Democratic Accountability in the Digital Governance of Education: A Review of Tensions and Challenges

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Abstract

The increasing digitalization of education, particularly through algorithmic infrastructures and data-driven tools, promises enhanced administrative efficiency, improved learning outcomes, and personalized educational experiences. However, it simultaneously introduces significant tensions and challenges regarding democratic accountability. This article reviews the current literature to identify and discuss these tensions and challenges and their implications for educational governance. The analysis highlights three primary tensions: First, digital governance often conflicts with educational professionals' autonomy, as algorithmic decisions based on standardized, quantifiable data may constrain educators' leeway for professional discretion as well as their capacity to adapt decisions to local contexts. Second, the ethical and moral foundations of education are challenged by the shift toward performance metrics and algorithmic informed decision-making, potentially undermining critical thinking and independent judgment. This shift may redefine what it means to be an educated subject, prioritizing quantifiable data and data-driven outcomes over reflective human judgment. Third, digital governance risks marginalizing tacit knowledge, that is, context-specific, experiential insights vital for democratic deliberation which cannot be easily quantified or algorithmically "defined". These tensions also highlight significant challenges, particularly how to maintain democratic accountability through inclusion, dialogue, and reflective deliberation when governance increasingly relies on less transparent algorithmic processes. To address these issues, it is crucial to critically examine current digital governance approaches and explore how they can be reimagined to support professional autonomy and ethical judgment rather than possibly constrain them. This review contributes to educational governance by highlighting the need for digital infrastructures to integrate experiential and tacit knowledge in decision-making, thereby enabling genuine deliberative spaces where big data complements, rather than replaces, human expertise and discretionary spaces. The article concludes by recommending that future research should empirically investigate how digital tools can support democratic accountability, and ensuring digital governance upholds rather than undermines democratic values.

Keywords: *Democratic accountability, digital governance, algorithmic infrastructure, democracy, education*

1. Introduction

The digitalization of education has flourished in a new era of governance, where algorithmic infrastructures and data-driven tools play an increasing role in decision-making processes within schools and educational institutions. Education is "increasingly governed through data that is itself managed by actors and manipulated using software technologies that remain hidden and little understood" [1, p. 84] While the integration of digital tools, such as learning analytic platforms (LAPs), promises to streamline administrative processes, improve learning outcomes, and provide personalized educational experiences, it also raises critical questions about whether this integration is subject to democratic insight by involved stakeholders. As educational governance becomes more intertwined with digital technologies, the very nature of decision-making shifts, challenging traditional

views of accountability in general, and of democratic accountability in particular. When the nature of decision-making shifts, there is a risk that democratic deliberation is suspended using “self-evident data” [2, p.5]. A key concern is the possibility that governance and policy making increasingly evade democratic accountability in the digital age [2].

Democratic accountability, as defined by Ryan [3], emphasizes the importance of inclusion, dialogue, and deliberation in decision-making processes, ensuring that all relevant stakeholders - students, teachers, parents, and policymakers - are given a voice in governance. In the context of education, where digital tools are increasingly mediating decisions, there is a growing concern that these tools may unintentionally undermine the democratic principles they were intended to support. Specifically, there is a risk that algorithmic decision-making, which often operates on “self-evident data” [2, p.5] could exclude critical human perspectives, limit opportunities for dialogue, and narrow the scope of human deliberation.

The current body of literature offers valuable insights into the ways in which digital infrastructures are currently reshaping governance in education [4]–[8]. These studies highlight the potential of data-driven tools to enhance efficiency and standardization in educational settings, but they also highlight the tensions between digital automation and human agency, judgement and decision-making. For example, Macgilchrist [6] emphasizes the tension between the design of digital tools and their ability to incorporate diverse voices, while Sefton-Green and Pangrazio [8] explore how automated systems of governance can diminish human agency, leaving key decisions subject to algorithmic processes rather than being subject to human deliberation. However, while these studies touch on various dimensions of digital governance, there remains a gap in the literature concerning the specific challenges and tensions involved in ensuring democratic accountability within these systems. Accordingly, this article aims to review existing literature related to the tensions between human-centered, democratic decision-making on the one hand, and the automation of governance processes, on the other. This also entails reviewing the challenges of enabling democratic and inclusive deliberation in systems increasingly reliant on data-driven technologies (“algorithmic digital infrastructures”). It appears crucial to explore how the rapid rise of digital infrastructures in education is reshaping and being re-shaped by governance practices, and whether the digital transformation may strengthen or hinder the principles of inclusion, dialogue, and deliberation.

Given the complexities of educational governance in the digital age, this review is guided by two key research questions:

1. What characterizes, according to literature, the tensions in digital governance when ensuring democratic accountability in education?
2. What are the primary challenges faced by educational stakeholders in maintaining democratic accountability within the framework of digital governance?

This article addresses these questions and lays a theoretical foundation for future empirical research on the topic. Thus, it seeks to provide insights useful for educational leaders, policymakers and software developers in designing governance systems that uphold democratic values. By doing so, the article contributes to the growing body of research on digital governance in education, while also addressing a critical gap in current literature.

The review is grounded in the theoretical framework of deliberative democratic evaluation [3], ensuring that for governance systems to be truly democratic, they must enable inclusion, promote spaces for democratic dialogue, as well as encouraging reflexive deliberation. In the context of digital governance, these principles are particularly important, as the complexity and opacity of algorithmic systems could potentially obscure the decision-making processes they are meant to support. Moreover, as noted by scholars like Benson [9], tacit and experiential knowledge, that is forms of knowledge that are often difficult to measure or quantify, are frequently excluded from deliberative processes that rather give priority to explicit, data-driven information. Excluding such knowledge forms could potentially pose a threat to the democratic integrity of digital governance systems, as it risks overlooking the stakeholders who are most affected by educational policies and decisions.

The article is structured as follows. First, it presents a theoretical framework. This is followed by a presentation of the methods used to analyze the current literature on the topic, followed by a presentation of findings and discussion. The article concludes with recommendations for future research and discusses practical implications for educational governance in the digital age.

2. Theoretical Framework

'Deliberative democratic evaluation', as articulated by Ryan [3], provides appears as a useful framework for exploring the implications of algorithmic governance in education. This approach highlights the importance of inclusivity, open dialogue, and reflective deliberation in processes of democratic decision-making. By emphasizing these three principles, the chosen framework challenges the notion that algorithmic decisions, often perceived as 'objective and neutral', can replace or even replace the deliberate complexities of human judgment and processes of decision-making. The first and vital component of deliberative democratic evaluation is its emphasis on the inclusion of diverse voices, particularly those voices of groups that have been marginalized by oppressive structures. The second principle in deliberative democratic evaluation calls for the active promotion of dialogue among involved stakeholders. Good practices in governance require open communication which allows for the inclusion and consideration of a range of different viewpoints. This element of the framework emphasizes the importance of creating deliberative spaces where the involved parties engage in in-depth conversations with regards to the practical realities surrounding the implications of algorithmic digital infrastructures in their local school or educational institution.
The third principle is democratic deliberation as part of the framework. Deliberation can be understood as a reflective process over relevant issues, including identification of values and preferences. The inclusion, dialogue and deliberation can be understood as requirements of democratic accountability, which paves the way for issues to surface, thereby minimizing the risk of not covering important issues that may otherwise remain undisclosed.

3. Methodology and Methods

The methodological approach of this study is inspired by a qualitative evidence synthesis, as detailed by Grant and Booth [10]. This method enables a systematic, yet time-efficient review of the literature, providing a broad overview of the current state of research on digital governance in education. The intention of using this method is not aggregative, adding studies together. Rather, the method aims at uncovering themes or constructs in or across qualitative studies [10, p. 99]. The goal, as previously noted, is not to deliver a comprehensive, state-of-the-art review of the field, but conversely to offer a thematic overview of the key tensions and challenges surrounding democratic mechanisms of accountability in the digital governance of education.
The search for relevant literature was conducted across several academic databases, including ERIC, Google Scholar, Oria, and EBSCO. These platforms were selected for their wide coverage of educational research. In this way, I sought to capture a wide range of relevant studies. Search terms included variants such as 'democratizing digital governance', 'education', 'governance and education' and 'democracy' which allowed for a wide exploration of pertinent discussions in the field. The inclusion criteria ensured the alignment of the selected articles to the research questions. Studies were included if they aligned with the following parameters: 1) Addressed the role of digital governance in educational settings; 2) focused on challenges, tensions, or value-oriented issues within such governance frameworks; 3) highlighted democratic accountability as a central theme and; 4) articles not older than 15 years, as digital governance is a relatively novel phenomenon [5]. By applying these criteria, seven key articles were selected.

The initial search yielded limited results that directly addressed the research area of interest. The search on Google Scholar resulted in 48,100 search hits, whereas only three articles were chosen.

These were: "*Artificial intelligence and the technological turn of public education privatization: In defence of democratic educatio*n" [11], "*Governing software: Networks, databased and algorithmic power in the digital governance of public education*" [1] and "*Educational imaginaries: Governance at the intersection of technology and education*" [12]. After reviewing in-depth the four first pages in the list of massive search hits, the remaining search hits were omitted, as the articles addressed other issues such as digital innovation in teaching and learning, democratizing sciences, digital citizenship and information technology in general. In the Eric research database, the initial search yielded 126 results, whereas 3 articles were picked and included. These were: "*Digital Devices in the Governing of the European Education Space: The Case of SORPRENDO Software for Career Guidance*". [13], "*Governed by Edtech? Valuing Pedagogical Autonomy in a Platform Society*" [14] and "*The Death of the Educative Subject? The Limits of Criticality under Datafication*" [8]. The Oria search provided over 2900 search hits, largely overlapping with the two first searches. From this database, one article was chosen: "*To resist, or to align? The enactment of data-based school governance in Italy*" [15]. EBSCO search offered the same articles as those found in the first two databases. Thus, no articles were included from this database as satiation was achieved.

Following the qualitative evidence synthesis and selection of the eight key articles, a thematic analysis was conducted to identify key themes within and across the selected literature. Braun and Clarke's approach to thematic analysis [16] guided this process, enabling a systematic categorization and interpretation of the data. In the analysis I utilized a theoretical thematic analysis, a form of analysis which is driven by a theoretical interest and highlighting some aspect of the data [16 p.12]. This approach enabled the uncovering of emergent themes not explicitly addressed within the framework, though relating to the overarching, theory-driven categories. Using this analytical approach ensured a nuanced understanding of the complexities and challenges associated with democratic accountability in digital governance, while laying a foundation for the analysis and discussion which followed.

4. Findings and Discussion

4.1 Tensions Between Digital Governance and Professional Autonomy

First, the findings reveal significant tensions between the data-driven approach to digital governance, and educational professionals' professional autonomy. This tension is particularly evident in the analysis provided by Williamson [1], who examines how cross-sectoral intermediaries in England, such as NESTA (National Endowment for Science, Technology and the Arts) and the Education Foundation, actively promote the government's use of software in educational governance. These organizations seek to align educational practices with emerging digital governance models that give priority to predictability and efficiency of outcomes, which are key values in a neoliberal framework.

Williamson [1] further elaborates on how these digital governance networks utilize database-driven software and infrastructure to influence and control learners' behaviors, thoughts, and actions. Learning analytics, for instance, is a constructed concept where the conduct of the learner is increasingly shaped by decisions delegated to the algorithmic power of database software [1,p. 100]. This mechanistic approach to governance raises critical concerns about the erosion of professional autonomy among educators. Specifically, there is a significant risk that the roles of school authorities and educators will be reduced to the execution of predefined, data-driven instructions, narrowing the space for professional discretion adapted to specific situations and local contexts, which are emphasized in the concept of phronesis [17].

Much along the same lines, the case of the SORPRENDO software discussed by Romito et al. [13], the algorithmic logic embedded within the digital tool is designed to standardize career guidance across Europe. While this approach enhances efficiency and comparability, it risks overlooking the local context and the nuanced needs of individual students, thus limiting educators' capacity to exercise phronesis, that is, practical wisdom in making contextually informed decisions. This tension, it may be argued, reflect a broader challenge in the context of digital governance: Balancing the demand

for standardized, data-driven insights with the need for professional autonomy and ethical discretion in educational practices.

4.2 The Ethical and Moral Challenge of Digital Governance

Second, findings reveal the ethical and moral challenge that follows the intricacies of digital governance. Sefton-Green and Pangrazio [8] raise critical questions on whether the foundational principles of education are being challenged through the process of datafication. Their analysis suggests that the shift towards models of data-driven governance implies more than refining existing educational practices but may fundamentally alter what it means to be an educated subject. They argue that if education is increasingly focused on performance metrics, algorithmic analysis, and correlation rather than causation, this development could potentially undermine the capacity for critical and independent thinking. These qualities, it may be argued, are necessary prerequisites of the educative subject as well as the broader educational mandate cf. [18]. In this context, the role of critical thinking may be come obscured, as algorithmic digital infrastructures may take on a wider role than was originally intended; minimizing human judgement and deliberation rather than supporting these processes of subjectification. Moreover, Sefton-Green and Pangrazio [8] also emphasize the need for more empirical research to understand more comprehensively how individuals learn with and from big data, and how these experiences might reshape their identities and capacities for critical thinking. They caution that the current trajectory of digital governance could lead to a future where the educative subject is redefined by the limitations and biases inherent in data-driven systems. Such a "dystopian" prospect highlights the importance of critically examining the impact of digital governance on the development of the educative subject as well as the broader educational mandate, where ethical considerations still hold an important role.

This concern aligns to a significant extent to the views of Kerssens and van Dijck [14], who argue that the rise of educational technologies (EdTech) in governance collides with the notion of professional autonomy. They highlight how EdTech platforms are designed with built-in values that may not align with the ethical and inclusive goals of educational institutions. The use of such technologies can potentially undermine the democratic deliberation process by limiting the scope for educators and school leaders to critically engage with and interpret the data produced by these systems.If the numbers and statistics these softwares generate are interpreted as "how the world works" or as "objective truth", there is a risk that democratic deliberation become empty words; devoid of meaning where the leader has already decided to a particular outcome regardless of the voices uttered based on situated, tacit or experiential forms of knowledge.

The concept of phronesis [17] is crucial in addressing these challenges. It emphasizes that school authorities and leaders should exercise ethical reflection and context-sensitive judgment when using digital governance tools. In other words, phronesis, when seen in relation to big data and algorithimic digital infrastructures, brings to surface the need for *data literacy*. However, the current trajectory of digital governance, as portrayed in the described literature, appears to constrain rather than enable the exercise of phronesis. This raises important questions about whether digital governance ought to be reimagined to support, rather than undermine, the ethical and moral judgements of educational professionals, especially those in positions of power utilizing such tools for making informed decisions.

4.3 The Challenge of Including Tacit Knowledge in Democratic Deliberation

Third, the findings reveal a key emerging theme from literature, which is the marginalization of tacit knowledge in the realm of digital governance. As Benson [9] argues, tacit knowledge, knowledge that is deeply personal, context-specific, and often inexpressible, plays a vital role in democratic deliberation. However, the algorithmic nature of digital governance tools leans towards quantifiable knowledge that is easily measured and aggregated. In the context of digital governance, tacit and implicit knowledge, it may be argued, become highly relevant as algorithmic systems implying

quantifiable data have taken the centre stage, thereby downplaying qualitatively grounded, context-specific insights based on tacit and experiential knowledge [9]. Such insights may entail practical knowledge embodied in human experience, that is otherwise difficult to make explicit. Arguably, the incorporation of both knowledge forms ensures a through democratic dialogue and process.

The study by Landri [15] on data-based school governance in Italy illustrates this tension. Landri discusses how the increased reliance on data outputs in governance possibly reduces the complexity of educational processes to simple numbers and statistics, thereby excluding the rich, contextual experience that educators accumulate over years of professional practice, making it a part of their implicit and tacit knowledge repertoire. The danger in the over-reliance on data outputs is the exclusion of this and tacit knowledge limits the scope of democratic deliberation. At an organizational or institutional level, this minimization of experiential knowledge may also dehumanize processes of decision-making, as decisions are increasingly driven by algorithms rather than informed by the lived experiences and insights of professionals.

To prevent such developments, there is a need to ensure that digital governance tools are designed and implemented in ways that encompass tacit forms of knowledge. This might involve creating spaces where school authorities, school leaders and educators can engage in reflective, critical and deep dialogue, allowing them to interpret and contextualize data in light of their professional experience and the specific needs of their schools and students.This demands true deliberative spaces, where the role of algorithms and hard statistics are not ignored, but rather informs and builds upon the rich and lived experiences of educational professionals working with increasingly complex challenges.

5. Implications and Future Research

The findings from this review highlight the importance of critically examining the role of digital governance in education, particularly in terms of its impact on democratic deliberation, professional autonomy, and the ethical dimensions of educational practice. The tensions and challenges identified in the literature suggest the need for a highly critical perspective on the current approaches to digital governance. Accordingly, one pressing concerns surfaces; whether the current design of algorithmic digital infrastructures are inadequate for supporting a truly democratic and inclusive educational system, as there is a need to create space for experiential forms of knowledge grounded in rich experience.

On the basis of the findings in this article, future research should focus on further disentangling the complexities of digital governance, and how algorithmic infrastructures and learning analytic platforms are (or are not) aligned with the principles of phronesis or practically situated judgements based on experiential and tacit knowledge. This could involve exploring how digital tools can be designed to support, rather than possibly constrain, the professional autonomy of educators, and how these tools can be integrated into educational governance in ways that promote, rather than undermine, ethical and moral judgements in processes of decision-making.

Moreover, there is a need for empirical studies that investigate how tacit knowledge can be effectively built into digital governance processes. Such research could provide valuable insights into how processes of democratic deliberation can be preserved in the face of increasing influence of digital ‘big data’ and algorithmic decision-making.

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