Anthropology & Education Quarterly

SPECIAL ISSUE New Ethnographies of Education From the UK: Performative Challenges, Methodological Innovations

ARTICLE OPEN ACCESS

Uncovering Edtech's Embedded Values: Making the Case for Socio-Technical Audits in Ethnographic Inquiry

Louise Couceiro[1] | Rebecca Eynon[2,3] | Laura Hakimi[3]

[1]Faculty of Education, University of Melbourne, Melbourne, Victoria, Australia | [2]Department of Education, University of Oxford, Oxford, UK | [3]Oxford Internet Institute, University of Oxford, Oxford, UK

Correspondence: Louise Couceiro (louise.couceiro@unimelb.edu.au)

Received: 27 June 2025 | **Revised:** 23 February 2026 | **Accepted:** 9 April 2026

Keywords: digital | ethnography | schools | socio-technical | values

ABSTRACT

Drawing on three ethnographic studies of secondary schools in England, this article makes a case for "socio-technical audits"—a method combining technological walkthroughs with observations, workshops, and interviews—as part of ethnographic inquiry. A case example is presented to illustrate how the integration of socio-technical audits enables articulation of the underlying logics of technologies, while producing empirically grounded, contextually situated accounts of how technologies are interpreted, negotiated, and embedded within everyday educational practice.

1 | Introduction

Despite longstanding claims by policy makers and the commercial sector that digital technologies can make schools more efficient, effective and equitable, the realities are far more complex (Livingstone and Sefton-Green 2016; Macgilchrist 2024). It is well-established among critical scholars in the Sociology of Education, Science and Technology Studies (STS) and the emerging area of Critical Digital Education, that EdTech "cannot be understood simply in terms of technological tools that produce effects, as in crude, essentialist forms of technological determinism, or as 'mere tools' that people mold and put into service for their purposes" (Castañeda and Williamson 2021, 3). Consistent with this view, technology is understood here as a complex socio-cultural and material artifact that is embedded within social structures and practices (Selwyn 2016). Accordingly, educational technology (EdTech) does not simply refer to digital tools used in or for education, but is situated within long histories of attempts to mechanize, automate, or otherwise mediate education through technical means (Watters 2014). Ethnographies offer a powerful antidote to techno-solutionist narratives as they "contest the shiny images of seamless, frictionless technologies improving education" (Macgilchrist 2024, 25). In this article, we advocate for integrating socio-technical audits as part of ethnographic inquiry, presenting a case example to illustrate how this approach not only helps make visible the underlying logics embedded in EdTech but also helps examine the diverse ways these technologies "play out" in different school contexts. By doing so, we move beyond abstract debates about EdTech's potential, instead highlighting the nuanced, context-dependent realities of its use and impact in everyday educational practice.

Our use of "socio-technical" is distinct from the sociotechnical systems tradition in organizational studies, exemplified by Trist and Bamforth (1951), which emphasized aligning social and technical subsystems to optimize efficiency and productivity. The socio-technical approach we advocate draws from critical traditions in STS and critical technology studies (e.g., Mackenzie and Wacjman 1999), which emphasize the co-constitution of the social and the technical. Addressing the limitations of approaches that focus solely on one dimension, a socio-technical approach recognizes the need to understand the technical dimension of technologies in terms of affordances and the values they promote (Gleason and Heath 2021), while also accounting for the varied social and pedagogical practices, and the broader political and commercial contexts that shape their use.

However, how best to capture this socio-technical complexity remains a challenge for ethnographers of education; and while there have been a small number of rich ethnographies in this domain (e.g., Livingstone and Sefton-Green 2016; Monahan 2006; Rafalow 2020; Sims 2017; Warschauer 2003), in ethnographic studies of "traditional" school classrooms, the digital often remains under-theorized and taken for granted (Alirezabeigi et al. 2020; Schubert and Röhl 2017).

The ethnographic studies from which this article draws formed part of a broader project ("Towards equity-focused Edtech: A socio-technical approach") exploring how technologies are embedded in secondary school practices and how these dynamics relate to questions of equity and educational opportunity. The focus of this empirical ethnographic article, however, is methodological: to demonstrate the analytic value of incorporating socio-technical audits within ethnographic inquiry. The socio-technical audit—a sustained, systematic and reflexive process for examining both the sociological and technical dynamics underpinning the use of educational technologies—therefore offers a methodological bridge between the study of everyday educational practices alongside critical interrogation of EdTech. In doing so, it expands the ethnographer's analytic gaze to include the technical architectures, commercial entanglements, and ideological assumptions that shape digital practices in schools while still attending to how these practices are negotiated, resisted, and reconfigured.

The case example we present focuses on Strobe Maths,[1] an EdTech platform widely used in schools across England. Claiming to offer "personalized" learning for students in and outside the classroom, Strobe Maths exemplifies common claims that technology can support equity via improving access to tailored resources for all students whilst automating marking to free up teacher time. Platforms have been understood as socio-technical infrastructures that not only mediate interactions but also extract, process, and commodify data in ways that reshape institutions and relationships (Van Dijck et al. 2018). In education, this "platformisation" (Nichols and Garcia 2022; Pangrazio et al. 2022; Sefton-Green 2021) has introduced new forms of governance, data flows, and pedagogic relations. We therefore approach Strobe Maths not as a neutral educational platform, but as part of a broader political economy of data-driven schooling. Our socio-technical audit of the platform combines technical and sociological analyses, drawing on observational, workshop, and interview data collected during three school ethnographies, as well as publicly available materials from the Strobe Maths website. Through this case we seek to illustrate the value of incorporating socio-technical audits into sustained ethnographic inquiry, demonstrating how analyzing both the sociological and technical dimensions of educational technologies is essential for comprehensively capturing their social and educational implications.

In addition to its methodological contribution, the case example addresses a critical area requiring further investigation. Namely, how the values embedded in educational technologies emerge in school settings and shape pedagogical practices. Existing scholarship has examined how corporate values underpinning EdTech products can be influential in shaping students into neoliberal subjects (e.g., Ball and Grimaldi 2022). Here we add to this literature by identifying three specific corporate values: completion, time on task, and punctuality. Our analysis demonstrates how these values can become normalized and reinforced within school environments in mutually constitutive ways, disproportionately shaping the experiences of students from disadvantaged backgrounds and deepening existing educational inequities.

2 | Accounting for the Socio and the Technical

Technologies are not neutral tools and cannot be understood without connection to the web of social relations from which they originate, are immersed in, and will ultimately influence through their use (de Roock 2021; Robertson 2019). In the context of educational technologies, there is a limited yet growing body of empirical research that seeks to meaningfully integrate these two dimensions (e.g., Apps et al. 2022; Decuypere 2021; Gleason and Heath 2021; Warr and Heath 2025; Williamson 2017). Some approaches have addressed the sociological and technical dimensions of EdTech through rich conceptual analyses (Gleason and Heath 2021; Warr and Heath 2025; Williamson 2017). For example, drawing on the concept of the "data assemblage" (Kitchin and Lauriault 2014) and the methodological strategy of disassembling platforms, Williamson (2017) undertakes a socio-technical survey of ClassDojo—a platform for tracking students' behavior data, and a social media network for sharing feedback and connecting students, teachers and parents/carers. He contends that researching such an assemblage requires investigation of

> its technical and material components, the people that inhabit it and the practices they undertake within organizations and institutions, the marketplaces and financial techniques that enable it, the policies and standards that govern it, and the knowledges and discourses that frame it.
>
> (p. 64)

Attending to each of these components through close engagement with various sources including news media, the ClassDojo website and publicly reported market data, Williamson (2017) demonstrates how ClassDojo has been "assembled over time as a mutating public sphere platform for education" that is shaping student and teacher subjectivities (p. 64). His sociotechnical survey, which interrogates ClassDojo's technical architecture alongside the sociocultural, economic, and political dimensions he identifies, provides a specific and contextualized foundation for reflecting on broader patterns and potential reconfigurations in educational policy and practice.

Gleason and Heath (2021) also take a conceptual approach to their investigation of the sociotechnical implications of using Google Classroom and Google Meet during the Covid-19 pandemic. They use the "techno-ethical audit" framework (Krutka et al. 2019) to ask a series of questions "designed to uncover the ethics of the technology in relation to legal, economic, democratic, pedagogical, and technological design" (Gleason and Heath 2021, 29). The audit includes questions such as, "Was this technology designed ethically and is it used ethically?" and

"Are laws that apply to our use of this technology just?" (Krutka et al. 2019, 569). Moving beyond a purely technical understanding of the Google platforms, Gleason and Heath (2021) similarly highlight the significance of attending to the sociological dimensions of these tools. The techno-ethical audit allows them to examine the multifaceted ways in which the EdTech is embedded within and shaped by broader sociocultural, political, economic, and pedagogical contexts. They conclude that Google's platforms construct students primarily as passive technology users, offering them limited agency or control. Furthermore, that these platforms predispose students to "unnecessary practices of surveillance and monitoring with severe consequences, all while subjecting them to regimes of data collection and sharing for corporate profit" (Gleason and Heath 2021, 37–38).

More recently, Warr and Heath (2025) employed the "technology audit" as an analytical tool to examine the discriminatory design of algorithms in LLMs used to score and provide feedback on student writing samples. The audit was comprised of two questions. The first addressed whether AI responses demonstrate encoded bias and treat groups differently; the second explored the extent to which AI legitimates particular "standards of knowing as unquestioned truths" (Warr and Heath 2025, 251). To investigate these questions, the authors conducted a synthesis of studies on algorithmic bias, focusing on instances in which identical writing samples were evaluated by LLMs under varying student identity descriptors. Their findings revealed that LLMs demonstrate implicit biases such as assigning lower evaluation scores when the student was described as attending an "inner-city school" or expressing a preference for rap music.

While these studies (Gleason and Heath 2021; Warr and Heath 2025; Williamson 2017) provide important insights into the sociological and technical dimensions of educational technologies, more grounded and practice-orientated methodological approaches—particularly those that involve direct engagement with schools and classroom settings—are needed to fully understand how technologies shape everyday educational practices:

> Whereas processes of implied user configuration have received substantial interest over the years, much less is known about how users *actually* interact with platforms, or how they navigate, chart, roam, deploy and *become with* data practices more broadly in real time.
>
> (Decuypere 2021, p. 76)

The gap between researcher-led analysis and actual user experience has, to some extent, been addressed through use of the walkthrough method (Light et al. 2018) in several educational technologies studies (e.g., Apps et al. 2022; Arantes 2023; Decuypere 2019; Troeger and Bock 2022), enabling nuanced analyses of platform design and architecture, alongside other key elements such as technical affordances and discursive framing. The walkthrough method allows researchers to infer "implied" patterns of use and to speculate on how design elements may influence user behavior and experience; yet often it remains that the researchers are conducting the walkthroughs, not the students or teachers who are engaging with these technologies on a routine basis. To better account for the situated practices of those who use these tools in real-world contexts, some scholars have started to explore hybrid approaches that integrate user perspectives more directly. Notably, Apps et al. (2022) represents a significant departure from conventional applications of the walkthrough method by integrating technical investigations of EdTech with user-centred, sociological analyses. The researchers examined two digital reading platforms in Australia by combining an initial researcher walkthrough of the EdTech platforms with semi-structured interviews with teachers. The walkthrough method was further incorporated in the interviews, enabling the researchers to focus on participants' situated practices.

Decuypere's (2021) IUDE toolbox also aims to bridge this gap between design intention and lived user experience. The toolbox consists of four methodological points of inquiry: the Interface, Usage, Design, and Ecology (IUDE) of data practices, that can be used "to research what happens *on* platforms, what users concretely do *with* these platforms, what is happening *behind* the platform's interface, and conclusively how research equally needs to incorporate what is ecologically situated *beyond* a concrete platform" (p. 75). Investigations of "Usage"—which Decuypere (2021) contends should include corporate (e.g., support staff) and technical actors (e.g., IT personnel) as well as teachers and students—arguably presents the biggest methodological challenge. Notwithstanding the well-documented difficulties associated with recruiting schools for research (Striepe and Cunningham 2022), securing access to EdTech personnel is also difficult given EdTech companies often operate as closed systems with limited transparency.

Despite these challenges, sustained research efforts are required to fully account for the socio-technical dynamics underpinning the use of educational technologies across varied pedagogical settings. Our use of socio-technical audits as part of ethnographic inquiry offers a way to address this complexity, extending these methodological approaches. It draws inspiration from Ritter's (2022) socio-technical study of a Norwegian software firm which, while outside the field of education, is grounded in ethnographic practice. Ritter begins by suggesting that the "proliferation of digital platforms in everyday life calls orthodox observation-based research into question and throws ethnography into an epistemological crisis" (p. 917). In other words, "traditional" ethnographic methods are no longer adequate for studying digital environments. Ritter argues that this crisis can be overcome by integrating "technical walkthroughs, which can systematically capture the meanings that platform interfaces generate, with participant observation, which can elucidate how members of a given community of practice make sense of their skilled practices, social relationships, and artifacts" (p. 919). What is particularly striking about Ritter's analysis is the value it places on socio-technical inquiry within a broader ethnographic approach. He concludes: "My immersion in the everyday culture of the software firm and my connectedness to digital platforms frequently used by the employees inspired thorough methodological reflections" (p. 930). Specifically, Ritter reflects that this deep immersion was essential for gaining a holistic understanding of the meanings that affordances of interfaces generate alongside emic perspectives of the key stakeholders

in situ. Our approach builds on this ethnographic tradition and the broader field of platform ethnography in education (Nichols and Garcia 2022) through sustained engagement in school settings to examine how EdTech is embedded in everyday practices, how it reconfigures roles and relationships, and how it intersects with broader structures and systems.

3 | Methodology

The data used for this socio-technical audit is derived from three ethnographic studies undertaken as part of a broader research project ("Towards equity-focused EdTech: A socio-technical approach") and was gathered by the same researcher.[2] The schools were selected to reflect variation in geographic location, economic context, cultural diversity of the student population, and levels of technical resources and infrastructure. In each ethnographic study, the researcher spent 10–14 weeks embedded within the school community. All three schools were non-selective, but they differed in their governance structures[3] and the socio-economic characteristics of their catchment areas, as reflected, for example, in the proportion of students eligible for free school meals (FSM). They also varied in terms of diversity, particularly with respect to the percentage of students receiving support for special educational needs and disabilities (SEND) and those with English as an additional language (EAL). Furthermore, the extent to which digital technologies were embedded in the schools' everyday practices, as well as the degree of agency afforded to both students and teachers in their use of such technologies, varied across the settings. A brief description of each school is presented below.

3.1 | Research Sites

Draymoor Academy[4] was situated in an urban area characterized by high levels of socio-economic disadvantage in North West England. There were around 1300 students registered and the proportion of students eligible for free school meals was significantly above the national average. The academy also had a higher-than-average percentage of students with EAL and SEND, and the proportion of students attaining grade 5 or above in GCSE maths and English was below national average (HM Government 2025b).[5] Technology use was primarily driven by a top-down approach from the MAT-level and was relatively limited. In classrooms, teachers routinely used visualisers to present instructions and information, to model step-by-step approaches to answering questions and solving problems, and to provide feedback on student work. Outside the classroom, "adaptive" EdTech—products that claim to "personalize" learning resources according to student ability and progress—were used to assign compulsory maths homework and to facilitate independent learning. Adaptive EdTech was also used to support a small number of students with specific needs in intervention classes. Generally, teachers and students had limited autonomy in their use of technologies.

Hawthorne Park was an all-girls community school located in an urban area in the South East of England with an enrolment of approximately 1200 students. Its academic performance was strong, with the proportion of students attaining grade 5 or higher in GCSE maths and English significantly exceeding the national average (HM Government 2025b). The proportion of students with SEND aligned with the national average, while the numbers of those eligible for free school meals and those who spoke English as an additional language exceeded national figures (HM Government 2025b). However, according to school staff, the majority of EAL students were "highly proficient" in English (The Bell Foundation 2025). Similar to Draymoor Academy, adaptive EdTech products were used for homework, independent learning, and targeted intervention sessions. However, at Hawthorne Park, both teachers and students had greater access to technologies; for instance, teachers could reserve laptop trolleys for use during lessons, allowing students to work directly on devices in the classroom. Teachers and students were also afforded higher levels of agency in their use of technologies.

Milborough High, the largest of the three schools with approximately 1500 students, was located in an urban area in the North West of England and belonged to a small MAT. The school had a strong creative arts legacy and served a diverse community. The proportions of students with EAL and SEND, and those eligible for free school meals all exceeded national averages (HM Government 2025b). The school performed well academically, with an above-average percentage of students achieving grade 5 or higher in maths and English GCSEs (HM Government 2025b). The degree of agency granted to teachers and students in their uses of technology, along with the school's level of technological resourcing, fell between that of Draymoor Academy and Hawthorne Park. While the school did not have the capacity to support individual device use during lessons, there was roughly one computer room available per curriculum area, which teachers could book for specific lessons. As with the other studies, adaptive EdTech products were primarily used for homework, independent study, and targeted intervention sessions. Notably, Milborough High encouraged the use of a greater number of these technologies compared to Hawthorne Park and Draymoor Academy.

3.2 | Socio-Technical Audits: Development, Application and Analysis

In each school, the researcher selected the most widely used EdTech as the focus for socio-technical audits. The audit was designed prior to fieldwork and refined through an iterative process, allowing emerging empirical insights to inform its ongoing development. The technical component involved the researcher undertaking numerous walkthroughs of the selected technology. "Even though many platforms (...) have the sheen of being formally neutral, they remain uniquely ideological in how they are structured and composed, and in how they thereby plan to convey specific messages and frame specific sorts of worlds" (Decuypere and Landri 2020, 4). Drawing on elements from Light et al. (2018) and Decuypere (2021), a walkthrough schedule was developed to account for the EdTech's environment of expected use, its affordances and limitations, discourses and rhetorical style, embedded values and assumptions, and aesthetic design. The schedule included questions and prompts for the researcher to address, such as: "Describe the initial landing page and how this guides users," and "What values are promoted through the interface? (i.e., how the system 'reflects' assumptions about teaching and how teachers 'know' the students)". For Strobe

Maths, the researcher assumed the position of school manager, teacher and student to undertake a series of walkthroughs. For each position, they followed three different "activity flows" (Light et al. 2018) deemed most relevant.[6] For example, as the students predominantly engaged with Strobe Maths to complete compulsory homework assignments (though "independent learning" options are also available), the researcher followed an activity flow beginning with the "Compulsory" button, continuing through to completion of the assigned tasks. For teachers, a "Homework hand-in" summary table is positioned in the centre of an otherwise-sparse landing page. As this is the most prominent feature, the researcher followed an activity flow beginning with the "View hand-in" button, enabling her to see an "overall completion" summary for the entire class, and ending with the option to investigate individual students' performance on a range of metrics including number of correct answers, number of unattempted questions, and time spent on individual questions.

The completed walkthrough schedules, forming the technical component of the audit, were integrated with the sociological component, which involved observing students engaging with the EdTech across various settings such as mainstream and intervention lessons, internal exclusion rooms, and homework clubs. During observations, the researcher completed an observation schedule developed by the research team. Questions and prompts centred on how students and teachers interacted with the EdTech, as well as the role the EdTech appeared to play in shaping relationships among students and between students and the teacher. The sociological component also involved workshops with students, and semi-structured interviews with teachers, students, and parents/carers, some of which incorporated walkthroughs of the EdTech platform. Teachers and students involved in the observations were invited to participate in individual or paired interviews. Almost all invited teachers participated. While recruitment for student interviews relied on self-selection, the resulting sample was fairly diverse across several dimensions including digital access at home, English language proficiency, gender, and level of SEND support. Recruitment for the parent/carer interviews also relied on self-selection via email invitations, which likely led to underrepresentation of individuals with limited access to technology.

The data presented in this article is drawn from a larger data set consisting of 180 day visits, 42 teacher interviews, 67 student interviews, 18 parent/carer interviews, 7 workshops with students and 173 classroom observations across the three research sites. Additionally, the researcher gathered relevant materials produced by the schools including photographs of posters, guidance materials, and display boards, and screenshots of information publicly available on the EdTech website.

The data from both the technical and sociological components was managed using NVivo software and analyzed using reflexive thematic analysis comprising six phases: (1) data familiarization; (2) data coding; (3) initial theme generation; (4) theme development and review; (5) theme refining, defining and naming; and (6) writing up (Braun and Clarke 2021). Following an initial phase of data familiarization and coding, which involved development of a mixture of semantic and latent code labels aimed at "capturing single meanings or concepts" (Braun and Clarke 2021, 35) the researcher proceeded to develop, refine and define themes. Candidate themes, generated from initial clusters of codes, were iteratively reviewed and refined through reflexive engagement with the data, synthesizing diverse meanings and patterns across the dataset. The analysis presented in the case example is drawn from the following finalized themes: "Compliance over competence – valuing completion, duration, punctuality and performance," "EdTech, evolving roles, and changing relationships," and "Data drives decisions". Taken together, these themes illustrate how Strobe Maths' value-laden data influenced the schools' pedagogic practices, shaped student-teacher dynamics alongside students' perceptions of themselves and others, and contributed to processes of surveillance and datafication.

4 | Strobe Maths: A Socio-Technical Audit Embedded in Ethnographic Practice

This illustrative case highlights the value of attending to the social and technical dimensions of EdTech within ethnographic inquiry in order to fully explore the implications of using technologies in everyday educational practices. The analysis incites critical questions about the values prioritized in such technologies and suggests that uniform approaches to deploying EdTech in pursuit of equity is not only inadequate, but may reinforce existing inequities.

4.1 | "We Want to Keep That 100% Going": Valuing Completion, Time on Task, and Punctuality

Strobe Maths uses student data (collected over the course of the first 100 questions) to deliver "personalized" homework by building profiles based on students' pace and performance. Questions are accompanied by support videos, and are scheduled and sequenced in a way that is intended to optimize retention. The company's stated mission is to develop confidence through personalized learning. Achieving this objective fundamentally depends on students' sustained engagement with the platform; an outcome that is supported through its promotion of specific behavioral values: completion (100% of questions answered correctly), time on task (the amount of time spent engaging with the platform) and punctuality (the timeliness of task completion). These values are reflected in the platform's prioritization of data-driven indicators. For example, the most prominent feature on the teacher landing page is the centrally positioned "Homework hand-in" summary table, which spans the full width of the screen (Figure 1). Student performance is coded through use of color (green signals completion; yellow signals incompletion; and gray signals the task has not been started), and quantitative indicators showing the number of students in each category. The table provides teachers with a condensed overview of their classes, including homework due dates and progress towards completion—a bar colored mostly gray indicates that most students in the class have not started the homework assignment. The XP Boost column provides data on students' engagement with independent (non-compulsory) tasks.

Clicking the "View Hand-in" button takes teachers to a more detailed table in which statistics for individual students are displayed (Figure 2). The percentage of questions students have answered correctly ("Completion") is presented alongside

"Working time" (approximately how much time each student has spent completing their homework), and "Completion day" (when each student completed their homework, or not). In the "Alerts" column, symbols are used to signal specific aspects of students' performance. For instance, a purple flag indicates that a student has been unable to answer a question correctly after watching the support video and making six attempts. Students are ranked in order of completion, with those who have completed the least amount displayed at the top.

Values of completion, time on task, and punctuality are also reflected in the design of the student interface. The landing page displays a week-by-week overview of the status of their compulsory homework tasks (Figure 3). Color coding—green, orange and red—is employed to visually indicate level of completion. Green status is only achieved once all compulsory questions have been correctly answered, with students permitted to reattempt questions until marked correct. Students can select which compulsory homework to engage with, including tasks from previous weeks that remain incomplete. Tasks that have been completed are no longer accessible.

These same values were discursively (re)produced across the school environments, though to varying degrees. Draymoor Academy had a very specific and tightly controlled pedagogic approach that afforded limited agency to both teachers

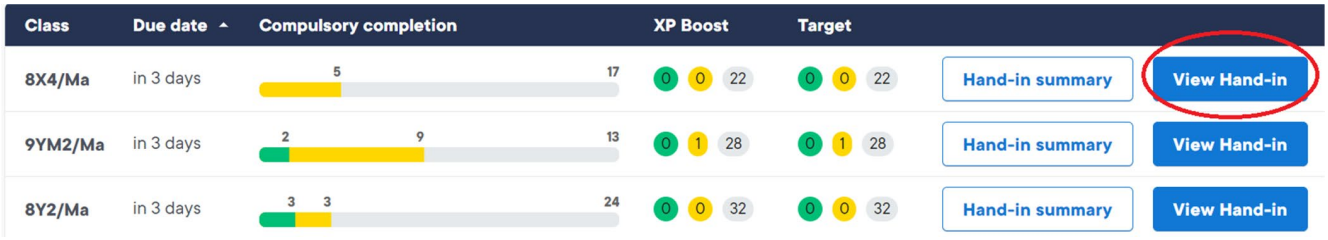

FIGURE 1 | "Homework hand-in" summary table.

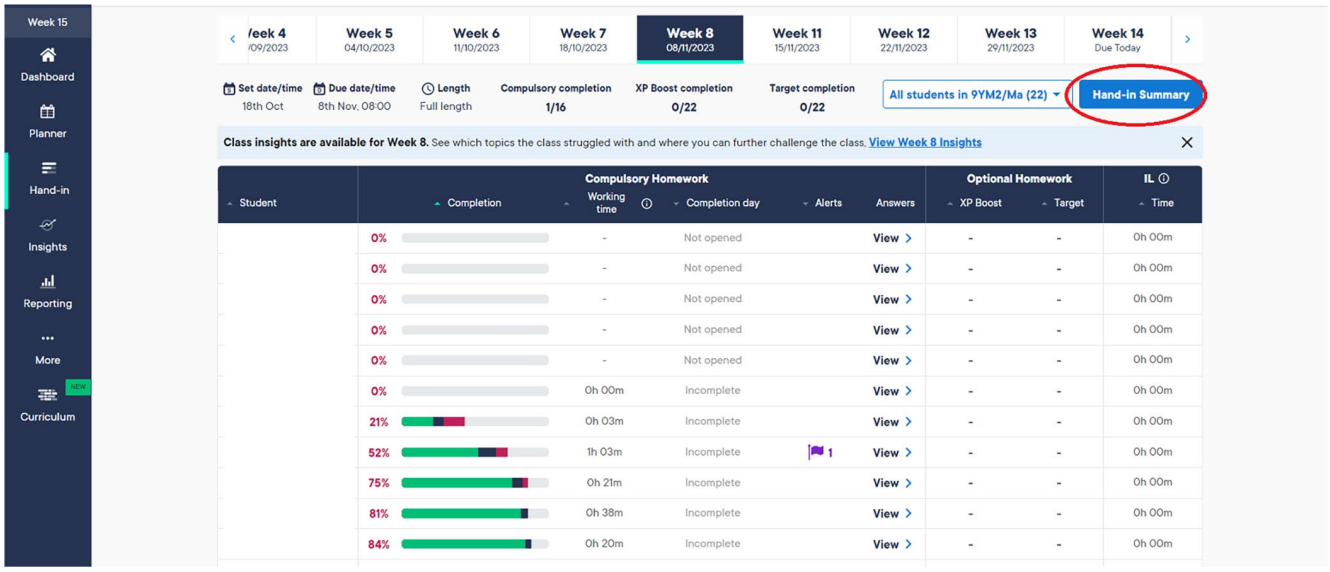

FIGURE 2 | "Homework hand-in" summary table: Detailed class view.

FIGURE 3 | Student landing page.

and students. Strongly influenced by cognitive science (e.g., Lemov 2021; Sherrington 2019), the school placed strong emphasis on repetition, consistency, and supporting students to take ownership of their learning, though within a highly prescriptive framework. Strobe Maths, underpinned by principles of independent practice and repetition, was perceived as a pedagogically-aligned and cost-effective means of supporting the school's efforts to improve attainment, and the culture of the school was particularly amenable to the normalization of the platform's emphasis on completion, time on task, and punctuality. Teachers constantly reminded students to complete their compulsory homework on time. It was common practice for teachers to display the hand-in summary data (Figure 2) on the interactive whiteboard:

> ... they call out the names of students who have not completed the homework and will therefore be receiving a detention, in addition to other students who have engaged, but not to the expected standard, for example, "[student name] that's only 25 minutes, you need to be doing at least 40 minutes"
>
> (classroom observation note, Year 8 maths, Draymoor Academy, October 2023).

Posters displayed around the maths department also reinforced this message. "Aim to complete 60% by Monday" was emblazoned in red across the top, with four strategies to ensure completion listed underneath: start early, watch the videos, do the bookwork checks (writing workings on paper) and seek help. In other words, completing steps one to four will culminate in success at step five: achieving 100% completion. This discursive framing suggests that getting it done, rather than learning per se, is the goal; a sentiment that was very much present in conversations with teachers, students, and parents/carers. When asked about the platform and their perspectives on its usefulness as a learning tool, many students spoke about its compulsory nature and the repercussions associated with non-completion and inadequate engagement time:

> It's not fair if someone spends 40 minutes and gets 20% and doesn't get a [detention], but I spend 12 minutes and get 90% and I get a [detention]! That's not fair. I would make the pass mark 80% because not all students are really that smart
>
> (Mercy, aged 12, Draymoor Academy, interview, November 2023).

The platform's embedded values of completion and time on task were also reflected in interviews with parents/carers, as illustrated by one parent who shared that she had received an email because her daughter had "only completed 78%" of her homework:

> ... and that took her 40 minutes. She didn't complete the rest of the homework simply because she didn't understand. The requirement was to spend one hour online doing this homework. (...) I asked why they set this requirement if she didn't understand some of the components of the task and they said (...) if she doesn't understand something, she still has to spend time online, which to me looks like she would need to stare at the screen
>
> (Katerina, Draymoor Academy, interview, February 2024).

This emphasis on completion, time on task, and punctuality was also evident at Milborough High—"Strobe is very like you've got to do your Strobe and it's like drilled into you" (Emir, aged 15, Milborough High, interview, November 2024)—though it manifested differently. The school fostered a warm and convivial atmosphere, underpinned by a culture of competitiveness. The Head of Maths (Dominic) was proud to report that the school was "ranked in the 80th percentile globally" for Strobe Maths completion (interview, November 2024). The configuration of the Strobe Maths reporting pages, many of which feature side-by-side displays of individual (Figure 2) and class performance data (Figure 1), facilitate comparative practices and, in this context, could be seen to both support and reinforce the school's competitive culture. As with Draymoor Academy, teachers frequently displayed reporting data on the interactive whiteboard. During an observation of a high-attaining Year 7 class, the teacher navigated to the most recent data and announced: "this class is the best in the whole of Year 7 (...) do you remember when they were at 95% and 96% and now they've gone down? We've moved ahead and that's thanks to your amazing homework effort" (classroom observation note, Year 7 maths, Milborough High, December 2024). In an earlier lesson, the teacher had implored students to bring any questions they were struggling with: "write it down or take a screenshot because we want to keep that 100% going" (classroom observation note, Year 7 maths, Milborough High, November 2024). Notwithstanding the teacher's commitment to supporting students' learning, the implication was that students should seek help to ensure the class maintained a 100% completion rate to retain its top position.

The platform's underlying values were also evident within the prevailing practices and discourses at Hawthorne Park. Of the three schools, Hawthorne Park was the most well-resourced and demonstrated the highest levels of academic attainment. The overall atmosphere was characterized by a more flexible and permissive approach, with greater levels of agency afforded to both teachers and students. While the importance of students complying with the platform's data-driven expectations remained apparent – during a walkthrough workshop one student declared, "It's not really focusing on learning, just focusing on getting it done" (walkthrough workshop note, Year 8, Hawthorne Park, March 2024) – its presence endured in a more subtle form. Framed as a "homework club" rather than detention, observations of lunchtime sessions revealed a more relaxed approach to completion. Students were permitted to eat their lunch and talk with one another while working on their outstanding assignments. Despite the informal setting, the values inscribed in the platform still played an active role in shaping student-teacher relationships. Mediated through generalized performance metrics that eschew more nuanced dimensions of learning, the values fostered transactional interactions between teachers and students. When

students entered the classroom their attendance was registered and, after a quick glance at their performance data, the teacher told them which week(s) required attention. Platitudes such as, "You're a bit hit and miss here, aren't we. You need to get more in the greens," were common (homework club observation note, Years 7–9, Hawthorne Park, February 2024). The researcher observed that while teachers were active in supporting students, the focus seemed "to err more towards echoing Strobe's emphasis on completion statistics and time spent rather than the act of learning itself" (homework club observation note, Years 7–9, Hawthorne Park, February 2024).

Additional to these surface-level, color-coded indicators and percentages, Strobe Maths does afford teachers access to more detailed, granular data on individual students' engagement, such as their answers to individual questions. However, teachers in all three schools reported that they did not have time to look at this level of detail: "I think we probably don't harness enough but again it's like the time to sit down and generate reports and then like decode them and then find out what they mean and stuff" (Imogen, maths teacher, Hawthorne Park, interview, March 2024). Although teachers saw the potential value of this information, due to time constraints they tended to focus their attention on the content most immediately available and prominent within the interface:

> It's very useful to be able to see the questions because obviously the one he needs to seek help on I can go (...) right let's go through this. (...) what it is useful for is when they come in and go "blah blah blah I did such and such and I have done them" and I can go, "well look, you can clearly see you've not done these questions". Again this is, I think, a thing where it comes down to how much time I have - if I had loads more time I could go through it a little bit more
>
> (Linden, maths teacher, Draymoor Academy, interview, October 2023).

Linden was candid in admitting that the summarized data pinpointing specific question completion was "useful" for evidencing students' non-compliance, and indicated they would only look at additional information if time permitted. While time constraints were clearly influential, the platform design—which prioritizes data reflecting values of completion, time on task, and punctuality while rendering insights into *how* students are experiencing or approaching their learning less accessible—was significant in guiding the teachers' attention and shaping behaviors.

4.2 | "Strobe the Snitch": Datafication and Surveillance

The platform's data visualizations are not neutral representations; however, their veneer of validity and prioritized position on the interface contributed to their perception as meaningful and authoritative across the three schools: "part of the persuasive power of data visualizations stems (...) from the clarity and apparent unambiguity of their output" (Macgilchrist and Jarke 2025, 361). In Strobe Maths, persuasiveness is achieved through an assemblage of various and detailed data points, color codes and bar charts. The data's prioritized position coupled with its authoritative aesthetic focused teachers, students, and parent/carers' attention on the values encoded in the data. Students came to be positioned as "thin" subjects—calculable, essentialised and de-contextualized (Ball and Grimaldi 2022, 292), viewed through a lens of compliance and judged by whether they had completed their homework, completed it on time, and for a sufficient duration. One parent referred to the platform as "Strobe the snitch," explaining that the automated progress emails they received "felt like sneaky kind of like, he's not done his homework yet" (Shir, Milborough High, interview, March 2025). While parents/carers' engagement with the automated updates about their child's homework varied considerably, teachers actively monitored and responded to the data:

> I obviously take great pride in going, "no I can clearly see everything you've done" (...) although the mass of data is not necessarily useful on a day-to-day basis, I can at any point go to the kids, "I can see everything you're doing. I can literally see every attempt you take, how long you've taken on each attempt. If I wanted to I could go in and prove that you have not done certain things or have done certain things". You know it gives me that um ability to do those things
>
> (Linden, maths teacher, Draymoor Academy, interview, October 2023).

Strikingly candid in their description of how they use the data, Linden's emphasis on being able to "literally see every attempt," including how long each attempt took, underscores the granular level of visibility afforded by the platform. In this context, the teacher is not positioned as a facilitator of learning, but as a monitor of student compliance. The assertion, "I could go in and prove that you have not done certain things" illustrates a data-driven approach centred on accountability, where the platform served less as a pedagogical aid and more as a mechanism of behavioral oversight, enabling sustained surveillance and retrospective justification for disciplining students.

Although the use of Strobe Maths' reporting data was less overtly punitive at Hawthorne Park and Milborough High, the practice of tracking and monitoring student compliance remained deeply normalized, illustrating a broader process of datafication—understood here as "the collection of data at all levels of education (individual, classroom, school, region, state, international), potentially about all processes of teaching, learning and school management" (Jarke and Breiter 2019, 1). Consistent with Selwyn et al.'s (2021) observation that students were "well-accustomed" to the analysis and profiling of their academic data in a study of three Australian secondary schools, these students appeared similarly accepting of datafication and surveillance practices. Perhaps this is unsurprising given what Smith (2018) has conceptualized as the "data doxa" – the "way in which digital data (...) have come to be perceived

in Western societies as normal, necessary and enabling" (p. 2). Indeed, when asked how they felt about their Strobe Maths data being displayed on the interactive whiteboard during lessons, students who tended to complete their homework were generally apathetic: "I'm not trying to brag here but I do my homework on time every single time, so I'm not bothered if when they do it" (Safiya, aged 14, Milborough High, interview, November 2024). Those who did not comply also appeared indifferent, and some even asserted that displaying their data in this way was motivating and/or important for their learning: "I wanna know the truth where I'm, where I'm lacking, where I'm really doing, I don't know if I'm, where I'm wrong, where I need to improve" (Malika, aged 12, Draymoor Academy, interview, November 2023).

Yet, while perhaps perceived as "necessary and enabling" (Smith 2018, 2) by some, the surveillance practices afforded by Strobe Maths did not feel straightforwardly positive for all students: "It's a bit weird when the teacher can see every mistake you've done through your working out, it's not really giving you like the comfort of like you know, it's like the teacher can see everything" (Evie, aged 17, Hawthorne Park, interview, March 2024). Some students also expressed frustration about their limited agency in engaging with their own data. During a walkthrough workshop with Year 8 students at Hawthorne Park, several students expressed difficulty in accessing and interpreting their own performance data – "it's confusing to check your scores" – and noted that after 3 weeks, the data became inaccessible: it "disappears (...) you can't see past work or what you've got wrong" (walkthrough workshop note, Year 8, Hawthorne Park, March 2024).

This limited access contrasts sharply with the ongoing visibility of data to teachers, highlighting an imbalance in how data is controlled and experienced. The discomfort described by some students reflects a perception that the data produced by Strobe Maths is affective, capable of shaping how students see themselves and are seen by others. As Jarke and Breiter (2019) reflect, datafication "transforms not only the ways in which teaching and learning are organized but also the ways in which future generations (will) construct reality with and through data" (p. 1). This was evident in the ways students interpreted and assigned meaning to the Strobe Maths data, with one student noting, "if you're longer, you've spent more time on it, but like if it's short that means like you're just generally smart" (Idris, aged 12, Milborough High, interview, December 2024). Constructing a reality in which faster completion is equated with more intelligence, the data became a marker of identity and capability, shaping students' understandings of academic success.

For some, datafication practices seemed to negatively impact their self-perception, motivation, and overall engagement. This was particularly the case among those who found it challenging to satisfy the platform's narrowly defined criteria for success. At Milborough High, the Head of Maths reflected that of the 220 students who had not started their homework that week, many were "at the lower end of the ability spectrum," going on to explain: "I think it's a little bit overwhelming for them to have to sit and think I've got to do an hour's worth of maths," emphasizing that it was specifically the value placed on duration that made the task feel too "overwhelming" (Dominic, Head of Maths, Milborough High, interview, November 2024). Informed by the design of the platform itself, these students were also more likely to be disproportionately subjected to processes of datafication and surveillance. As noted above, by ranking students according to task completion, with those completing the least displayed at the top of the hand-in summary table (Figure 2), the platform directs teachers' attention towards these individuals. At Milborough High, teachers scanned the top of this table every week "to target" three students who were not meeting expectations (Dominic, Head of Maths, Milborough High, interview, November 2024). These students were then called to the teacher's desk during lesson time, shown their performance data, and encouraged to complete their homework on time and to the required standard. Similarly, Strobe Maths requires students to show their workings on paper, including writing a specific code associated with each question. At random intervals, the platform prompts the user to provide a particular code to verify they have completed the work on paper. Students who had not completed this aspect of the task—indicated by a flag on the system—were also subjected to additional scrutiny. One student explained that "if you get the best, the teacher won't check, um, your booklet and if you get the worst the teacher will like every time check your booklet" (Amina, aged 11, Milborough High, interview, November 2024).

At all three schools, such practices appeared to be underpinned by a shared belief among teachers that Strobe Maths positively contributes to improved academic outcomes. At Hawthorne Park, for example, one of the maths teachers referred to a graph they had created showing the correlation between students' number of completed Strobe Maths assignments and mock exam results, stating: "The more you did, the better your grade was" (Imogen, maths teacher, Hawthorne Park, interview, March 2024). Similarly, at Milborough High, the Head of Maths remarked: "you can see certain students who are spending longer on [Strobe] and doing their homework properly are actually improving a lot more in class. It's helping their retrieval practice, things like that" (Dominic, Head of Maths, Milborough High, interview, November 2024). However, the teacher's emphasis on "certain students" suggests such correlations are unlikely to be universally experienced. Although increased practice time might logically support improved outcomes, the cumulative effect of these data-driven practices requires critical examination. Our analysis suggests that the repetitive and routine reinforcement of a particular set of values embedded in the data visualizations themselves—namely, those of task completion, time on task, and punctuality—contributed to the normalization of the notion that these behaviors are what matter most. This presents significant challenges for pedagogy, as it diverts attention away from the actual learning process and quality of students' understanding, in favor of surface-level indicators that are narrow in scope and, as discussed below, lacking in transparency.

4.3 | "Getting it Done": Subjects of Compliance

It became evident that the platform's emphasis on its value-laden metrics often incentivized students to circumvent, shortcut and game the system in order to comply with expectations and avoid repercussion: Strobe Maths has "more focus on just getting it done than learning. People just want it gone so find ways to get

out of it through cheating" (walkthrough workshop note, Year 8, Hawthorne Park, March 2024). Across all three schools, students employed a range of strategies to ensure completion. These included repeatedly guessing answers until correct, outsourcing tasks to entrepreneurial peers for a fee ranging anywhere between £1 and £5, and using Internet search engines, social media platforms, and AI apps such as Gauth and Photomath. As one student explained:

> I use an app for it so I take a picture of the question and it tells you the answer. (...) It takes me 30 minutes with the app, so if I don't use the app, it takes me an hour and a half which I think is just pointless 'cause I'm sat there bawling my eyes out trying to get the questions right
>
> (Veronica, aged 13, Milborough High, interview, December 2024)

Veronica's account not only highlights the emotional strain that some students might experience when trying to independently complete tasks they find difficult, but also reflects the broader and ingrained emphasis on completion, as revealed in her assertion that using an AI app to answer the questions reduces her completion time from 90 minutes to 30.

Many students also reported seeking assistance from teachers, parents/carers, and siblings when they encountered questions they could not answer—an approach that was broadly encouraged by the schools. However, Strobe Maths is unable to capture such interactions in the data it generates. It cannot "know" whether a student has used an AI app, paid a friend, or received assistance from a teacher or family member. This technical limitation was acknowledged by students, with one explaining that using an AI app would "make the questions a lot harder for the students 'cause just showing that you're getting it right every time and then if they don't have the AI they probably won't be able to do any of the questions" (Sebastian, aged 14, Milborough High, interview, November 2024). Consequently, some students chose to avoid using AI apps, while others felt compelled to rely on them in order to complete assignments when faced with significant difficulties. One student reflected that although she knew using Photomath would mean she would "end up with the wrong level," she still resorted to it when she was "really, really struggling" (Eleri, aged 15, Milborough High, interview, November 2024).

While some teachers appeared to interpret and utilize the data with an awareness of its limitations by supplementing it with additional sources of information including their contextual knowledge of individual students, the data generated by Strobe Maths was generally treated as sufficiently authoritative for monitoring and evaluating engagement; likely reinforced by the persuasive clarity of the visualizations and their privileged position within the interface. Ultimately, the platform's emphasis on completion, time on task, and punctuality appeared to compel many students to prioritize compliance over meaningful engagement, undermining the learning process altogether. This tension was powerfully articulated by a student at Draymoor Academy, who envisioned a reality in which quality, rather than quantity, is legitimized, and where motivation is rooted in a desire to learn rather than fear of punishment:

> I don't like it [Strobe Maths] because, uh, yeah, in my opinion, it should have like, questions that like, like stuff that you need to do and Strobe (...) people like shouldn't do it because like, it gives [detention]. I, I think it would be better if, uh, the, the questions were very easy and if you wanted to do them because of review or not doing them just because you get a [detention]
>
> (Xavier, aged 12, Draymoor Academy, interview, November 2023).

For Xavier, students should not simply engage with Strobe Maths to avoid punitive consequences, but to "review" material because they want to. This raises critical questions about the kinds of values EdTech might alternatively foreground. Rather than reinforcing values such as completion, time on task, and punctuality, Xavier's words gesture towards the prioritization of values such as autonomy and potentially curiosity. Reimagining the design and use of educational technologies in this way invites a reconsideration of how digital tools might more meaningfully support educational equity—not through compliance, but through responsiveness to the diverse needs, motivations, and lived experiences of students.

4.4 | "I can't learn on my own": Exacerbating Existing Inequities

Our analysis suggests these value-laden educational technologies present significant equity issues, disproportionately impacting students and schools with fewer resources. At Draymoor Academy and Milborough High, Strobe Maths was deployed as an independent learning tool in non-mainstream settings to support particular students. At Draymoor Academy, its use was encouraged in the internal exclusion room, and at Milborough High, in designated support spaces for students with EAL and students with SEND, with completion remaining a primary focus. The internal exclusion room at Draymoor Academy was intended as an alternative to suspension, providing a supervised setting for students who had breached the behavior policy. Depending on the seriousness of the offense, students spent anywhere between one lesson and a few days in the room, with an average of around 70 students assigned to the space each day (though there was only capacity for 27). The room was recently equipped with one-to-one devices intended to support students' learning, and students were encouraged to engage with Strobe Maths and other EdTech platforms so that they did not "fall behind" (field note, October 2023). However, the devices functioned more as a behavior management tool than a pedagogic resource. When asked about the devices' impact, the staff member responsible for the room highlighted significant improvements in behavior, but made no reference to their educational effectiveness. A series of observations in the room revealed fewer than 20% of students engaged with the EdTech platforms at any given time, and while a considerable number of students seemed to require support while using Strobe Maths, insufficient staffing levels meant such support could not be provided. Jessica, a student who spent quite a lot of time in the internal exclusion room said:

> The most bad thing of it is, I can't learn on my own because I'm very forget do you know what I mean?

> I feel like I always need someone next to me, to help me but like, sometimes when I'm sat on my own and I'll be sitting there and I'll think, I don't know what's going on, I need someone to help me but that's what the teachers don't understand, you need someone sat next to you, as a help
>
> (Jessica, aged 14, Draymoor Academy, interview, November 2023).

Many of the students assigned to the internal exclusion room experienced disadvantage on one or multiple axes (e.g., EAL and/or SEND) and often required assistance with their learning, as described by Jessica. However, "my hunch [was] that many students do not seek help because they are not hopeful they will receive it, ultimately restricting their options to deciphering the EdTech's explanation, guessing, Googling or disengaging entirely" (observation note, internal exclusion room, Draymoor Academy, October 2023).

Comparatively, in the EAL and SEND support spaces at Milborough High, there were often members of staff available to support students who were working on their Strobe Maths assignments: "At times, he Googles the answers, but when the TA helps him his engagement levels increase. He engages in dialogue with her about the different questions, checking his knowledge and talking steps through" (observation note, SEND support space, Milborough High, December 2024). However, as the findings above demonstrate, academically less successful students and students experiencing disadvantage struggled with the significant amount of independent learning required of them, expected to use a technology that—despite its claims—was not responsive to their needs.

Observations of these spaces in the two schools demonstrate that the value of the platform, marketed as capable of supporting students from disadvantaged backgrounds as effectively as other students, was heavily shaped by the social context of its use. While the implications of the use of the technology differs according to context, our research provides further support for concerns that technologies can reinforce and at times exacerbate inequities in education (Eynon 2023; Facer and Selwyn 2021).

5 | Conclusion

Through this illustrative case study, we have sought to highlight the analytic value of incorporating socio-technical audits within ethnographic inquiry, demonstrating how the values embedded in educational technologies emerge in school settings and shape pedagogical practices. Importantly, the sustained, systematic, and reflexive approach to fieldwork enabled close examination of how key stakeholders interpret, negotiate and experience educational technologies. Attending to these lived experiences revealed how values embedded within Strobe Maths were normalized and reinforced within schools, often in ways that disproportionately shaped the experiences of students from disadvantaged backgrounds.

Integrating a socio-technical audit within ethnographic inquiry offers anthropology of education a powerful approach for examining how technologies shape and are shaped by institutional, pedagogical, commercial, sociocultural, and political priorities, and how these priorities manifest in everyday school practices. In doing so, it extends the ethnographic gaze beyond observations and interviews to include the technical design of educational technologies, making visible the otherwise opaque infrastructures, design logics, and value assumptions that circulate and shape everyday schooling in significant ways. Crucially, this lens illuminates dimensions of culture and power that might remain obscured in more conventional classroom ethnography. An ethnographer may observe a student becoming disheartened or disengaged; yet without interrogating the technical architectures of the platform itself, the conditions producing that experience risk remaining under-theorized.

This methodological contribution also advances debates in the anthropology of education concerning subjectivity, governance and temporality. Socio-technical audits can make visible how educational technologies participate in the production of particular learner subjectivities—for example, by encoding assumptions about completion, time on task, and punctuality—and how these assumptions become normalized through classroom practice. It foregrounds the socio-technical constitution of temporality, as platform-generated rhythms of repetition, feedback, and progression reorganize the pace and sequencing of learning, while also sharpening analysis of governance by tracing how metrics, dashboards, and automated feedback systems redistribute power and recalibrate responsibility between students, teachers, and institutions.

As educational technologies become an increasingly taken-for-granted feature of schooling, integrating socio-technical audits within ethnographic inquiry is vital for apprehending the digital not as a neutral backdrop to social life, but as an active participant in the cultural production of value, power, temporality, and inequality. Such methodological expansion strengthens anthropology of education's capacity to develop critical, empirically grounded understandings of how educational technologies reconfigure teaching and learning, and with what social and educational consequences.

Funding

This work was supported by the Economic and Social Research Council Education Research Programme, grant ES/X00242X/1.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

A preprint version of this article is available at: https://doi.org/10.31235/osf.io/gxaup_v1.

Endnotes

[1] Strobe Maths is a pseudonym for the EdTech platform referenced throughout this article.

[2] This study employs six in-depth ethnographies to explore the relationships between equity, technology, and teaching and learning in

secondary schools in England. In each of the ethnographic studies, a researcher spent an entire term in the school community and used a variety of methods—including socio-technical audits—to explore how technology is embedded in everyday school practices.

[3] Two of the schools (Draymoor Academy and Milborough High) are academies run by different MATs (multi-academy trusts). Academies receive funding directly from the government and have more control over how they do things than community schools, which are maintained by the local authority (HM Government 2025a).

[4] The school names along with participant names are pseudonyms to protect the privacy and confidentiality of the institutions and individuals involved.

[5] GCSEs are typically taken by students aged 15–16 at the end of compulsory secondary education in England. A Grade 4 represents a standard pass, broadly equivalent to a 'C' grade on the old grade scale (Ofqual 2018).

[6] The researcher could not conduct walkthroughs from a parent/carer perspective as consent for this particular access had not been sought.

References

Alirezabeigi, S., J. Masschelein, and M. Decuypere. 2020. "Investigating Digital Doings Through Breakdowns: A Sociomaterial Ethnography of a Bring Your Own Device School." *Learning, Media and Technology* 45, no. 2: 193–207. https://doi.org/10.1080/17439884.2020.1727501.

Apps, T., K. Beckman, and S. K. Howard. 2022. "Valuable Data? Using Walkthrough Methods to Understand the Impact of Digital Reading Platforms in Australian Primary Schools." *Learning, Media and Technology* 48, no. 2: 294–309. https://doi.org/10.1080/17439884.2022.2160458.

Arantes, J. 2023. "Educational Data Brokers: Using the Walkthrough Method to Identify Data Brokering by Edtech Platforms." *Learning, Media and Technology* 49, no. 2: 320–333. https://doi.org/10.1080/17439884.2022.2160986.

Ball, S. J., and E. Grimaldi. 2022. "Neoliberal Education and the Neoliberal Digital Classroom." *Learning, Media and Technology* 47, no. 2: 288–302. https://doi.org/10.1080/17439884.2021.1963980.

Braun, V., and V. Clarke. 2021. *Thematic Analysis: A Practical Guide*. SAGE Publications.

Castañeda, L., and B. Williamson. 2021. "Assembling New Toolboxes of Methods and Theories for Innovative Critical Research on Educational Technology." *Journal of New Approaches in Educational Research* 10, no. 1: 1–14. https://doi.org/10.7821/naer.2021.1.703.

de Roock, R. S. 2021. "On the Material Consequences of (Digital) Literacy: Digital Writing With, for, and Against Racial Capitalism." *Theory Into Practice* 60, no. 2: 183–193. https://doi.org/10.1080/00405841.2020.1857128.

Decuypere, M. 2019. "Researching Educational Apps: Ecologies, Technologies, Subjectivities and Learning Regimes." *Learning, Media and Technology* 44, no. 4: 414–429. https://doi.org/10.1080/17439884.2019.1667824.

Decuypere, M. 2021. "The Topologies of Data Practices: A Methodological Introduction." *Journal of New Approaches in Educational Research* 10, no. 1: 67–84. https://doi.org/10.7821/naer.2021.1.650.

Decuypere, M., and P. Landri. 2020. "Governing by Visual Shapes: University Rankings, Digital Education Platforms and Cosmologies of Higher Education." *Critical Studies in Education* 62, no. 1: 17–33. https://doi.org/10.1080/17508487.2020.1720760.

Eynon, R. 2023. "Algorithmic Bias and Discrimination Through Digitalisation in Education: A Socio-Technical View." In *World Yearbook of Education 2024*, edited by B. Williamson, J. Komljenovic, and K. Gulson, 245–260. Routledge.

Facer, K., and N. Selwyn. 2021. *Digital Technology and the Futures of Education: Towards 'Non-Stupid' Optimism. Futures of Education Initiative*. UNESCO.

Gleason, B., and M. K. Heath. 2021. "Injustice Embedded in Google Classroom and Google Meet: A Techno-Ethical Audit of Remote Educational Technologies." *Italian Journal of Educational Technology* 29, no. 2: 26–41. https://doi.org/10.17471/2499-4324/1209.

HM Government. 2025a. *Types of School: Academies*. HM Government.

HM Government. 2025b. *Compare School and College Performance in England*. HM Government.

Jarke, J., and A. Breiter. 2019. "The Datafication of Education." *Learning, Media and Technology* 44, no. 1: 1–6. https://doi.org/10.1080/17439884.2019.1573833.

Kitchin, R., and T. Lauriault. 2014. "Towards Critical Data Studies: Charting and Unpacking Data Assemblages and Their Work." *Programmable City Working Paper* 2. https://ssrn.com/abstract=2474112.

Krutka, D. G., M. K. Heath, and K. B. S. Willet. 2019. "Foregrounding Technoethics: Toward Critical Perspectives in Technology and Teacher Education." *Journal of Technology and Teacher Education* 27, no. 4: 555–574. https://doi.org/10.70725/560948mgghtd.

Lemov, D. 2021. *Teach Like a Champion 3.0: 63 Techniques That Put Students on the Path to College*. John Wiley & Sons.

Light, B., J. Burgess, and S. Duguay. 2018. "The Walkthrough Method: An Approach to the Study of Apps." *New Media & Society* 20, no. 3: 881–900. https://doi.org/10.1177/1461444816675438.

Livingstone, S., and J. Sefton-Green. 2016. *The Class: Living and Learning in the Digital Age*. NYU Press.

Macgilchrist, F. 2024. "Educational Ethnography in an Age of Technoculture: Exploring Noise and Glitch Instead of Fetishising the New." In *Novelty, Innovation & Transformation in Educational Ethnographic Research*, edited by J. Budde, A. Wischmann, M. Meier, and G. Rißler, 16–28. Routledge.

Macgilchrist, F., and J. Jarke. 2025. "Who Said Only Military Officers Can Deal With Uncertainty? On the Importance of Uncertainty in Edtech Data Visualisations." *Discourse: Studies in the Cultural Politics of Education* 46, no. 3: 359–378. https://doi.org/10.1080/01596306.2025.2467365.

Mackenzie, D., and J. Wacjman, eds. 1999. *The Social Shaping of Technology*. 2nd ed. Open University Press.

Monahan, T. 2006. *Globalization, Technological Change, and Public Education*. Routledge.

Nichols, T. P., and A. Garcia. 2022. "Platform Studies in Education." *Harvard Educational Review* 92, no. 2: 209–230. https://doi.org/10.17763/1943-5045-92.2.209.

Ofqual. 2018. *GCSE 9 to 1 Grades: A Brief Guide for Parents*. Ofqual.

Pangrazio, L., N. Selwyn, and B. Cumbo. 2022. "A Patchwork of Platforms: Mapping Data Infrastructures in Schools." *Learning, Media and Technology* 48, no. 1: 65–80. https://doi.org/10.1080/17439884.2022.2035395.

Rafalow, M. H. 2020. *Digital Divisions: How Schools Create Inequality in the Tech Era*. University of Chicago Press.

Ritter, C. S. 2022. "Rethinking Digital Ethnography: A Qualitative Approach to Understanding Interfaces." *Qualitative Research* 22, no. 6: 916–932. https://doi.org/10.1177/14687941211000540.

Robertson, S. L. 2019. "Comparing Platforms and the New Value Economy in the Academy." In *World Yearbook of Education 2019 Eynon*, edited by R. Gorur, S. Sellar, and G. Steiner Khamsi, 169–186. Routledge.

Schubert, C., and T. Röhl. 2017. "Ethnography and Organisations: Materiality and Change as Methodological Challenges." *Qualitative Research* 19, no. 2: 64–181. https://doi.org/10.1177/1468794117744748.

Sefton-Green, J. 2021. "Towards Platform Pedagogies: Why Thinking About Digital Platforms as Pedagogic Devices Might Be Useful." *Discourse (Abingdon)* 43, no. 6: 899–911. https://doi.org/10.1080/01596306.2021.1919999.

Selwyn, N. 2016. *Is Technology Good for Education?* Polity Press.

Selwyn, N., L. Pangrazio, and B. Cumbo. 2021. "Knowing the (Datafied) Student: The Production of the Student Subject Through School Data." *British Journal of Educational Studies* 70, no. 3: 345–361. https://doi.org/10.1080/00071005.2021.1925085.

Sherrington, T. 2019. *Rosenshine's Principles in Action*. John Catt.

Sims, C. 2017. *Disruptive Fixation*. Princeton University Press.

Smith, G. J. 2018. "Data Doxa: The Affective Consequences of Data Practices." *Big Data & Society* 5, no. 1: 1–15. https://doi.org/10.1177/2053951717751551.

Striepe, M., and C. Cunningham. 2022. "Gatekeepers, Guides and Ghosts: Intermediaries Impacting Access to Schools During COVID-19." *Ethnography and Education* 17, no. 3: 275–292. https://doi.org/10.1080/17457823.2022.2049332.

The Bell Foundation. 2025. *EAL Assessment Framework: Secondary*. Bell Foundation.

Trist, E. L., and K. W. Bamforth. 1951. "Some Social and Psychological Consequences of the Long-Wall Method of Coal-Getting: An Examination of the Psychological Situation and Defences of a Work Group in Relation to the Social Structure and Technological Content of the Work System." *Human Relations* 4, no. 1: 3–38. https://doi.org/10.1177/001872675100400101.

Troeger, J., and A. Bock. 2022. "The Sociotechnical Walkthrough – A Methodological Approach for Platform Studies." *Studies in Communication Sciences* 22, no. 1: 43–52. https://doi.org/10.24434/j.scoms.2022.01.3064.

Van Dijck, J., T. Poell, and M. De Waal. 2018. *The Platform Society: Public Values in a Connective World*. Oxford University Press.

Warr, M., and M. K. Heath. 2025. "Uncovering the Hidden Curriculum in Generative AI: A Reflective Technology Audit for Teacher Educators." *Journal of Teacher Education* 76, no. 3: 245–261.

Warschauer, M. 2003. *Technology and Social Inclusion: Rethinking the Digital Divide*. MIT Press.

Watters, A. 2014. *The Monsters of Education Technology*. Tony Bates Associates Ltd.

Williamson, B. 2017. "Learning in the "Platform Society": Disassembling an Educational Data Assemblage." *Research in Education* 98, no. 1: 59–82. https://doi.org/10.1177/0034523717723389.