Platform Studies in Education

T. PHILIP NICHOLS
Baylor University

ANTERO GARCIA
Stanford University

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Abstract *In this introductory essay in "The Platform Studies in Education" symposium, T. Philip Nichols and Antero Garcia consider the expanding role of platform technologies in teaching, learning, and administration and the contributions of education research to the emerging multidisciplinary literature of platform studies. Their essay outlines theoretical lineages that identify platforms not as standalone tools but as multisided markets linking their users to competing social, technical, and political-economic imperatives. It also highlights connections to related education research that demonstrates the impact of these conflicting imperatives for equitable student learning, teaching teacher education, and policy making. The authors conclude by reflecting on the critical interventions that greater attention to platform relations in education might offer and the forms of coalitional work, across disciplinary and geographic borders, needed to realize these potentials.*

Keywords educational technology, technology uses in education, educational media, platform technologies, platform studies

Digital platforms have become an unavoidable part of modern education. Even before a global pandemic pushed schools into prolonged periods of online instruction, a significant amount of teaching, learning, and administration was already being facilitated through platform technologies. Though the most familiar platforms are multipurpose giants like Google, Amazon,

and Facebook, the term also applies to more specialized resources, such as those educators use to manage classrooms (ClassDojo), present curricular content (Prezi), monitor school devices (GoGuardian), assess learning (Kahoot!), communicate with families (SeeSaw), and supplement instruction (Khan Academy). Students, too, use platforms to access, produce, and submit assignments, and central offices rely on them to gather and analyze school and classroom data. Even curriculum providers increasingly bundle their products with platforms to personalize content and measure learning outcomes. Few corners of education, it seems, have escaped platforms' reach. While the COVID-19 pandemic has heightened our dependence on such technologies, the embedding of platforms in the everyday life of schools—what some call the "platformization of education" (Perrotta, 2020; van Dijck & Poell, 2018)—has been an ongoing process over the last decade.

Concurrent with the rise of platforms in education, several high-profile incidents have raised questions about their wider social impacts. Edward Snowden's 2013 National Security Agency revelations showed that the connectedness made possible by networked platforms could be easily appropriated into state agendas for mass surveillance (Gellman, Blake, & Miller, 2013). The 2018 Cambridge Analytica scandal, likewise, highlighted how data harvested from platforms could be used not only for micro-targeting advertisements to consumers but for spreading misinformation and disenfranchising voters, all while generating value for platform owners (Rosenberg, Confessore, & Cadwalladr, 2018). Critical scholarship also shined a light on the often-hidden mechanisms that animate platform technologies and the ways that code, data, and algorithms reproduce raced, classed, gendered, and abled formations of difference. Books like Safiya Noble's

Algorithms of Oppression (2018) and Cathy O'Neil's *Weapons of Math Destruction* (2016) have inspired popular documentaries (Netflix's *Coded Bias* and HBO's *Persona*, respectively) and, in turn, have helped cultivate a growing public dialogue about ethics, equity, and justice in a world increasingly mediated by platforms.

This essay, and the symposium it introduces, is interested in the relationship between the ongoing platformization of education, on one hand, and the uneven impacts that platforms are having on civic life and planetary flourishing on the other. While it would be comforting to compartmentalize the two—to see our preferred pedagogical apps as somehow distinct from the injurious platforms in newspaper headlines—there are more continuities between them than differences. Indeed, a growing body of international, multidisciplinary research, loosely clustered together under the name "platform studies" (Burgess et al., 2016; Plantin et al., 2018), has shown that platforms of all kinds frequently share a common organizational logic beneath their surface-level differences. Unlike software solutions of the past, platforms do not just deliver consumer-facing services to their users but simultaneously extract data from these interactions, which their owners can sell or use in future product development. This two-sided logic presents challenges for anyone weighing the costs or benefits of a given platform. Since 2020 we have seen how the same tools that helped mobilize protests in response to state violence against Black lives also provided data to those policing and suppressing movements for racial justice. In schools, we have seen how the same services that allowed instruction to persist through a pandemic also extended new (and already-existing) modes of surveillance into intimate corners of students' homes and

personal lives. Amid such contradictions, how are educators to determine which platforms are helpful or harmful, which should be implemented, adapted, regulated, or avoided?

Reasonable as these questions are, we suggest they are the wrong starting point for making sense of the evolving role of platforms in education. Platforms are not static tools that can be subjected to a simple cost-benefit calculus or selectively wielded to achieve only the most morally laudable goals. They are dynamic environments that materialize a range of competing interests and imperatives in the educational settings where they are introduced. Following scholars working in or adjacent to platform studies, we suggest that attending to the social, technical, and political-economic dimensions of platforms offers a more generative path forward. Only by grappling with the uneven impacts of platforms on teaching, learning, and administration can we truly confront the challenges and opportunities that connective technologies pose for ethical and equitable education.

In what follows, we offer an overview of platform studies as an emerging field of inquiry and discuss its relational orientation to studying and intervening in networked technology systems and its connections to existing research in education. We outline how a focus on platform relations can help crystallize new potentials for education research, policy, and practice, possibilities that are reflected and extended in the articles included in this symposium. Ben Williamson, Kalervo Gulson, Carlo Perrotta, and Kevin Witzenberger (2022) examine the policy implications of platforms increasingly functioning as critical infrastructures for K–16 education and molding institutional norms and practices to their own logics. Luci Pangrazio, Amy Stornaiuolo, T. Philip

Nichols, Antero Garcia, and Thomas M. Philip (2022) read across three vignettes to consider how attention to platforms offers educators resources for identifying data processes that work for and against the interests of students. Finally, Niels Kerssens and José van Dijck (2022) reflect on the transnational impacts of private platform providers becoming key actors in public education and offer counterstrategies that researchers and practitioners might use to advance a more equitable and democratic vision for technology in public schools.

Defining Platform Studies

Platform studies is a transdisciplinary area of inquiry that examines the form, function, and politics of platform technologies and their impacts on society. Early uses of the term were applied to scholarship that examined how the design of computing hardware, such as personal computers and gaming systems, helped shape the software applications developed for it (Montfort & Bogost, 2009). Over time, however, the concept of "platforms" evolved to include new modes of digital exchange that accompanied the spread of e-commerce, content sharing, and social media websites at the turn of the century. It was also bolstered by the advent of mass-market smartphones and mobile applications (apps). Media theorist Tarleton Gillespie (2010) noted that *platforms* is "an increasingly familiar term in the description of the online services of content intermediaries" (p. 348), and, as such, they offer a useful site for illuminating the political contexts of the emerging connective media landscape.

The familiarity of platforms has only grown since then. Burgess (2021) suggests we are now living under a "platform paradigm" (p. 22), where platforms like Google and Facebook have

tremendous national and international influence. Their logics—their ways of operating and their systems of value—are actively reshaping foundational infrastructures of social and economic life. For management and business scholars, these transformations are cause for celebration. They laud "the platform revolution" as a necessary development for disrupting antiquated industries and institutions, from hospitality (Airbnb) and transportation (Uber) to higher education (EdX) (Parker, van Alstyne, & Choudary, 2016). They regard platforms as an opportunity to spur innovation and economic growth by harnessing the latent power of data sharing and automation.

Sociologists and legal scholars have been less optimistic. They argue that the expansive forms of surveillance and data extraction on which the emerging "platform economy" depends are a threat to the rights of not just active platform users but all citizen-consumers caught in the wake of platformization (Pasquale, 2015; Vallas & Schor, 2020). Jose van Dijck, Thomas Poell, and Martijn de Waal (2018) affirm this, suggesting that platforms are not so much ushering in a revolution as they are "gradually infiltrating in, and converging with, the (offline, legacy) institutions and practices through which democratic societies are organized" (p. 2). From this view, platforms are both less and more "disruptive" than their boosters assert. Less because they rarely deliver the radical social transformations their owners promise, and more because the mundane transformations that they do deliver are incrementally remaking civic life and public infrastructures in the image of platform technologies—nudging them to comport with the architectures and logics of platforms and, by extension, with the values, biases, and political ambitions of their funders, owners, and designers.

A Relational View of Platforms

Disputes over the potentials and perils of platforms likely ring familiar to education researchers and practitioners. As sites where competing visions of innovation and technology-driven transformation have long been applied and contested (Cuban, 1993), schools figure heavily in debates over the social futures made possible by platformization. Calls for technology-enhanced "disruption"—of teaching, learning, curriculum, assessment, discipline, administration—have become familiar refrains at all levels of the education system (Christensen, 2008; cf. Nichols, 2022). And these appeals are increasingly met with rejoinders about the failed promises of disruption (Reich, 2020) and the historical role of technology in deskilling teacher labor and perpetuating inequality (Watters, 2021). Understandably, such clashes can leave educators uncertain about how trusting or skeptical to be about the platform technologies offered to classrooms. Integrating them becomes a cost-benefit analysis with no easy answers, one that weighs the concrete efficiencies and affordances of platforms against the vague, yet consequential, impacts they might hold for teaching and learning.

What platform studies offers to these deliberations is a different approach to thinking about digital media: a *relational* orientation. Unlike a calculator or an overhead projector, a digital platform is not a singular or stable technology. It is a platform *for* something else—just as a physical platform supports the weight of an object or a political platform advances a group's policy priorities. In Tarleton Gillespie's (2010) foundational formulation, platforms are "intermediaries" for social exchange; their primary function is not "social exchange" itself but the creating and conditioning of relations that make such exchanges possible. This means that even though it is common to talk

about, or evaluate, platforms in terms of what they do (e.g., delivering goods and services), understanding them requires that we also grapple with how they do it, with the ways they mediate relations among users, service providers, and other technical systems.

While not all of the scholarship that takes such an approach explicitly categorizes itself under "platform studies," we find the term helpful for distinguishing research tuned to the relations that animate networked media from more conventional explorations of a technology's fixed features, affordances, or efficacies. Given the range of disciplinary lineages contributing to this growing assemblage of inquiry—from sociology (Burrell & Fourcade, 2021), law (Cohen, 2017), and cultural studies (Ferrari & Graham, 2021) to economics (Sanchez-Cartas & León, 2021), political theory (Di Porto & Zuppetta, 2020), and urban planning (Bauriedl & Strüver, 2020)—there is no singular conceptual or methodological framework around which all platform-oriented scholarship coheres. Nevertheless, there are family resemblances in how these literatures foreground platform relations, and theorists of platformization have offered flexible heuristics for interrogating such relations that resonate across disciplinary specializations (Bratton, 2015; van Dijck et al., 2018). One of the earliest and most influential of these models is van Dijck's (2013) conception of platform relations as an interplay among the social, technical, and political-economic dimensions. We elaborate on this model to draw connections to existing education research and to highlight new lines of inquiry and collaboration that such an orientation has begun, and might continue, to open for the field.

In Jose van Dijck's (2013) model, the *social* dimension refers to the uses and outcomes of platform processes. This is the dimension that surfaces most commonly in discussions of platforms in education. It includes the activities of users (e.g., consumers, producers, platform workers) as well as the content generated in and circulated through platforms (e.g., audio-visual-textual media, advertisements, products, services). The *technical* dimension refers to the constellation of technologies—code, data, algorithms, interfaces, protocols, hardware—that allow platforms to run. And the *political-economic* dimension refers to the commercial and regulatory interests that condition platforms' designs and uses (e.g., governance, ownership, and business models), along with the material resources on which the operation of platforms depends (e.g., rare earth minerals, factory labor, supply chains, cloud servers).

To illustrate the relations between these dimensions, we build on van Dijck's (2021) suggestion that we think of platform relations like a tree (figure 1). Just as a tree's visible leaves, fruits, and flowers depend on invisible circulations in its trunk and root system, the social uses and impacts of platforms are always conditioned by their technical and political-economic substrates. Even seemingly mundane activities—using a search engine, "liking" a post, entering grades in a learning management system—are guided by the interrelations of each platform dimension. Put simply, not one of these dimensions exists independently; each perpetually invokes and co-constitutes the others. While our visualization of this phenomenon is not a totalizing view of all possible platform relations, as a heuristic it begins to highlight the range of interests and actors that platforms mediate as well as locations where education research, policy, and practice might strategically engage and intervene.

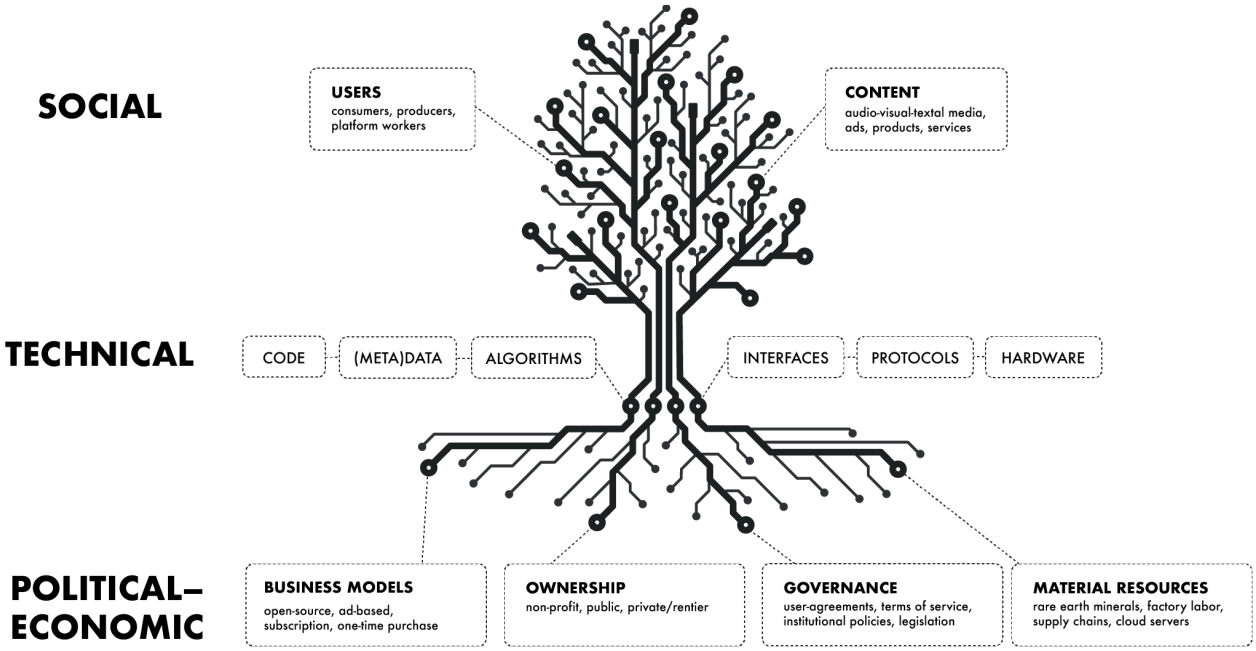

Figure 1.

This relational orientation challenges the most familiar perspectives on digital technologies in education. Education research and practice related to platforms tend to privilege the social dimension over, and apart from, the others. During the COVID-19 pandemic, for instance, we witnessed a collective rush for districts to identify platform solutions that could be used to approximate or replace in-person practices. Consideration of the technical and political-economic implications of these adoptions, if it occurred at all, was an afterthought, secondary to their immediate social utility (Williamson, 2021). The centering of technology's social uses for education was also a pattern before the pandemic. For example, scholars have long explored the powerful social practices that emerge when young people use digital platforms for personal expression and political action (Lankshear & Knobel, 2011) or when educators use social media to forge professional learning networks (Greenhow, Robelia, & Hughes, 2009). District and

school policies, likewise, have foregrounded "digital citizenship" and "appropriate use" related to technology—decidedly social concerns—over regulations geared toward transparency, accountability, and local oversight in other dimensions of platform systems (Hollandsworth, Donovan, & Welch, 2017). To be clear, we do not dismiss such work. These are significant and necessary contributions to our understanding of teaching and learning in the context of platformization. Our contention is not that the social dimension is unimportant but, rather, that divorced from its technical and political-economic relations, it offers only a partial view of the meaning, function, and impact of platform technologies in education. This, in turn, can make it easy to overlook some of the more subtle ways that platforms both enable and constrain activities in classrooms.

Frictions: How Platforms Empower and Disempower

A relational view of platforms helps crystallize something that a focus on any one of their dimensions alone can hide: platforms are shot through with contradictions. The technical features that platforms inherit from their designers and the economic imperatives imposed by the business world are not always aligned. The leafy social dimension of platforms is also often far removed from a platform's economic roots, which can prevent the interests and values of users from manifesting in the platform's design.

Economists Juan Manuel Sanchez-Cartas and Gonzalo León (2021) suggest that such frictions are endemic in the very logic of platforms as we know them. As multisided markets, platforms simultaneously offer diverse services to consumers while extracting data from them. This data

feeds internal uses and drives external sales; platforms' commitments to user needs and public well-being are always refracted through potentials for profit, growth, and power. Scholars have given different names to this dynamic—platform capitalism (Srnicek, 2017), surveillance capitalism (Zuboff, 2018), rentier platforms (Sadowski, 2020)—that highlight the economic imperatives that underwrite the observable, even mundane, uses of platforms in everyday settings. Where these contradictory impulses bump against one another, frictions emerge that have profound implications for civic and environmental flourishing and, by extension, for ethical and equitable education.

Discriminatory Design and Predatory Inclusion

One way that the frictions in platform capitalism impact civic life is through what Ruha Benjamin (2019) terms "discriminatory design." This is the process by which platform designers reproduce raced, classed, gendered, and abled biases by coding them, knowingly or unknowingly, into platform architectures. The effect of discriminatory design is that existing social hierarchies are reinforced, or exacerbated, through often-invisible technological means. Safiya Noble (2018), for instance, shows how "color-blind" search engine algorithms misrepresent marginalized subjects by privileging the circulation of hypersexualized images of Black women. Virginia Eubanks (2017) similarly demonstrates how automated decision-support systems exclude poor people from social welfare programs. The opacity of the design of these products, as well as the neutral framing of their outcomes, allows these systems to discriminate if no intentional intervention develops. Many educators experienced a form of discriminatory design in the pivot to virtual instruction during the COVID-19 pandemic. Platforms like Zoom use face-detection algorithms, which have

been shown to be less accurate for nonwhite users (Dickey, 2020), thus making basic features of the software more difficult for teachers and students of color to use without being washed out or disappearing into a virtual background. In this way, platforms, through their technical designs, can withhold functionalities, resources, and representations from users in ways that reinforce existing formations of difference.

Platforms don't just perpetuate inequity through exclusion. A second way is through what sociologist Tressie McMillan Cottom (2020) describes as "predatory inclusion" (cf. Taylor, 2019), where commercial platforms lure in users with short-term benefits (e.g., free services; subsidized devices; "access" to information, skills, or credentials) while locking them into long-term predatory relationships (e.g., data extraction, surveillance, exploitative contract terms). A highly visible example of this are "gig work" platforms like Uber, Doordash, or Amazon's Mechanical Turk, which use the assurance of "flexible hours" and "being your own boss" to enroll those excluded from stable employment into low-paying and precarious labor conditions without benefits or protections (Dubal, 2017; Irani, 2015). It isn't difficult to find analogous practices in education. Over the last decade, platform providers have embedded themselves into all aspects and levels of school systems, in part, through promises to ameliorate administrative and pedagogical concerns related to accessibility, cost savings, data-driven decision-making, and college and career readiness. This includes the introduction of platform-mediated massive open online courses, or MOOCs (e.g., edX), and high-revenue degree and micro-credentialing programs (2U, Code Bootcamps) in higher education (McMillan Cottom, 2017; Williamson, 2020) and in K–12, the expanded imprint of subsidized hardware (e.g., Chromebooks) and

learning management systems (e.g., Google Classroom) and the recruitment of educators as brand ambassadors (e.g., Google Certified Teacher/School programs) (Krutka, Smits, & Willhelm, 2021; Saldaña, Welner, Malcolm, & Tisch, 2021). Such practices are "inclusive" in that they expand access to technologies and credentials for a greater number of people but also "predatory" because they do so by capitalizing on the real and perceived needs of schools, often in ways that privilege commercial interests over the privacy, autonomy, and the long-term well-being of teachers and public institutions.

There is also another, more subtle way that platforms can be predatory. The data they generate, and their mechanisms for extracting it, not only threaten the privacy of individual students and educators, but they also reinforce the integration of technologized surveillance in schools, as they do in other sectors of society (singh, Davis, & Gilliard, 2021). The platforms commonly used for monitoring attendance, behavior, and academic performance or for personalizing assessments and instruction, for instance, increasingly derive diagnostic, and even speculative, insights about students (Lupton & Williamson, 2017). This information not only shapes how students are positioned in relation to teachers and school systems, but it also normalizes surveillance as an unavoidable, and perhaps even desirable, part of living in an age of connective technology. Crucially, the consequences of this normalization do not fall evenly on all students. As Simone Browne (2015) argues, regimes of surveillance have been disproportionately weaponized against marginalized communities, especially communities of color. For instance, in education there are multiple instances of districts sharing the data they collect about students with Homeland Security fusion centers and Immigration and Customs Enforcement agents (Abamu, 2018;

Bedford, 2020). This suggests that even though platform data can be put to benign uses in schools, students' inclusion in these data sets leaves them at the mercy of people, policies, and software systems that control how that data is circulated and that may link them to wider modes of racialized surveillance and policing. While research that attends primarily to platforms' most immediate social uses could easily overlook such frictions, a relational perspective helps make them visible for analysis, resistance, and regulation.

Digital Colonialism and Planetary Flourishing

Understanding platforms relationally also points to the scales beyond individuals, classrooms, and schools to which such technologies are connected. One reason that education research tends to focus so intently on the social uses of platforms is because it's common to think about technology primarily in the localized contexts where it operates. We weigh the affordances and drawbacks of Google Classroom for learning management or Twitter for professional networking by considering their immediate impacts in our classrooms and in our lives. This makes intuitive sense. However, the relational nature of platforms means that these uses are never as bounded as they appear. Every login, click, swipe, and keystroke ripples outward, linking us—via platforms' technical and political-economic dimensions—to other software systems, commercial interests, and production processes unfolding both nearby and around the world.

Platform companies are well aware of the benefits to be gleaned from these local and global connections. When Google or GoGuardian converts our usage into data, it is not because they are interested in us as individuals. Rather, they recognize there is tremendous value in pooling

our behavioral data with others' to derive population-level insights, which they can either sell or use to edge out their market competition (Viljoen, in press). In the platform economy, data is capital, and the low barriers to collecting it produce powerful incentives for companies to expand their reach to ever-wider domains. Benjamin Bratton (2015) suggests that the largest firms increasingly function as sovereign states, each with its own forms of "soft power" foreign policy. Much as companies like Google, Amazon, Apple, and Microsoft have cemented their place in education systems in the Global North through the provision of free or inexpensive hardware and software services, they increasingly do so in the Global South in exchange for government contracts and favorable regulatory conditions—a phenomenon legal scholar Michael Kwet (2019) calls "digital colonialism." Kwet's research on the South African education system reveals how platform providers are following familiar colonial blueprints to secure political-economic advantages around the world and how these movements often use schools as a powerful wedge for gaining influence in other public institutions and infrastructures. This Trojan horse strategy often yields unexpected consequences. Morgan Ames (2019) shows, for instance, that when the adoption of individual laptops in Paraguayan schools required students to have a unique identification number, this became justification for the government to force parents, particularly in rural areas, to register with the state so their children could access such devices. While not a planned part of the school laptop program, this centralized data system became an infrastructure through which the state could enforce military service and fines and, potentially, suppress dissent. Of course, as in the longer history of colonialism, there are also important local contingencies for how these interventions unfold and how communities are resisting and subverting the impositions of platform providers (King, Forsey, & Pegrum, 2019). These include strategically using free,

open, and decentralized alternatives to institutionally sanctioned commercial software (Kwet, 2019) or prioritizing information and communication technologies that can be creatively repurposed to sustain community interests and autonomy (Okon, 2015). More empirical accounts of these contestations are needed to better understand and respond to the transnational variations and implications of platformization in education and beyond.

The language of colonization might also be apt for describing platforms' inflections beyond the scale of nation-states. Despite the familiar associations of digital media with "going green," it is becoming increasingly evident that platform technologies are having devastating impacts on the health of the planet (Carruth, 2014). One reason for this is the hardware on which platforms run. The model of "planned obsolescence" that technology companies use to coax users into regularly buying new, slightly improved devices has accelerated the production of waste both in manufacturing and consumption (LeBel, 2016). Schools are not immune from this pattern: the imperative to keep pace with the latest technologies has tethered district spending and classroom practices to the whims of technology firms' update cycles for decades (Cuban, 1993; Garcia & Nichols, 2021). The environmental costs involved in perpetually dismantling, recycling, or disposing of these technologies are considerable, and they have been demonstrated to result in heightened pollution and contamination, often in the poorest parts of the world (Nixon, 2011).

Another reason for the environmental impact of platforms is the infrastructures they depend on. While the imagery associated with platforms often evokes a kind of airy immateriality, things like "the cloud" and "wireless networks" are actually supported by deeply material global processes.

Lisa Parks and Nicole Starosielski (2015) argue that networked media cannot be understood apart from the diverse resources that underwrite them—transoceanic cables, telecom wiring, server farms, cooling plants, shipping logistics—to say nothing of the human labor and natural resources involved in creating and sustaining these infrastructures. All of this involves a tremendous amount of energy to maintain, even though much of it occurs at scales conveniently obscured from the user of a given platform. Though it is easy to forget, the connectivity so often ascribed to digital platforms not only links us to friends, colleagues, goods, and services but also connects us to these broader political-economic relations, where the ethical implications resonate well beyond individual users. To the extent that our school systems are inextricably bound up with these processes, these, too, are matters of educational concern (Selwyn, 2021). A relational approach to platforms offers an orientation that helps bring into view these distant scales and their attachments to local practices.

Platform Relations in Current Education Research

It can be daunting to think about digital platforms from this relational perspective. It would be far simpler, and more straightforward, just to focus on their instrumental social uses for teaching, learning, and administration and to ignore the interests and imperatives embedded in their technical and political-economic dimensions. However, only by looking across these relations can we get a clear picture of the ways platformization is influencing teaching and learning and its implications for ethical and equitable public education. While a focus on the social remains the predominant emphasis in education research and practice, a growing literature has begun

laying critical groundwork for sustained inquiry into platform relations in education and avenues for response.

Much like in the broader, amorphous field of platform studies, the education scholarship tuned to the social, technical, and political-economic dimensions of platforms is not a monolith. There is no singular genealogy that accounts for its emergence or spread in education. Some come to this orientation through direct engagement with self-identified platform studies work in communication, media, and legal studies. The subfield of critical edtech, for example, where scholars have long advocated for a turn from examining instrumental tech use to the underlying politics of technology (Selwyn, 2012), offered some of the earliest coarticulations of these literatures, spotlighting the challenges that big data and platform technologies pose for educational governance and practice (Decuypere & Simons, 2014; Eynon, 2013; Williamson, 2015). Others, however, have come to the study of platforms relations obliquely, through traditions of media education (e.g., critical media literacy, media ecology, digital literacy) or through situated problems of practice arising from the use of networked technologies in education. These variations help explain the wide range of theories, methods, and citational chains appearing across the platform-related education research now emerging.

While it is beyond the scope of this essay to give a comprehensive review of these lineages or their offshoots in educational platform studies, it is worth highlighting some recent work that elucidates the far-reaching implications of platform relations for learning, teaching, and policy. Where, in the past, it may have been possible to relegate technology concerns to the purview of specialized

fields within education, this scholarship, taken together, suggests that platformization increasingly renders such distinctions meaningless. Few, if any, corners of education today are untouched by the mediations of platform technologies.

Platform Relations in Student Learning

In literacy studies, a growing research base examines the ways students' learning in and with digital media are always co-constituted with the technical dimensions that underwrite them (Burnett & Merchant, 2020; Leander & Burriss, 2020; Nichols & Johnston, 2020; Nichols & LeBlanc, 2021). These studies foreground the active role played by platforms' technical components in shaping what students do, make, say, or think in classroom settings. Bethany Monea (2020), for example, shows how platform interfaces—the design and layout of features on the screen—conditioned students' interactions in an online writing community by nudging them toward certain forms of participation over others. Importantly, these prods are not neutral; they can be key mechanisms through which discriminatory designs are manifested. For instance, scholars have demonstrated that the training data and algorithms in widely used writing assessment platforms inherit language ideologies from their designers, which can reinforce racialized norms for "standard English" (de Roock, 2021) and delimit the boundaries for acceptable written expression in schools (Dixon-Román, Nichols, & Mensah, 2020). Such findings not only complicate one-dimensional depictions of digital media as tools for youth empowerment or creative expression, but they also point to opportunities to reframe digital media learning, including attention to "data literacies" (Pangrazio & Sefton-Green, 2020; Stornaiuolo, 2020) and "critical data education" (Pangrazio & Selwyn, 2020).

Platform Relations in Instructional Practice

In teaching and teacher education, too, a relational view of platforms has challenged the familiar conception of technology as a stable tool to be implemented in instructional practice. Indeed, the frictions that arise from platforms' social, technical, and political-economic dimensions can often work against the stated aims that an educator might have for introducing them into the classroom. Rohit Mehta and Earl Aguilera (2020) demonstrate this in their study of Flipgrid, a platform for video-based discussion, and its impacts on their own teacher education courses. Despite their aspiration to "humanize" their teaching with the interactive app, they found that the platform's technical design features encouraged communication patterns that made some students feel alienated or vulnerable. An introductory activity facilitated through the app, for instance, made participation difficult for one deaf student, and several racially and linguistically minoritized students also reported feeling uneasy about how the platform's bias toward short visual and oral responses would affect how their classmates would view them. Other scholars have found similar contradictions in focused studies of stand-alone platforms like ClassDojo (Robinson, 2020) and Google Classroom (Krutka et al., 2021), where companies' aspirations to be one-stop shops for administrative, academic, and behavioral data ultimately nudge educators to adopt forms of technology-enhanced surveillance, tracking, and discipline that work against their larger pedagogical goals (Bayne, 2014). Importantly, the value of such findings is not just to delineate which platforms are "bad" or "good" but to highlight the indeterminacy involved in making such judgments. Because they are animated by competing social, technical, and political economic interests, any platform's potential for addressing or exacerbating educational challenges is too deeply situated and overdetermined to be graded on such a simple rubric. Instead, scholars have

worked to develop frameworks and resources that might better equip teachers and teacher educators to identify and address the alignments and discontinuities between their own instructional values and those embedded in platforms. One such approach invites educators to conduct "techno-ethical audits" of the hardware and software used in their school sites, evaluating the technical and political-economic attachments that platforms like Google Classroom or Google Meet carry when they are integrated into instruction (Gleason & Heath, 2021; Krutka et al., 2021).

Platform Relations in Education Policy

Recent studies of platforms relations also add texture to policy research on the role of data and datafication in the "networked governance" of education (Au & Ferrare, 2015). Researchers have shown that computer-based data management systems increasingly function as critical infrastructures for schooling, linking classrooms not only to school, district, state, and federal levels but also to commercial curriculum providers and international entities, such as the Organisation for Economic Co-operation and Development (OECD) (Anagnastopolous, Rutledge, & Jacobsen, 2013; Williamson, 2017). Such connections have produced what Sigrid Hartong (2017) describes as "new governmental constellations that are constituted by (digital) data flows" (p. 138). Importantly, as Luci Pangrazio and colleagues (2022) argue, the growing imperative for these flows, and for data-driven decision-making, in local and global policy directives is not easily disentangled from the platforms that facilitate their extraction, circulation, analysis, and storage. Policy demands for international comparative data related to the United Nations Sustainable Development Goals and assessments like the Programme for International

Student Assessment (PISA) not only pressure countries with stratified mobile internet access into exploitative deals with technology providers (Kondowe & Chigona, 2018; Kwet, 2019; cf. Gallagher & Knox, 2019), but they also mold practice to better align with the norms the aggregated data produces. Steven Lewis (2020), for instance, demonstrates how the OECD's PISA4U platform packages instructional insights culled from PISA data into universal standards for "what works," which are then delivered in professional learning settings around the world. Kalervo Gulson and Kevin Witzenberger (2020) show how business intelligence, testing, and socioemotional learning platforms are increasingly marketed directly to educators as resources for meeting policy mandates for data-driven education, even if there is little evidence that the data they generate is linked to the data points most important to policy makers, schools, or communities. With the COVID-19 pandemic, the need for further inquiry into the policy implications of platforms has only heightened. The eagerness with which platform providers have offered services to keep instruction going, to monitor students' online behavior, to close digital divides with propriety products, to address learning loss with artificial intelligence tutoring programs, and to mitigate against shortages in teacher labor highlights just a few of the dimensions where policy interventions and regulations are necessary sooner rather than later (Bayne & Gallagher, 2021; Gilliard & singh, 2021; Williamson, 2021).

Seeing Like a Platform

The literature we highlight demonstrates two important points. The first is that the growing significance of platform relations has not been lost on the myriad subfields of education. Even if it is not the predominant orientation for thinking about, or practicing in, the emerging edtech

landscape, the substantial work now being done offers insights, models, and future directions for sustained studies of platforms' inflections in classrooms, schools, and transnational education systems. The second is that, despite the disunity in the genealogies these subfields have followed to arrive at the study of platform relations, their common concern with the interplay of platforms' social, technical, and political-economic dimensions speaks to the subject's profound stakes for education. Not all of the scholarship we review explicitly narrates itself as part of a wider, multidisciplinary tradition like platform studies, but the relational nature of platforms provides a common unit of analysis that enjoins this work as part of a shared pedagogical and political project.

This symposium uses the "Platform Studies in Education" as a shorthand for this project. It does so, in part, to signal its alignment with other work that has, similarly, recognized platforms as offering unique opportunities for collective agenda setting and social action in education (Decuypere, Grimaldi, & Landri, 2021; Sefton-Green, 2021). But the name is less important than its underlying orientation. Our intent is not to consolidate the work of diverse subfields under a single, umbrella category. Rather, we wish to suggest that confronting the challenges of platformization in education demands a perspective that is not reducible to any one subfield of educational research. There is a need to see teaching, learning, and administration as platforms do—as sites where technologies can be put to social uses, where technical components can mine and process data, and where political-economic interests can forge new markets and dependencies. Much like activists in the 1960s found "the environment" to be a useful concept for consolidating multiple concerns (e.g., littering, pesticides, atomic fallout) into a tractable

problem they could work to save, the relational quality of "platforms" similarly renders the frictions that connective technologies surface in education amenable to coalitional inquiry and mobilization.

Toward New Coalitions in the Study of Platform Relations

There are two kinds of coalitions we see as especially necessary, and possible, through attention to platform relations. The first are those forged across disciplines. We have already demonstrated the wide range of scholarship that has drawn on, and contributed to, studies of platform technologies. This work is irreducible to disciplinary jurisdictions. Platforms' relational quality means that no matter where you begin, if you pull on some thread associated with them, you will quickly find yourself trespassing into some other field or discipline. Rather than viewing this as daunting—or worse, as need for boundary making—it can be seen as an invitation for humble consideration of where different modes of knowledge production intersect and where they might be generatively combined.

This not only helps ward off the tendency for research on complex, multiscale subjects to reinvent the wheel across disciplines, but it also fosters opportunities for different kinds of expertise to address urgent questions. Scholars of education policy, for example, may not have intimate knowledge of platform architectures or emerging theories of artificial intelligence law; however, the convergence of these bodies of knowledge will likely be necessary for adaptive technologies to be appropriately understood and regulated in local, national, and international school settings. In the same way, there are also rich opportunities for coalitions to be brokered with parties outside

the academy. Political activists and organizers, for instance, have long histories of working against, hacking within, and otherwise obfuscating the imposition of surveilling or extractive platform technologies (Costanza-Chock, 2020; Florini, 2019). Importantly, such forms of collaboration are not unidirectional. Just as education research can benefit from the knowledge and expertise of other disciplines, it also has resources and critical contributions to make to these wider conversations.

A second kind of coalition extends transnationally. Kerssens and van Dijck (2022) point to how the impact of platforms unfolds differently across countries and how different national policies, cultural values, and corporate interests interact with varied social contexts must be explored. The COVID-19 pandemic has highlighted how national efforts to address and mitigate impacts of social duress varied substantially from one country and region to another; learning across these systems of governance, particularly within educational settings, will continue to yield new insights into the lasting role of platforms as an infrastructural force. Similarly, transnational coalitions also have implications amid looming climate catastrophes. As climate change threatens to further reshape society at scales even greater than the COVID-19 pandemic, the role of platforms across all three dimensions will play a fundamental role in our experience of and response to impending environmental changes. We recognize that it is not the responsibility of education research to tackle such impacts alone. However, how education contributes to the present moment must be examined. A relational orientation toward platforms offers one means for tracing these impacts from local usage to global impacts.

A relational perspective of how platforms are shaping and remaking the landscape of education illuminates the myriad intersections of our work as researchers with emerging literature and new fields. As we consider how the emphasis of education research through different lenses can connect researchers to emerging and flourishing scholarly conversations, this focus on platform functions is imperative for addressing fundamental, equity-focused inquiries within our field.

We see the study of platform relations as, ultimately, a hopeful project. The shape of the internet today and the platforms currently available did not an inevitably grow out of technological innovation; they are the contingent upshot of human and industry choices. This is another way of saying: they could have been, and might yet be, otherwise. The promise of platform studies in education, then, is not to map in detail the vast scope of exploitations encapsulated in networked media but instead to identify where and how these relations might be changed and what role education might play in such transformations. The speculative project of platform studies sets a wider horizon than simply "unbiased algorithms" or "accessible hardware." It invites us to imagine other futures—democratically owned and governed hardware and software, for instance, or data practices modulated by commitments to racial, economic, and environmental justice. As with any political project, the coalitional work involved in imagining, prefiguring, and building such worlds is best left to the collectives. In this spirit, we see the articles in this symposium as both testaments to the powerful work already happening within and outside of education and also gestures toward the work still to come.

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