Data, AI, and Algorithmic literacies for effective participation in datafied democracies

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PARTICIPATION: SUBSTANTIVE, OR JUST SYMBOLIC?

In contemporary democracies, participation is increasingly mediated by digital technologies and data-driven mechanisms such as open consultations, participatory online platforms, and algorithmically governed public services. Whereas earlier democratic theories have conceptualised participation as rooted in informed citizenship, dependent on access to information, deliberation, and electoral competence (Brennan, 2011), current governance operates within data-intensive environments where public debate and policy justification are structured through metrics, indicators, and analytics (Ranganathan et al., 2015). This shift reflects a broader datafication of democracy, in which civic engagement depends not only on access to information but on the capacity to interpret, interrogate, and act upon data.

This datafication of democracy is reconfiguring participation in two key ways: first, participation increasingly occurs through processes of data production, as citizens generate data through everyday digital interactions, often passively and without explicit civic intent (Baack, 2015; Dencik and Kaun, 2020); and, civic processes are progressively mediated by algorithmic systems, shifting decision-making authority towards institutions that control data infrastructures and thereby intensifying concerns surrounding opacity, bias, and diminished democratic accountability (Hintz, 2024; Land and Wong, 2025).

Participation is increasingly framed as a complex and multifaceted concept encompassing transparency, policy effectiveness, accountability, and democratic rights, particularly in relation to the inclusion and empowerment of marginalised groups. Yet this expansion also exposes significant structural tensions within datafied societies, where meaningful engagement is frequently contingent upon citizens' levels of data and information literacy. In the absence of such literacies, participation risks becoming largely symbolic, as formal mechanisms for engagement may exist without enabling substantive influence over decision-making processes. This dynamic privileges technically proficient actors over those with critical insight but limited technical skills, as well as those lacking both capacities, thereby reproducing epistemic asymmetries in which open data and digital infrastructures remain practically inaccessible despite their formal availability (Johnson, 2014; Keller et al., 2017).

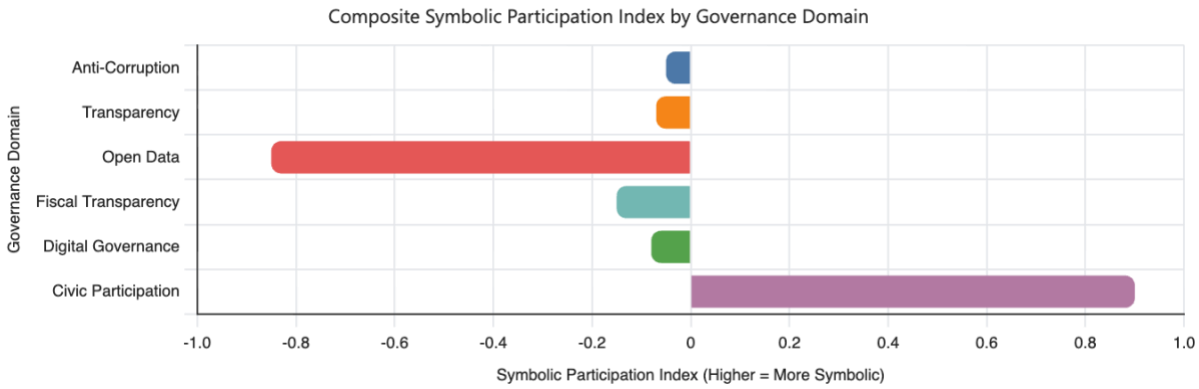
These transformations introduce significant risks, as persistent inequalities in data literacy and technical expertise produce uneven participation and undermine inclusivity (Keller et al., 2017). Overreliance on data-driven decision-making is fostering technocratic governance, privileging expert knowledge and narrowing public deliberation (Gray, 2016), while expanding data infrastructures raise concerns about surveillance and behavioural control (Dencik and Kaun, 2020), and algorithmic systems further reproduce and amplify social inequalities (Hintz, 2024). Consequently, participation becomes symbolic, reinforcing existing hierarchies of knowledge and influence.

At the core of these tensions lies a broader contradiction between democratic ideals and the assumptions embedded within datafied systems of participation. While governments increasingly advocate transparency, inclusivity, and accountability, such initiatives often presuppose high levels of digital, technical, and civic skills among citizens, framing participation less as a capability requiring sustained institutional support than as an individual right to be exercised autonomously, thus participatory initiatives risk functioning primarily as

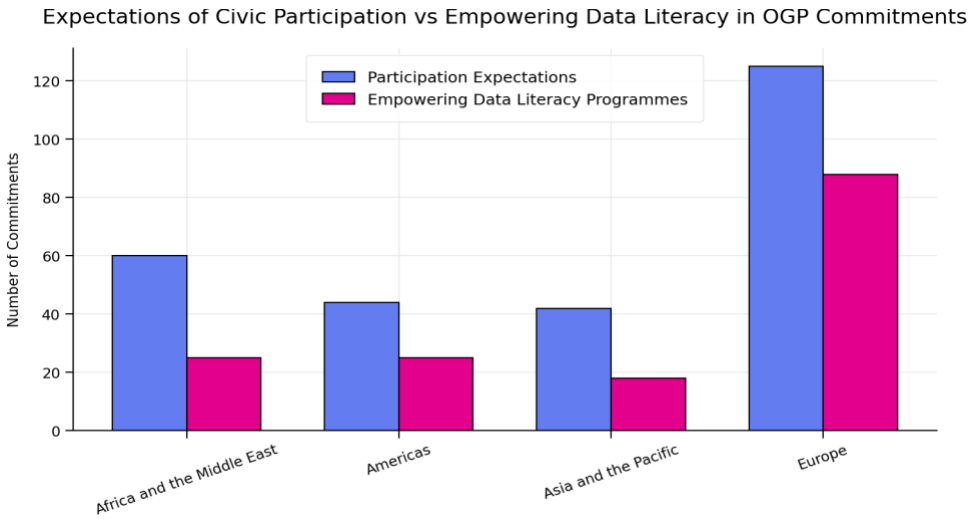
mechanisms of procedural legitimacy that signal openness without meaningfully redistributing power or amplifying diverse voices.

THE PARADOX OF OPENNESS AND SYMBOLIC PARTICIPATION IN OPEN GOVERNMENT

The Open Government Partnership (OGP) illustrates how participation in datafied democracies tends to be largely symbolic. Our analysis of 866 National Action Plans (NAPs) across four regions from 2023 onwards shows that, despite strong emphasis on transparency and civic engagement, a significant gap persists between open data availability and citizens' capacity to use it meaningfully. This "paradox of openness" reflects how expanded infrastructures—such as data and transparency portals—are not matched by investment in critical data literacy (Janssen et al., 2018; Johnson, 2014). As a result, openness does not automatically translate into meaningful participation, as illustrated in Figure 1.



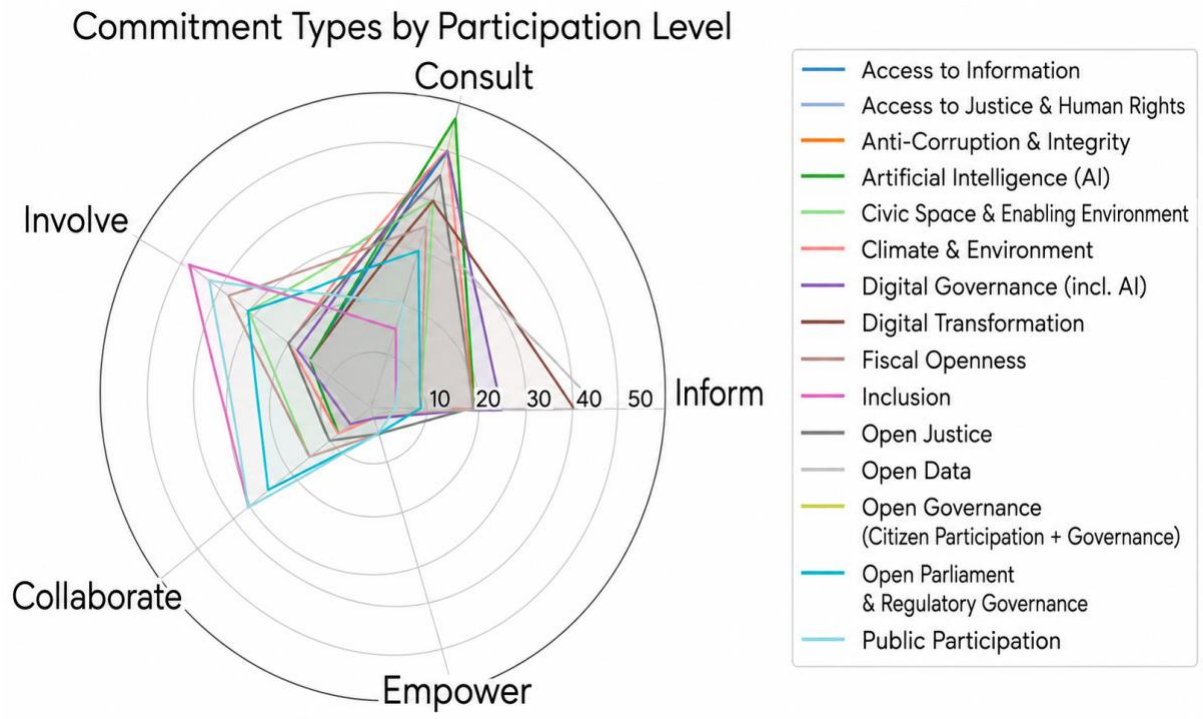
Within OGP discourses, participation is framed around transparency, access to information, civic engagement, and anti-corruption. Yet these commitments often assume that citizens possess the technical skills required to interpret complex datasets and engage effectively in policy processes as illustrated in Figure 2.



In practice, this creates an "expertise gap" where transparency exists formally but remains largely inaccessible, making openness performative rather than genuinely participatory (Sieber and Johnson, 2015).

Across NAPs, participation depth remains uneven when assessed against the five IAP2 domains (inform, consult, involve, collaborate and empower), with most initiatives limited to informing or consulting rather than involving, collaborating with, or empowering citizens as

shown in Figure 3. Although some efforts promote data literacy through accessible formats and training, engagement rarely progresses to meaningful co-decision-making. These trends reveal interconnected barriers, including restricted participation, unequal data access and understanding, opaque AI systems, and weak institutional incentives for power-sharing.



OPEN SOLUTIONS FOR CIVIC PARTICIPATION, AND THE ROLE OF HIGHER EDUCATION

As visible in OGP NAPs, in **symbolic participation** citizens are formally included through access to data and information but remain excluded in practice (Sieber and Johnson, 2015; Keller et al., 2017). Critical data literacy should be then understood as a foundational democratic competence that extends beyond technical proficiency to include the ability to critically interrogate how data are generated, framed, and mobilised within relations of power (Atenas et al., 2020; Sander, 2024).

From a critical perspective, the central constraint is structural rather than individual, thus, embedding this competence within higher education (HE) can enable more equitable forms of participation, with open educational practices (OEP) illustrating how real-world datasets can foster civic engagement and critical reflection (Atenas et al., 2023). Within this framework, open data can function as an open educational resource (OER) when integrated into evidence-based teaching, allowing learners to examine and challenge the empirical foundations of policy and public discourse (Atenas et al., 2015; Atenas and Havemann, 2019).

In this sense, evidence from civic monitoring highlights that participation depends not merely on data availability but on the capacity to critically interpret and act upon it (Buttiglione and Reggi, 2015), thus, framing open data as OER shifts it from a passive transparency mechanism into an active pedagogical resource that supports critical inquiry and strengthens civic agency aligning civic engagement with knowledge production, enabling students to act as data intermediaries and active contributors to public understanding, as meaningful

engagement depends on the capacity to understand how data is produced, mediated, and shaped by power relations (Atenas et al., 2023).

Furthermore, the integration of open data across HE supports the progressive development of AI, and algorithmic civic competencies. While traditional civic education has focused on rights, responsibilities, and institutional knowledge (Karatsiori et al., 2026), this is no longer sufficient in data-driven democracies, thus engagement with data can foster inclusive, scaffolded, and critical engagement with IA systems, as the growing entanglement of participation with algorithmic systems renders AI literacy increasingly necessary to critically understand data-driven infrastructures and their embedded biases (Hintz, 2024; Dencik and Kaun, 2020).

Ultimately, strengthening critical data, AI, and algorithmic literacy is essential to shift citizenship towards informed participation. Addressing structural inequalities and sustaining a more inclusive and substantive democratic practice will demand critical citizens who can understand how data are selected, processed, and deployed in the automated decision-making systems in welfare, policing, healthcare, and finance (Hintz, 2024; Land and Wong, 2025; Atenas and Caldwell, 2026; Karatsiori et al., 2026). In this sense, Algorithmic literacy further extends this by emphasising evaluation, governance, and the ability to audit and critique such systems (Brown et al., 2021), to support non-experts in detecting harmful algorithmic behaviours; weak accountability and opaque governance as a core civic competence (Shen et al., 2021; Costanza-Chock et al., 2022).

This approach moves from access to information towards interpretation, application, and ultimately the transformation and governance of datafied systems, framing data, AI, and algorithmic literacy as core competencies for democratic participation (Atenas et al., 2023; Atenas and Caldwell, 2026). This will require moving beyond transparency-driven models of openness towards meaningful participation, understood as a supported, capability-based process. Although open data initiatives have improved informational access (Janssen et al., 2018; Sieber and Johnson, 2015), uneven interpretive capacities continue to constrain meaningful engagement (Johnson, 2014), prompting development of alternative practices such as civic monitoring and data activism (Buttiglione and Reggi, 2015), alongside participatory co-creation between citizens and institutions (Godinho et al., 2021). Data justice approaches extend this agenda by foregrounding fairness, representation, rights, and citizen control over data infrastructures (Dencik & Sanchez-Monedero, 2022;. Fenton, 2023).

HE has a civic responsibility to strengthen democratic futures through its position at the intersection of research, policy, education and society (Godinho et al., 2021; Atenas et al., 2023), and can advance open practices and civic engagement while positioning students as co-creators of knowledge. However, it is important to recognise that HE is not the only or exclusive pathway for developing these capacities; rather, it is one node within a broader ecosystem of democratic learning and participation. This also reframes its role as a civic duty that extends beyond enrolled students, requiring engagement with wider publics. In this regard, open education (UNESCO 2019; 2024) offers a key mechanism for widening access, enabling the dissemination of knowledge, resources, and pedagogical practices that support critical data and AI literacy for participation beyond institutional boundaries.

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