain or provided under an open licence, promoting a robust commons in which anyone (with the proper social arrangements) may participate, and interoperability is maximised (Atenas et al., 2021). In contrast, closed data is data that someone owns and does not share in the public domain. Yet accessing data and content is more complex than being open and thus 'accessible'; it also needs to be discoverable. That is, it needs to show up when students search for it, and this is more political than it seems. Czerniewicz et al. (2016) demonstrate that "in the academic domains, indications are that knowledge patterns continue to reflect physically based geopolitical realities — where knowledge from the South is peripheral while knowledge from the North still dominates in terms of all the conventional metrics" (p. 1). There is a gap between the discoverability of data from the North in respect to data from the South. The existence of open data is not always the problem, but rather its discoverability and visibility via search engines (Czerniewicz et al., 2016). This is the case when it comes to research in climate change, where the USA is the dominant knowledge engine for publications (Czerniewicz et al., 2016). We agree with the authors that "citations also have their uneven geographies" (Czerniewicz et al., 2016, p. 3.). On the other hand, researchers in the Global South struggle to access research, and it is known that research works that are more likely to be found will be cited more often. The information found online shapes knowledge production and, thus, what comes to be known (Czerniewicz et al., 2016).

From this evidence, it is clear that the visibility and findability of data and in particular, open data is political, and never neutral. It is interesting that in our professional development experience, *DataPraxis*, the majority of the open data portals explored by participants were based in transnational institutions and non-governmental bodies with an overwhelming presence of Global North technicians and professionals, and of course, data sources. What we can infer from all of the above is that to access open data and content, one requires both the knowledge, understanding and skills to deal with the more technical side of it, but also the necessary social arrangements, e.g. meaningful connectivity. More broadly, it is essential that the knowledge, data, accessible and

findable through search engines is not mainly from the Global North, but that it is more balanced between the North and the South.

Critical data practices are about access and participation

In our generative example, we could observe how the educator was able to provide the conducive social arrangements: openness in choosing the project, exposing critical social problems such as climate change in the local context, the knowledge educators gained through the broader project of *DataPraxis* that enabled students to do something they had reasons to value, namely addressing a local problem that affects their community. In short, the educator in collaboration with her students constructed a meaningful intervention that showed respect for and empowered real people, very much aligned with the key ideas of the Capability Approach (Nussbaum, 2011; Sen 1999; Robeyns, 2017) embodying the ethos of a higher education for good.

For data practices to be meaningful, it is critical that learners can meaningfully participate as agents in their development, i.e., enabling social arrangements so that students can make a significant epistemic contribution. In this case, the right combination of motivation, knowledge, understanding and skills, adequate scaffolding and the needed material infrastructure led the group to make a meaningful contribution to their local community, but also to other rural communities where indigenous trees were also planted. Students were empowered as they experienced the satisfaction of being agents of change in their local community (be it the immediate university surroundings or their local villages). Students' initiatives and own ideas make more sense than old models and approaches to social change, as one of the students shared with Judith. This, in turn, aligns with Fricker's (2007, 2015) idea that the wellbeing of a human person has an epistemic dimension that is not only about receiving knowledge but, what is more, giving and sharing knowledge with the local community. It is about epistemic reciprocity.

The meaningful participation of people as agents in development practice has been a central concern in capabilitarian scholarship — in the work of Walker, Sen, Fricker and others. For example, Fricker (2007, 2015) argues that making epistemic contributions, that is, contributing

to the shared pool of knowledge is fundamental to human wellbeing, a dignified life, and expansive freedoms. Such contributions, the corresponding capabilities, and concomitant functionings can be fostered in and through education, and this endeavour surely will be for good.[4]

This vignette is an inspiring and generative example of what can be done by local people (students, teachers, and community members) who have agency and self-determination to contribute to local solutions in small and effective ways, partially through enacting a critical approach to data literacy. It materialises the fruitful combination suggested by Nussbaum (2011) of the internal capacities and dispositions of students and practitioners (motivation, aspirations, care and connection to their local context, knowledge, understanding, skills, self-determination), with conducive social arrangements: a suitable environment with a functioning digital and data infrastructure, access to resources and devices, and support from the lecturer that serve as enablers for people's agency to be enacted. The social conditions, in this case, served as the factors that transformed a desire, something students had reasons to value, into an action, a doing — planting indigenous trees around the university and local community and documenting that experience, creating an open educational resource (OER) that can be reused by others (see Figure 21.1). This example also shows how a group of students can make a meaningful contribution to the common pool of knowledge, i.e. in researching and listing those trees and showing how they can mitigate some effects of climate change and raise awareness in the community of small actions that can contribute to social change. We want to stress that given the relational conception of reality in African culture (Hord & Lee, 2016), being able to contribute to the local and shared epistemic pool of knowledge is hugely significant and can have a noteworthy impact on students' wellbeing.

One of the aims of HE4Good is to enable learners' meaningful participation as agents in their development. To do so, providing the enabling social arrangements so that students can make a meaningful epistemic contribution is key. Nonetheless, creating an educational

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4   Given the scope of this chapter, we will not explain the Capabilities Approach in depth. Instead, we refer the interested reader to the work of Walker and Unterhalten (2007), Sen (1999), Nussbaum (2011), Robeyns (2017), and Witthaus (2022).

space for good that promotes these enabling conditions that can trigger students' ability to discover and develop their capabilities and transform them into functionings, can go beyond the educator's willingness and even professionalism.

Critical data literacy will not be strengthened by inserting more efficient technology in the classroom. Instead, becoming aware of the complexity inherent in any social context (a datafied society in this case), and finding what is appropriate to scrutinise and investigate concerning unjust data practices could be helpful. In the same vein, having data which is open is not good per se, especially when it gets appropriated by forces which are not good at all. However, while some have argued that there is a data divide that must be compensated through engagement with the local socio-technological ecosystem (Gurstein, 2011), we agree with others that marginal participation in the knowledge economy does not only depend on the researchers' and citizens' lack of skills and understanding, but on their position at geographic, linguistic, and epistemic margins (Czerniewicz et al., 2016). There are relevant initiatives developing in Latin America, e.g. in the field of femicides which came to be known by the international research community when they were "spoken" in English (see 'Feminicidios' in D'Ignazio & Klein, 2020). Working jointly with educators collecting local voices and data was an effort to go beyond the missed data and concomitant data (in)justices.

Whilst students expanded their freedoms and grasped the relevance of open data and open content to developing a specific local intervention, the ongoing understanding and engagement with open production and the interactions between academic and community knowledge could not be established in advance. Nonetheless, the critical understanding of open and open resources that is not produced 'about' the Kenyan society but 'with and by' the young, educated students in the Kenyan higher education system, is undoubtedly an enabler of agentic practices.

It is of note that the students in this example, studying in-person at an urban university, did have a generative combination of access to digital and data infrastructure, a suitable environment with appropriate guidance to realise the activity, and all the internal capacities that were needed to create this experience. Conversely, if there is no access to data and digital infrastructure, most people that live, study, and work in rural settings will not be able to participate in the knowledge economy,

and their epistemic contribution is indirectly truncated. This brings an immediate consequence, amongst many others, that their capacity to be knowledge producers is severely curtailed. We know that the knowledge that counts is the knowledge that is produced and discoverable. Hence people in rural communities are excluded from that dynamic and vital process. This undoubtedly influences not only their participation in the (local) knowledge economy, but also in how they are (mis)represented in policy documents, government initiatives, and scholarship.

Data literacies are material

Our work stands in contrast to the tendency to think about data literacy with a Silicon Valley solutionist mindset, one that promotes the belief that data literacy is simply a matter of having the knowledge and skills to engage critically with data issues and data-driven technologies. What is often overlooked is that people can have the knowledge, skills, and motivation to collect and share data to solve local problems, but they might not have access to adequate infrastructure. By infrastructure, we mean, amongst other things, to have meaningful connectivity and access to electricity. In our view, the invisibilisation of the infrastructural problem is linked to the invisibilisation of the social reality of those at the margins, which entails injustice.

It is known that global connectivity and data innovation are fostering social change. Data shapes our daily lives and permeates the social and economic landscape of the different countries across the world. Yet, meaningful participation in today's digital age requires, amongst other things, access to data and information infrastructure, e.g. a high-speed broadband connection to the internet, moreover, *meaningful connectivity* (A4AI),[5] a new standard that measures not only if someone has access to the internet, but the quality of connection they have. The A4AI has defined meaningful connectivity by setting a minimum threshold across four dimensions:

- Regular internet use — minimum threshold: daily use.

- An appropriate device — minimum threshold: access to a smartphone.

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5   Alliance for Affordable Internet. https://a4ai.org/meaningful-connectivity/

- Enough data — minimum threshold: an unlimited broadband connection at home or a place of work or study.

- A fast connection — minimum threshold: 4G mobile connectivity.

This more nuanced understanding of connectivity considers that not everyone connects to the internet similarly. Researchers and policymakers should not rely on a binary metric of have or have not. The A4AI argues that ignoring the huge disparities in how people connect will not only increase inequalities online but also offline. The report *Data for Better Lives* (2021) by the World Bank dedicates an entire chapter explaining how data infrastructure (lack of) is a source of inequality.

However, infrastructures are invisibilised if they serve to maintain power structures and metaphors that serve that purpose. The internet is a material infrastructure that mediates human interactions and socialisation. As Couldry and Hepp (2017) put it: "Communication, media and their infrastructures matter increasingly today in stating the whatness of what is" (p. 27). Infrastructures, particularly data and information infrastructures should be regarded as political, as Bowker, Mongili and Pellegrino (2014) argue:

> We all too rarely think about the ways in which our social, cultural, and political values are braided into the wires, coded into the applications and built into the databases, which are so much a part of our daily lives. (p. xiii)

Infrastructures not only have to do with wires and codes but how human values shape some elements of data and information infrastructure (see, for example, Chan et al., Chapter 4, this volume). Certainly, the symbolic dimension of data is important, but it is essential to integrate the material as a critical dimension of critical data literacy, given that it mediates any experience in and with the digital. The invisible nature of data infrastructures is political and easily overlooked despite its tangible and visible consequences on data literacy issues (Gray et al., 2018), data and social justice. Crawford (2020) eloquently points out how the metaphor of "cloud computing" which supports the supposed immateriality of artificial intelligence (AI) is possible only because data generation, maintenance, and circulation are realised through the hidden tubes, cables, and labour associated with these processes. In a

similar vein, Starosielski (2015) in her book *The undersea network* states that:

> Manholes, such as the one beneath my feet [she refers to a picture taken by her in O'ahu beach in Hawaii, where a massive cable nexus is located that connects the island to the Internet] are some of the few sites where cable systems appear in public space. It is by looking down, rather than up to the sky, that we can best see today's network infrastructure. (p. ix)

Therefore, we argue that this material component is a key dimension of critical data literacy. Data justice requires it to be foregrounded and made visible. This aspect is critical when it comes to accessing and working with data. As mentioned above, the internet is mainly a material infrastructure that mediates human interactions and socialisation. In our example, the infrastructure was available to the students, together with other elements. Therefore, students could transform an opportunity into something tangible and real. They were able to do and be what they, as a group, had reasons to value, namely contribute to their local environment and the community by searching for adequate trees and planting them to curb some effects of climate change.

Conclusion

The purpose of education envisioned by UNESCO as a common good that involves everyone, everywhere coming together to repair a damaged planet, is possible. The potential of education as a route for sustainable collective futures, at least through this small example, is shown to be a reality. We can attest with this example how students enacted respect for life — human, but also non-human, by planting those trees. Education, as we have observed, encompasses an ethic of care, reciprocity, and solidarity. Conceptualizing education as a public endeavour and a common good aligns with data literacies for good and with higher education for good.

More generally, if, as educators, we understand literacy as a form of cultural politics (Freire & Macedo, 1987), a set of social practices that empower or disempower people, we will be in a better position to act. Moreover, this more nuanced understanding can enable educators to find strategies to articulate transforming practices that can mediate the relationship of learners to the world that takes place in the general

milieu in which learners find themselves, as we could see in the generative example we presented. In addition to this still unaddressed wicked problem, educators are facing a frenzy of concern about what is being called "artificial intelligence literacy", which entails both popular fantasies around automata in a perfect world and the need for skills to meet the new jobs connected to them (Selwyn, 2022). In addition, there is a media discourse that portrays education as obsolete and soon replaced by these robots, making educators feel frustrated and ignored. There is still so much to do to fully understand and articulate fertile practices that foster and strengthen a critical approach to data literacy. It is important to be cautious and humble and not shy away from the unsolved wicked problem of how to address data literacy pedagogically. It can be tempting to jump to the next new EdTech trend so that we feel current and up-to-date with fancy and unsubstantiated media discourses.

Critical data literacies are arguably the most important literacy in an age of datafication, especially if HE is to be for good. We wish to end this chapter with a call to action by asking educators and students to do challenging work if the aim is to advance data justice and, more generally, social justice in such a convoluted and critical moment we are living in. If, as we argued earlier, data justice is the intersection of datafication and social justice, there is no way we can address any injustice if we cannot challenge, scrutinise, and problematise what seems natural and commonsensical, all of which is hard work! We are aware that these tectonic movements still entail new areas of chaos and uncertainty in the best understanding of Hannah Arendt's idea of "vita activa" where being "capable of action means that the unexpected can be expected" (Arendt, 1958, p. 178) recognising as she does that humans "live on the earth and inhabit the world" (p. 7). We hope that our vignette contributes to demystifying what is to be expected, embracing, in all its richness, the complexities of critical data literacies, navigating the unexpected through politically committed action.

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