

DIGITAL EPISTEMOLOGY AND DEMOCRATIC CITIZENSHIP IN SOCIAL STUDIES EDUCATION

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ABSTRACT

Contemporary social studies education continues to prepare students for a public sphere that no longer exists in the form the discipline assumes. Civic knowledge, deliberation, and source evaluation were designed for an information environment mediated by editors, textbooks, and broadcast institutions; today that environment is mediated by recommender systems whose organizing logic is engagement rather than truth. This paper is a conceptual analysis, not an empirical study, built through a purposive synthesis of theoretical and empirical literature. It argues that the erosion of democratic citizenship is not solely a deficit of civic knowledge but a transformation in the epistemic infrastructure through which citizens come to know anything at all. Drawing on Dewey's theory of the public and Foucault's account of disciplinary power, it develops a philosophy of "digital epistemology" for social studies education, organized around two pillars: algorithmic awareness and data citizenship. It translates this framework into a proposed pedagogical model drawing on civic-online-reasoning literature, and argues that without explicit theorization of algorithmic power, the discipline risks irrelevance as platforms, not schools, shape what young citizens believe.

Keywords: digital epistemology, democratic citizenship, algorithmic literacy, social studies education, data citizenship, civic education

Introduction

A student scrolling a short-video feed or a social-networking timeline before school today encounters more purportedly factual claims about politics, history, and society in twenty minutes than a student a generation ago might have encountered from a textbook in a week. What that student sees, in what order, and with what emotional framing is not determined by an editor, a curriculum committee, or even by the student's own deliberate choices. It is determined by a recommendation system optimized to maximize engagement (Zuboff, 2015). This unremarkable fact of contemporary adolescent life has consequences for democratic citizenship that social studies education has been slow to theorize.

The discipline's dominant assumption remains that civic competence is primarily a matter of knowledge deficits. If students do not understand how a bill becomes law, or cannot distinguish a credible source from an unreliable one, the remedy is more content and better information-literacy instruction bolted onto an otherwise unchanged curriculum. We argue here that such a diagnosis, while not wrong, is incomplete. What has genuinely changed since the mid-twentieth-century civics curriculum was designed is not merely the volume of information available to citizens but the mechanism by which citizens come to regard something as true, credible, or worth acting upon. That mechanism is now substantially algorithmic, opaque, commercially motivated, and personalized at a scale no previous information system achieved. Democratic backsliding, declining trust in institutions, and the fragmentation of shared factual ground are, on this account, symptoms of an epistemological transformation as much as an educational or political one.

Our central claim is that social studies education needs an explicit philosophical apparatus for reasoning about how algorithmic systems shape belief formation — what we term “digital epistemology”, rather than treating platforms as a neutral backdrop against which older civic competencies are simply reapplied. Epistemology, in its classical philosophical sense, asks how human beings come to justify belief: what counts as evidence, what counts as a reliable testifier, and what processes reliably track truth. Social studies education has long assumed implicit answers to these questions. An answer, for instance, embedded in the very idea of teaching students to consult an encyclopedia, cross-reference a newspaper, or trust a peer-reviewed textbook. Digital epistemology names the fact that these implicit answers no longer describe how most young citizens actually encounter claims about the social and political world, and that the discipline responsible for producing democratic citizens cannot responsibly leave this transformation untheorized.

The study anchors this claim in the established philosophical theory of John Dewey alongside Michel Foucault's account of disciplinary power. The digital epistemology framework itself is organized around two pillars — algorithmic awareness and data citizenship. Dewey and Foucault were selected as the anchoring theorists because they offer complementary accounts of democratic communication and of power, respectively, and because both have been extended by recent scholarship on digital and algorithmic environments. The literature was identified through targeted searches of Google Scholar and leading education and media-studies journals using terms such as “civic online reasoning,” “algorithmic literacy,” “data citizenship,” and “digital citizenship,” and was retained where it was peer-reviewed and directly addressed civic education, algorithmic curation, or the evaluation of online information. Because this is a conceptual paper, selection was purposive rather than exhaustive, and the sources are intended as a reasoned synthesis, not a systematic review.

Theoretical Framework

1 Dewey's Public and Its Algorithmic Displacement

John Dewey's *Democracy and Education* treats democracy not primarily as a set of institutions but as “a mode of associated living, of conjoint communicated experience” (Dewey, 1916). For Dewey, a public comes into being through shared communication. Citizens become a public precisely to the degree that they hold experiences, concerns, and information in common and can reason about them together. Education's civic task is to cultivate the capacities of inquiry and communication as well as the ability to take the standpoint of others which make such a shared public possible.

Peters and Jandrić (2017) argue that Dewey's framework requires substantial reconstruction, rather than simple application, in a digital communicative environment, because the “global, ecological and digital turns” have altered the very conditions of communicated experience that Dewey took as democracy's foundation. Where Dewey imagined a public constituted through a common object of shared attention such as a town meeting, a shared newspaper or a shared curriculum, contemporary platforms constitute audiences through individualized, algorithmically curated attention, such that two citizens scrolling the same platform at the same moment may share almost nothing in common informationally. This is not a minor technical variation on Dewey's public; it is arguably its structural opposite. A Deweyan public requires overlapping experience as a precondition for democratic reasoning. An algorithmically personalized information environment is engineered, for commercial reasons, to minimize the need for any two users to encounter the same content (Zuboff, 2015). If Dewey's public square is displaced by a privately owned, individually personalized feed, then the philosophical bridge between education and democratic life that Dewey built cannot be assumed to still function. It must be rebuilt with explicit attention to what has changed.

This reconstruction is not merely an academic exercise. Kahne, Hodgin, and Eidman-Aadahl (2016) show empirically that the practices constituting civic and political engagement such as investigation, dialogue, circulation, production, and mobilization are now substantially enacted through digital, peer-based, and platform-mediated channels rather than the institutional channels civic education traditionally assumed. Their concept of “participatory politics,” distinguished explicitly from older models of institutional politics by its peer-based, interactive character and its relative independence from deference to traditional elites, captures precisely the kind of associated, communicated experience Dewey theorized, but relocated onto infrastructure that civic educators did not design and do not control. Because these practices are peer-based rather than institutionally mediated, they are also, crucially, more directly exposed to the ranking and recommendation logics of the platforms on which they occur. A peer's post about a political issue reaches other citizens not through an editorial decision but through an engagement-optimized feed.

Research also confirms that the extent and quality of these online civic learning opportunities measurably predicts students' civic commitments (Bowyer & Kahne, 2020), which strengthens the case that civic education cannot treat the digital environment as incidental to its Deweyan mission, it is now constitutive of it. The foregoing suggests that Dewey's foundational insight that democracy is sustained by the quality of communication available to a public, not merely by the existence of formal institutions remains correct, but that the object requiring pedagogical attention has shifted. Where Dewey's contemporaries worried about the quality of newspapers and the accessibility of public schooling, today's civic educators must worry about the quality and transparency of recommendation systems, and about whether students possess the

conceptual tools to recognize when their communicative environment has been shaped by a logic other than shared deliberation.

2 Foucault, Algorithmic Power, and the Internalization of the Feed

If Dewey supplies an account of what democratic communication should look like, Michel Foucault supplies a vocabulary for the power relations that structure communication as it actually operates. Foucault's *Discipline and Punish* (1977) describes how the panopticon's genius was not constant observation itself but the internalization of observation. Subjects who cannot verify whether they are being watched learn to regulate their own conduct as though they always are. Contemporary studies applying this framework to algorithmically mediated environments finds that a structurally similar dynamic now operates through data collection and behavioural prediction rather than architectural visibility. Dai, Thomas, and Rawolle (2025), in an empirical study of stakeholder experience of AI-mediated surveillance in education, describe this as a “post-panoptic” condition in which behaviour is shaped not only by the awareness of being watched but by continuous predictive feedback and algorithmically generated norms. This is a subtly but importantly different mechanism of power than the one Foucault originally described, because the machine learning system is not a passive observer but an active, adaptive agent of behavioural sorting.

Zuboff's (2015) analysis of what she terms surveillance capitalism supplies the political-economic complement to this Foucauldian account. The “logic of accumulation” underlying platform design is precisely one of extracting behavioural data to refine prediction and, ultimately, to shape future behaviour including, unavoidably, the behaviour of forming beliefs about the social and political world. Where Foucault's disciplinary institutions such as the school, the prison or the barracks operated through architectural visibility and direct supervision, the mechanism Zuboff (2015) describes operates through the continuous, largely invisible extraction of behavioural data, which is then used not merely to observe but to predict and, where profitable, to nudge future conduct. This is a more diffuse and less visible exercise of power than the classical panopticon, precisely because its subjects rarely perceive themselves as being disciplined at all. They perceive themselves as being served, entertained, or connected.

A civics curriculum that teaches students to identify the branches of government while leaving unexamined the disciplinary and commercial logics that structure the information environment in which those students form political judgements has ignored the site where a great deal of contemporary political subjectivity is actually produced. Dai, Thomas, and Rawolle's (2025) finding that AI-mediated surveillance in educational settings itself produces a “post-panoptic” normalization of behavioural monitoring which is one in which students, teachers, and administrators alike come to treat continuous data collection as an unremarkable feature of institutional life is instructive here precisely because it shows the mechanism operating inside schools themselves, not only on the commercial platforms students use outside them. If students are already being habituated, within their own educational institutions, to regard algorithmic monitoring as normal and unremarkable, then a social studies curriculum that fails to name this process explicitly is not merely missing an opportunity, it is tacitly reinforcing the very normalization it ought to be helping students to examine critically.

The Erosion of Epistemic Authority: A Critique of Contemporary Social Studies Pedagogy

The problem is not that social studies education has ignored digital technology altogether; digital citizenship, media literacy, and information-literacy standards have proliferated across curricula (Choi, 2016). The problem is more specific: much of this instruction continues to treat the digital environment as a content problem, teaching students to check whether a given article is

biased or whether a given website is credible while leaving the underlying architecture of algorithmic curation unexamined as an object of civic inquiry in its own right. Choi (2016) carried out a concept analysis of digital citizenship across the field and identifies four recurring categories; ethics, media and information literacy, participation and engagement, and critical resistance. It was found that “critical resistance,” the category most directly concerned with interrogating structural power over information, remains comparatively underdeveloped relative to the other three. In practice, this means students are frequently taught to be discerning consumers of individual pieces of content without being taught to reason about the systems that decided which pieces of content reached them in the first place.

This is a significant omission because the evidence on how algorithmic curation actually shapes political information diets is more complicated, and more instructive, than either the “filter bubble” alarmism or a complacent dismissal of platform effects would suggest. Bakshy, Messing, and Adamic (2015) found in a study of Facebook users that algorithmic ranking modestly reduced exposure to cross-cutting political content, but that individual choices about what to click were a substantially larger factor in limiting exposure to diverse viewpoints than the ranking algorithm itself. The civic-pedagogical implication is important. An oversimplified narrative in which “the algorithm” alone manufactures polarization risks obscuring the fact that algorithmic systems interact with, and often amplify, pre-existing human tendencies toward selective exposure. A social studies curriculum adequate to this evidence must teach students to reason about the interaction between platform design and human psychology, not to treat either in isolation.

At the same time, the broader epistemic environment these platforms have helped produce is genuinely altered. Lewandowsky, Ecker, and Cook (2017) argue that misinformation in the contemporary “post-truth” environment cannot be treated as an isolated failure of individual reasoning correctable through fact-checking alone, because it is sustained by societal-level trends of declining social capital, rising polarization, and a fractionated media landscape that operate at the level of the information ecosystem rather than the individual mind. Their argument implies a division of labour that most social studies curricula do not currently make explicit. Some interventions such as teaching students to verify a claim, to check a source's authority or to recognize a logical fallacy operate at the level of individual cognition and remain necessary, but other interventions must operate at the level of the ecosystem itself, helping students understand why an information environment structured around engagement metrics will systematically reward emotionally charged, identity-confirming content over accurate but unremarkable content, independent of any individual's reasoning failures.

If this diagnosis is correct, then civic education strategies aimed only at individual critical-thinking skills, however valuable, are addressing only part of the problem. The other part is structural, and requires students to understand something of how the information ecosystem itself is organized and monetized. A curriculum that teaches students to “check their sources” without ever asking why sources of a particular emotional register are more likely to reach them in the first-place risks treating a systemic phenomenon as though it were a purely individual one. Hence, placing the entire burden of epistemic self-defense on the student while leaving the architecture that produces the problem outside the scope of civic inquiry altogether. This is precisely the gap that a digital epistemology framework is designed to close.

Toward a Digital Epistemology Framework

We define a digital epistemology framework for social studies education as an explicit pedagogical account of how algorithmically mediated environments shape the formation, circulation, and validation of belief, organized around two interlocking pillars.

1 Algorithmic Awareness

Algorithmic awareness concerns students' understanding of how recommendation and ranking systems select and sequence the information they encounter, and why. This is distinct from and prior to the more familiar skill of evaluating individual sources. Tayie (2025) in a systematic review of algorithmic personalization and polarization in educational contexts finds that algorithms play a genuinely dual role. They can broaden exposure to diverse content in some configurations while reinforcing existing beliefs through filter-bubble and echo-chamber dynamics in others, and argues that media-literacy interventions explicitly targeting algorithmic mechanisms rather than only content evaluation are necessary to help learners navigate AI-curated news environments. This dual character matters pedagogically. A curriculum that presents algorithmic curation as uniformly and simplistically dangerous risks the same oversimplification as one that ignores it altogether. Students need the conceptual resources to recognize that the same underlying mechanism of personalization for engagement can, depending on context and platform design, either widen or narrow the range of political perspectives an individual encounters, and that this is itself an empirical question requiring evidence rather than intuition.

This is consistent with Kellner and Share's (2007) argument that critical media literacy for a genuinely democratic education must address how media institutions and technologies structure meaning and power, not merely how to decode individual messages. Before the platform era reached its current scale, Kellner and Share already insisted that media literacy adequate to democratic citizenship must be a form of critical pedagogy concerned with structures of ownership, production, and power, rather than a narrower skills-training exercise in spotting bias. Algorithmic awareness, as developed here, is best understood as the direct descendant of that argument, updated for an information architecture in which the relevant structure of power is not primarily editorial ownership but computational curation. Algorithmic awareness asks students to move from the question "Is this claim true?" to the prior question, "Why was I shown this claim, by whom, and for what purpose?" This reordering of civic inquiry treats the sequencing of information, not only its content, as a legitimate object of democratic scrutiny.

2 Data Citizenship

The second pillar reframes what earlier frameworks have called data literacy as a matter of citizenship rather than technical competence alone. Carmi, Yates, Lockley, and Pawluczuk (2020) develop the concept of "data citizenship" precisely to capture this shift. Understanding data not merely as something to be manipulated correctly, but as a domain in which citizens hold rights, exercise agency, and can be exploited if they do not. Their framework, developed explicitly in response to the age of disinformation and misinformation, treats data literacy as inseparable from questions of consent, surveillance, and the political economy of platforms. For social studies education, this reframes a familiar civics question: what rights does a citizen hold, and against whom are those rights exercised? — for an environment in which the primary counterparty is frequently a private technology firm rather than the state.

This reframing matters because the traditional civics curriculum already possesses a well-developed vocabulary for reasoning about rights, obligations, and the relationship between citizen and authority. What it has generally lacked is an application of that vocabulary to a counterparty which is in this case, the commercial technology firm that does not fit neatly into the state-centred model of citizenship that civics curricula still assume. Carmi et al.'s (2020) data-citizenship framework provides exactly this bridge, treating questions of consent, data ownership, and platform accountability as continuous with, rather than separate from, the traditional civics concerns of rights and obligations. A social studies unit that asks "What rights does a citizen hold

against the state?” is, on this framework, incomplete unless it also asks “What rights, if any, does a citizen hold over the data a platform collects while that citizen exercises their political voice online?”

Students who can reason about why they are shown particular political content (algorithmic awareness) and about what is done with the data their engagement with that content generates (data citizenship) possess a form of civic competence that neither traditional civics instruction nor content-focused media literacy, on its own, currently provides. This is the sense in which digital epistemology is not an additional unit to be appended to an existing scope and sequence, but a lens through which existing civics and history content such as elections, rights, social movements, propaganda and public opinion can be reconsidered for an environment in which the infrastructure of public communication has fundamentally changed.

Operationalizing Digital Epistemology in the Classroom

A philosophy of digital epistemology is only as useful as its translation into classroom practice, and here the existing literature on teaching digital evaluation skills offers considerable, encouraging guidance while also making clear that the task is harder than intuition suggests. McGrew, Breakstone, Ortega, Smith, and Wineburg (2018), in the foundational large-scale assessment of what they term “civic online reasoning” across thousands of middle-school, high-school, and college students in numerous U.S. states, found that students at every level struggled substantially to evaluate the credibility of online political and social claims. Many could not reliably distinguish sponsored content from independent reporting, and many based credibility judgements on superficial website design rather than on the reliability of the underlying source. This finding is sobering precisely because it was obtained from students who had already received some form of media-literacy instruction. It suggests that generic “check your sources” instruction is not sufficient.

McGrew (2020) in a subsequent intervention study demonstrated that explicit instruction grounded in the strategies professional fact-checkers actually use like “lateral reading,” in which the reader leaves an unfamiliar site to search independently for information about its source, rather than evaluating the site using only cues internal to the page itself measurably improved students' evaluative performance. Hence, source evaluation is a teachable strategy, not merely a disposition, and it is most effective when it mirrors the practical heuristics of domain experts rather than abstract checklists. It follows that teacher preparation, not only student curriculum, is implicated in the digital epistemology framework. A teacher cannot model lateral reading, algorithmic questioning, or data-citizenship reasoning for students without having first developed these habits in their own information practice, which suggests that professional development in this area should be treated with the same seriousness as content-area preparation in history or economics.

These findings support a design principle for digital epistemology instruction. It should be built around authentic tasks modelled on how credibility is actually established by skilled practitioners, rather than around generic checklists of warning signs, because the empirical evidence indicates that checklist-style instruction alone has not reliably closed the evaluation gap that McGrew et al. (2018) documented.

Translating the digital epistemology framework into classroom units within an inquiry-based structure suggests several concrete strategies for Social Studies, history and civics teachers:

- 1. Reframe source-evaluation lessons around algorithmic provenance:** Alongside teaching students to ask whether a source is credible, teachers should routinely ask compelling questions such as, “What platform served you this content, and what does that platform optimize for?” This enables algorithmic awareness.

2. Teach lateral reading as a core historical-thinking skill: Lateral reading should be taught as a core skill not an isolated digital-literacy add-on, building directly on McGrew (2020) evidence that this strategy is both teachable and effective.

3. Incorporate data-citizenship case studies into civics units on rights and government: The Carmi et al. (2020) framework can be used to extend existing curricular treatment of constitutional rights to the question of what rights, if any, citizens hold over data generated by their own political engagement online.

4. Use the empirical ambiguity of the filter-bubble evidence itself as an inquiry object: Rather than presenting algorithmic polarization as settled fact, teachers can present students with genuinely contested findings such as Bakshy et al. (2015) showing that individual choice, not algorithmic ranking alone, was the larger factor limiting exposure to diverse political content on Facebook as a compelling question for structured classroom deliberation, modelling reasoning under empirical uncertainty that is itself a core democratic competency.

5. Connect data citizenship and civic participation explicitly: Teaching students to critique platforms, spotting algorithmic curation and questioning data practices isn't enough on its own, because research shows young people's real civic engagement now happens largely through these same digital, peer-based channels (Kahne et al., 2016). Bowyer and Kahne (2020) found that giving students structured, guided practice actually using these channels for civic purposes like organizing, campaigning and discussing issues measurably strengthens their civic commitment. So a digital epistemology curriculum should pair critical awareness of platforms with hands-on, supported practice about using them well, rather than teaching suspicion alone.

Limitations and Future Research Directions

It should be noted that the framework proposed above is yet to be tested empirically and this should be a subject of further study. While the digital epistemology framework offers a robust theoretical lens for reconstructing civic education, its translation into widespread classroom practice faces tangible limitations. First, teacher preparedness remains a significant barrier. As the civic online reasoning literature suggests, educators cannot effectively model algorithmic awareness or data citizenship without first developing these competencies in their own information practices. Yet, pre-service and in-service professional development rarely addresses the political economy of platforms or the mechanics of algorithmic curation, leaving teachers to navigate this terrain without institutional support. Second, structural constraints within broader education systems, such as standardized testing regimes and rigid scope-and-sequence mandates, often disincentivize the deep, inquiry-based exploration this framework requires. These systems frequently favor the easily assessable, surface-level fact-checking skills that we argue are insufficient, rather than the complex systemic reasoning digital epistemology demands. Finally, the rapid pace of technological change means that specific platform mechanics discussed today may evolve or be replaced, requiring the framework to remain conceptually adaptable rather than tied to transient technical features.

Consequently, future research must move beyond theoretical articulation to empirical validation. Longitudinal, mixed-methods studies are needed to measure the specific impact of teaching the twin pillars of algorithmic awareness and data citizenship on students' civic outcomes. Key metrics for such research should include changes in students' susceptibility to emotionally charged misinformation, their willingness to engage in cross-cutting political dialogue, and their developing sense of legal and ethical agency regarding their personal data. Additionally, design-based research and action-research collaborations between university scholars and K–12 teachers could yield valuable, context-specific pedagogical models. Such collaborations would demonstrate

concretely how digital epistemology can be seamlessly integrated into existing social studies, history, civics, and economics lessons without requiring teachers to become computer scientists.

Conclusion

Social studies education was built for an information environment with editors, gatekeepers, and a rough approximation of a shared public square. That environment has not disappeared, but it has been layered over by an algorithmically curated one that operates on a different logic: engagement rather than deliberation, personalization rather than commonality, and prediction rather than persuasion. We argue that the appropriate response is neither technological alarmism nor complacent continuity with existing civics instruction, but a deliberate philosophical reconstruction of the discipline's foundations. This requires a digital epistemology that asks students not only whether a claim is true, but why they were shown it, who profits from their attention to it, and what happens to the data their attention generates.

Dewey supplies the normative vision of what shared democratic communication should accomplish. Foucault, and the literature on algorithmic and platform power that has extended his insights, explains the forces working against that vision by default. The civic-online-reasoning evidence suggests that the gap between the two is not inevitable, and that algorithmic awareness and data citizenship can give instruction aimed at closing it a coherent philosophical foundation.

None of this implies that social studies teachers must become computer scientists, nor that civics instruction should be reduced to commentary on technology firms. The discipline's inquiry-based architecture can absorb this reorientation, provided the questions students ask about evidence are extended to include the algorithmic and data-political dimensions of the environment in which that evidence now reaches them. If social studies education does not do this, it risks a diminished role in a public sphere increasingly authored elsewhere, by the design choices of a small number of technology firms whose central objective was never civic education. Reimagining democratic citizenship for this environment means reclaiming for the social studies classroom a question it has always claimed as its own: who gets to decide what a citizen knows, and on what authority?

That question will not be settled by argument alone, however, and because the digital epistemology framework proposed here remains conceptual and has not yet been tested in any classroom, its promise should be read as a hypothesis awaiting empirical evidence, not as a demonstrated result.

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