Learning in the 'platform society': disassembling an educational data assemblage

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Abstract   Schools are increasingly involved in diverse forms of student data collection. This article provides a sociotechnical survey of a data assemblage used in education. ClassDojo is a commercial platform for tracking students' behaviour data in classrooms and a social media network for connecting teachers, students and parents. The hybridization of for-profit platforms with a key public institution of society raises significant issues. ClassDojo is designed to influence how school leaders and teachers make decisions, how schools connect with parents, and how teachers act to change students' behaviour. Conceptualized as a 'public sphere platform' ClassDojo is reshaping discourses, practices and subjectivities in schools. In particular, ClassDojo provides evidence of how the business model and political economy governing social media—'platform capitalism'—is being inserted into public education. It is prototypical of education in an emerging 'platform society,' and of how student and teacher subjectivities are being reshaped by the presumptions and worldviews encoded in digital platforms.

Keywords *behaviour change, data assemblage, ClassDojo, platform capitalism, platform society, subjectivity*

Schools and teachers are increasingly tasked with the collection of data about students via technical platforms that originate in the private sector and are plugged into public sector institutions. Global technology companies such as Google, Apple, Microsoft, and Amazon have established huge presences in public education and are competing for their share of school business (Cavanagh 2017). Google's rapid expansion into schools in particular has raised concerns about big tech corporations using school data to track students and bypassing education officials, while changing the priorities of public education to focus on training skilled workers (Singer 2017a). The emerging hybridization of for-profit data platforms with a key public institution of society therefore raises significant questions about the political economy of educational data use, and about the

subjectivities of teachers as their job becomes more focused on data entry and collection, and of students as the subjects of calculations performed on those data.

While the technology giants battle for educational market share, the world's most successful education technology startup company is Class Twist Inc., the developers of the globally popular ClassDojo app. Originally launched in beta by two young British entrepreneurs as part of a Silicon Valley 'accelerator' program for educational technology startup companies in 2011, ClassDojo was officially rolled-out in 2013 and by late 2016 reported over 3 million subscribing teachers, with 35 million children signed in to the system across 180 countries. When first launched, ClassDojo was a simple app designed for use on mobile devices for teachers to track children's 'positive behaviour' by awarding them 'dojo points,' and quickly extended to capturing attendance records and producing behavioural reports on classroom trends for teachers and parents. As new features have been added—particularly with large injections of venture capital in 2013 and again in 2016—ClassDojo has become more like 'a social-media community where ... the app creates a shared classroom experience between parents, teachers, and students. Teachers upload photos, videos, and classwork to their private classroom groups, which parents can view and "like." They can also privately message teachers and monitor how their children are doing in their classrooms through the behavior-tracking aspect of the app' (Jackson 2016).

ClassDojo does not just superficially resemble a social media platform. It is actively driven by ambitions to become the main social media platform for schools. 'Your entertainment bundle is Netflix. Your music bundle is Spotify. What's your education bundle?' its chief executive has asked (Rodriguez 2016). Other features have been likened to Facebook, Snapchat and Slack:

> Slack would be ClassDojo's closest comparison … it's the end users who choose the service, going around the company's IT officials and downloading it on their own. Similarly with ClassDojo, teachers can download the app by themselves, without having to ask school administrators for permission or money to pay for the software. For Slack, keeping coworkers connected throughout the day is the objective while ClassDojo is meant to do the same for the support system of every student, keeping teachers, parents and school administrators on the same page. (Rodriguez 2016)

ClassDojo allows teachers to award points for observable behaviour, similar to pressing the 'like' button on Facebook, which creates a behavioural data trail for each student; permits text and video communication between teachers and parents, as the enterprise platform Slack does for office workers; acts as a channel for educational video content like Netflix; sends 'push notifications' to students and

parents with recommendations such as the 'ideal gifts' to purchase teachers at the end of term; and also allows schoolchildren to create digital portfolios, akin to platforms like Snapchat encouraging the 'sharing' of 'user-generated content.' It has also extended into a 'schoolwide' platform, whereby whole schools subscribe to the platform and school leaders can take an overview of everything occurring on it—in some ways taking on the form of an infrastructure for schools, much as commercial social media platforms have become infrastructures of sociality, consumption, cultural participation, and political life (van Dijck & Poell 2015). One of ClassDojo's major investors has stated, 'If you're an adult in the United States, you've got LinkedIn for work, Facebook for friends and family. This ends up being the third set of relationships, around your kids' (Harris 2016).

Though the Class Twist company does not present itself as a 'big data' organization, its ClassDojo app has amassed an enormous database of behaviour information about tens of millions of children worldwide—as well as user data from schools and teachers—much like popular social media operators extracting data from users' participation. 'Stripe did that in the financial industry, Uber in transportation, and Airbnb in hospitality,' claims a ClassDojo press release. 'The platform ClassDojo has created for classroom communication is doing the same thing for education' (PR Newswire 2016a). And, just as 'it is far from transparent how Facebook and other platforms utilize their data to influence traffic and monetize engineered streams of information' (van Dijck 2013: 12), ClassDojo's business model remains opaque. The recipient of substantial venture capital funding, it remains unclear how ClassDojo's owners may monetize the platform or what assurances its investors have of a profitable return on investment.

In this article I present a sociotechnical survey of ClassDojo as a 'data assemblage' composed of technical components, social relations, people, policies, funding arrangements, expert knowledge and discourse. Though it reflects a longer history of commercial attempts to reform public education through technology (Selwyn 2016), ClassDojo is distinctively prototypical of how schooling is being reshaped in a context where social media platforms—rather than state infrastructures—are becoming templates for how social and public life are arranged. Indeed, as ClassDojo has scaled up from a behaviour-tracking app to a social media platform, it is becoming more like an infrastructural substrate of schooling that orchestrates student tracking, parent communication, and the diffusion of discourses and best practice models of teaching and learning. In the process it is resubjectifying teachers as data workers collecting calculable information, and students as the data subjects of calculations performed via the platform. It is thereby transforming

classrooms into behavioural data markets where students can exchange 'good' behaviour for dojo points and rewards (while 'poor' behaviour results in points deductions), making data about children into a form of value and classrooms into little digital economies where personal data has exchange value and utility as a form of capital that fluctuates according to individual performance. Though behavioural points systems have long been used as disciplinary techniques by teachers, ClassDojo extends their scope and scale by making them into a technique of real-time surveillance, and transforming points into the digital data that the ClassDojo business model depends upon. As such, the political economy that frames and infuses ClassDojo, and the subjectivities it shapes in the classroom through its diffusion of discourses and practices, deserve concentrated analysis. Moreover, ClassDojo indicates how platforms designed in the commercial sector may in future years increasingly intervene in and rework public education at massive scale, both within and beyond state control.

Disassembling data assemblages

Given its expansion from a mobile behaviour-tracking app for the classroom to a networked communication and media platform for schools, ClassDojo needs to be understood in relation to emerging critical research on digital platforms. A 'platform' refers to internet-based applications such as social media sites that process information and communication, channel social traffic, and enable the creation and sharing of user-generated content. As 'online content-hosting intermediaries' many social media platform operators proclaim they afford opportunities to communicate, interact, or sell; yet they are also 'curators of public discourse' since 'their choices about what can appear, how it is organized, how it is monetized, what can be removed and why, and what the technical architecture allows and prohibits, are all real and substantive interventions into the contours of public discourse' (Gillespie 2010: 359). Van Dijck and Poell (2013: 2) have argued that these 'social media platforms have penetrated deeply into the mechanics of everyday life, affecting people's informal interactions, as well as institutional structures and professional routines.' Rather than being understood simply as technical systems, 'technical, social, and economic concerns determine platforms' structure, function, and use' (Plantin et al 2016: 6), while reciprocally successful individual platform 'microsystems' can then exert profound influences on wider 'ecosystems' of other competing and connected platforms (van Dijck 2013).

More recently, van Dijck and Poell (2015: 1) have suggested that we are entering a new kind of 'platform society' in which 'public and private communication is reshaped by social media's commercial mechanisms, transforming the political economy of the media landscape,' while also forcing 'all societal actors—including the mass media, civil society organizations, and state institutions—to reconsider and recalibrate their position in public space.' Likewise, Plantin et al (2016: 3) have suggested that social media platforms such as Facebook are undergoing 'infrastructuralization' as 'media environments increasingly essential to our daily lives (infrastructures) are dominated by corporate entities (platforms).' Infrastructuralized platforms are, then, becoming as integrated into contemporary society as existing infrastructural networks of transport, electric utility, broadcast, print media and telecommunications.

There is a strong political economy dimension to the infrastructrualization of platforms. The accumulation, ordering and organization of data about users is being put to use by platform operators as a way of extracting value from them. 'Platforms are particular comings together of code and commerce,' Langley and Leyshon (2016: 9) have argued, which are giving rise to 'platform capitalism,' whereby platforms enrol users through a participatory culture and mobilize code and data analytics to realize a business model that prioritizes rapid up-scaling and the extraction of revenues from users' data trails. Thus while platform operators are becoming '*mediators* in the engineering of culture and everyday life' (van Dijck 2013: 39), they also use digital data to drive revenue from connecting people, content, and services. As such, the platform operators driving platform capitalism are not 'mere owners of information' but 'becoming owners of the infrastructures of society' (Srnicek 2016: 96).

The emerging platform society is one in which the business model of platform capitalism has consolidated and is gradually interfering with more and more aspects of everyday life, including key public institutions of society such as health and education. Van Dijck (2016) has called the platforms that intervene in public institutions of society 'public sphere platforms,' and argues that their promise is to contribute to the public good, often in areas under-funded by governments. Like social media platforms, though, these new platform infrastructures for health and education are owned and structured by private actors and networks. Public sphere platforms are the result of a translation of the technical model and the business model of the social media platform into the infrastructural apparatuses of public institutions and practices.

Within education itself, critical attention has recently been concentrated on 'infrastructures of accountability,' the complex mixes of technologies, policies and actors that enable the collection, processing, and dissemination of information from standardized tests required to produce performance measures and ratings (Anagnostopoulos et al 2013). Commercial software firms and data analytics labs have carved out positions as sources of technical expertise within such infrastructures, since the 'data that fuel test-based accountability are … the products of complex assemblages of technology, people and policies that stretch across and beyond the boundaries of our formal education system' (Anagnostopoulos et al 2013: 2). The infrastructure of technologies, people and policies that underpins the production of data and accountability mechanisms is highly significant in its effects, because, 'as they define what kind of knowledge and ways of thinking matter and who counts as "good" teachers, students, and schools, these performance metrics shape how we practice, value and think about education' (Anagnostopoulos et al 2013: 11). A political economy of technology providers and government-approved markets for data collection platforms for education therefore underpins the engineering of the infrastructures of accountability, which then gives rise to new subjectivities of good teachers and students. Part of the argument in this article, however, is that the infrastructure of test-based accountability in education is now being paralleled by new kinds of platform infrastructures. Illustratively, ClassDojo has transformed from an app to a social media platform for schools, and is further seeking to scale up into a new kind of infrastructure centred on the measurement and inculcation of desirable student behaviours.

Before surveying ClassDojo's infrastructuralization as a public sphere platform, it is important to note that any platform consists of multiple moving parts, human and nonhuman, that have to be assembled together. Kitchin and Lauriault (2014) have described a 'data assemblage' as 'a complex socio-technical system, composed of many apparatuses and elements that are thoroughly entwined,' including 'all of the technological, political, social and economic apparatuses that frames their nature, operation and work.' An assemblage such as a digital platform, then, needs to be understood in terms of how its moving parts—whether human and social or nonhuman, material and technical—come together to form a relatively stable and functional whole. Significantly, data assemblages also 'evolve and mutate as new ideas and knowledges emerge, technologies are invented, organisations change, business models are created, the political economy alters, regulations and laws are introduced and repealed, skill sets develop, debates take place, and markets grow or shrink' (Kitchin & Lauriault 2014).

Researching such an assemblage therefore involves investigating 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. As a methodological strategy to the study of mutating data assemblages, van Dijck (2013: 25) focuses on '*disassembling microsystems*,' taking 'apart single platforms into their constitutive components' in order to understand them as both 'techno-cultural constructs and as organized socioeconomic structures,' while also '*reassembling the ecosystem*' of social relations and institutions they penetrate. Studying the 'users that employ them, technologies that drive them, economic structures that scaffold them, and institutional bodies that incorporate them' (van Dijck & Poell 2013: 2) is essential to the analysis of data assemblages and infrastructures.

Utilizing the concept of a sociotechnical data assemblage and the methodological strategy of disassembling platforms, I detail how ClassDojo has been assembled over time as a mutating public sphere platform for education. As with other social media platforms reshaping public discourse, ClassDojo is curating the discourses and practices of classrooms and public education. The political economy of platform capitalism that supports ClassDojo is becoming the business model for education, and in the process of enacting this model the ClassDojo platform is reworking student and teacher subjectivities.

Disassembling ClassDojo

Technicalities

The technicalities of platforms and infrastructures matter. Digital technologies are not the neutral backdrop for human activity, but 'complex, sociomaterial phenomena' and 'the residue of societal ambitions'—not 'things that simply happen to society' but rather 'the product of distinct human and institutional efforts,' 'richly etched with the politics, presumptions and worldviews of their designers,' which 'incorporate into and sometimes press upon the lived practices of their users' (Gillespie et al (2014: 1). In other words, digital technologies such as social media platforms translate the decisions of designers into the practices of users.

As a technical product ClassDojo consists of a mobile app and an online platform programmed by a team of Silicon Valley designers and enacted in the practices of teachers. Teachers can access and use the app on a smartphone or tablet in the

classroom, and open up the online platform on any other computing device or display hardware for pupils to view. The app allows class teachers to set their own behavioural categories, though it comes pre-loaded with a series of defaults that teachers can use to award or deduct feedback points—such as 'hard work,' 'participating,' 'helping others,' 'teamwork,' 'leadership,' and 'perseverance and grit,' which are intentionally aligned with recent applications of positive psychology to education (Williamson 2017). These defaults act as norms shaping teachers' attention, and thereby as prompts to reward those behaviours pre-coded in the ClassDojo platform. Each child in the system is represented by a customizable dojo monster avatar. Behavioural targets can be set for both individuals and groups to achieve positive goals, with children's points visualized as a 'doughnut' of green positive points and red 'needs work' deductions on the teacher dashboard. Teachers are able to display each child's aggregate points to their entire class as a kind of league table of behaviour, and school leaders can access each child's profile to monitor their behavioural progress. Parents can also access their children's accounts to view their data, and can opt to receive real-time notifications when dojo points are awarded or deducted. Individual and whole class 'report cards' can also be generated by staff at daily, weekly, monthly or yearly intervals, featuring visualized timelines of their behavioural progress and attendance, while the 'TrendSpotter' feature can be used to generate visualized insights into behavioural patterns of individuals and whole classes over time.

Launched in 2016, new 'school-wide' features to allow whole schools, not just individual teachers, to sign up for accounts, which enables 'teachers and school leaders to safely share photos, videos, and messages with all parents connected to the school at once, replacing cumbersome school websites, group email threads, newsletters, and paper flyers' (PR Newswire 2016b). ClassDojo can also be used to register students' attendance. At the same time that ClassDojo is expanding in scope to encompass new technical innovations and serve other practical and social functions, it is therefore obsolescing existing school technologies and materials. The new school-wide application of ClassDojo also makes it easier for the platform to be used by administrators, and means individual profiles remains persistent over time as students move classes. Leaders can use the school-wide features to track student progress across an entire institution and within individual classes. Teachers can also create 'Student Stories' for each child, where digital portfolios of class work can be uploaded.

The public ClassDojo website acts as a glossy public face to the platform and the company behind it. It presents the brand through highly attractive visual graphics,

high-production promotional video content, and carefully crafted text copy, as well as downloadable and printable classroom resources and staff development materials such as PowerPoint decks. The website also features an 'Idea Board' where pedagogic ideas can be submitted by teachers to be shared publicly, plus a blogging area for teachers. Parents assigned a login can access the 'Class Story' area where teachers share messages and video with all parents of children in a specific class, and individual teachers and parents can also exchange short text and multimedia messages. In these ways, ClassDojo is typical of the business model of platform capitalism, which relies on the voluntary labour of users to post content—resonant with the logics of 'participatory culture' that enrol users to social media platforms—whilst also undergoing infrastructuralization to orchestrate more and more of the everyday tasks of the school. With the roll-out of ClassDojo as a 'school-wide' platform, teachers may find themselves mandated to participate, rather than using it voluntarily as a pedagogic choice or strategy.

Less visibly, ClassDojo consists of particular technical standards and the products of software programming. The ClassDojo engineering blog details some of the complexity of the code and algorithms that have been used or designed to make all the different elements of the platform function—such as interoperability, database management, analytics, programming language standards, security, A/B testing, debugging and data visualization. Much of its source code is available to view on the ClassDojo area of the GitHub code repository. GitHub is therefore part of the assemblage of ClassDojo, a resource that both contains the code and algorithms used by the platform's programmers and a resource used by its engineers to locate existing re-useable code.

As a cloud-based service, all of ClassDojo's data servers and analytics are hosted externally. For this it employs Amazon Web Services. Amazon has recently moved to establish AWS as a key provider of cloud storage for schools (Cavanagh 2017). The safety and security page of the ClassDojo website notes that the web servers of AWS 'are physically located in high-security data centers – the same data centers used to hold secure financial information. … Our database provider uses the same https security connections used by banks and government departments to store and transfer the most sensitive data.' (At the time of writing in May 2017 the ClassDojo website link to the 'security measures' provided by AWS was inactive.) Any interaction with the ClassDojo platform, therefore, takes place via Amazon's vast global infrastructure of cloud technologies, including being physically stored in one of Amazon's data centres. ClassDojo is, in other words, physically, financially and technically located within one of the key global cloud infrastructures that

orchestrate the emerging platform society. Amazon is a paradigmatic example of the platform capitalist imperative to achieve massive-scale 'network effects' through the intensification of user data extraction, analysis, and control as a source of value (Srnicek 2016). As an AWS customer, ClassDojo is both supplying Amazon its data for storage and further cementing its monopoly position.

ClassDojo also extends into other platforms. It has its own Facebook and Instagram pages, plus a popular @ClassDojo account on Twitter with 68,000 followers. Much of its initial word-of-mouth marketing worked through these platforms, allowing ClassDojo to extend rapidly through network effects as enthusiastic early adopters recommended it to friends and colleagues. User-generated materials such as classroom resources are shared by teacher advocates on these platforms, as well as on other public sharing sites such as Pinterest, thus extending it to other platforms. In this sense, ClassDojo is typical of how individual platform microsystems interpenetrate wider platform ecosystems to generate network effects and grow digitally. Indeed, network effects are a major part of ClassDojo's marketing, with its website including a company timeline visualizing its growth milestones and escalating user numbers. As this brief survey of the technical aspects of ClassDojo demonstrates, it consists of myriad technologies, materials, standards and so on; but these technical elements all need to be orchestrated by human hands.

People & organizations

Who makes and owns ClassDojo? As van Dijck (2013: 36) notes, 'a platform's ownership model is a constitutive element in its functioning as a system of production.' Critical studies of social media platforms and infrastructures have demonstrated that their functioning cannot be separated from their designers and programmers (Gillespie et al 2014; Plantin et al 2016). As van Dijck and Poell (2013: 5) have noted, the 'computer code, data, algorithms, protocols, interfaces and the platform organisations that are responsible for programming' together 'steer user experiences, content and user relations via platforms.' Any system of data collection or online communication platform has to be programmed to perform its tasks according to the particular objectives of its owners and engineers (Kitchin & Lauriault 2014).

ClassDojo depends on a vast network of people and organizations. It was founded in 2011 by two young British entrepreneurs, Liam Don and Sam Chaudhary. Don was educated as a computer scientist and Chaudhary as an economist—with

experience of working for the consultancy McKinsey in its education division in London—before both moved to Silicon Valley having successfully applied to the education technology 'incubator' program Imagine K-12. Imagine K-12's founder Tim Brady was the first investor in ClassDojo and continues to sit on its board; he has been described by ClassDojo's founders as a key mentor and influence in the early days of its development. Brady was an early employees at Yahoo! in the 1990s. Considerable Silicon Valley experience therefore sits on the ClassDojo board, reflecting the massive growth of interest among Silicon valley companies in the education business and market in recent years (Singer 2017b).

In addition to its founders, ClassDojo is staffed by a variety of software engineers, designers, product managers, communications and marketing officers, privacy, encryption and security experts and human-computer interaction designers. Notably, most of ClassDojo's staff are drawn from the culture of software development, many of them with experience in other Silicon Valley technology companies, social media organizations and consultancies. Founders Don and Chaudhary themselves have limited educational experience of working with schools in the UK prior to moving to Silicon Valley, with their first hire being a former teacher with experience of working at a charter school chain (Wan 2014).

Externally, ClassDojo employs three independent privacy consultants to guide it in relation to data privacy regulation in north America and Europe, and works with a team of security researchers to continually test ClassDojo for vulnerabilities. ClassDojo also works with over 20 third-party essential service providers to support the platform with data storage, video encoding, photo uploading, server performance, data visualization, web analytics, performance metrics, A/B testing, third-party auditing, information governance, independent code reviewing, and managing real-time communication data. The third party service providers include Amazon Web Services, which hosts ClassDojo's servers and data analytics, Google Analytics, for analytics on its website, and many others. As a platform microsystem, ClassDojo therefore functions in relation to a much wider platform ecosystem.

Business support for ClassDojo has been confirmed through the award of a number of prizes. The business magazine *FastCompany* listed ClassDojo as one of the 10 most innovative education companies in 2013, and in 2015 it won the Crunchie award for best education startup from the TechCrunch awards while its founders were featured in the '30 under 30' list of *Inc* magazine. Its extensive coverage in business publications and prizes have helped ClassDojo and its

founders to consolidate their reputations and brand as both a successful classroom resource and an entrepreneurial business startup.

As a sociotechnical assemblage it is important to note that ClassDojo functions through user involvement. Users are both configured by ClassDojo—in the sense that it makes new practices possible—but can also reshape ClassDojo to their own purposes. The basic reward mechanism at the heart of the ClassDojo behaviour tracking app can be customized by any signed-up teacher. These reward categories then shape the ways in which points are awarded in classrooms, changing both the practices of the staff employing it and the experience of the pupils who are its subjects. The capacity for teachers using ClassDojo to observe and reward behavioural points in such a way that they are visible to both parents and school leaders has been described as 'normalizing surveillance' in schools (Soroko 2016). Its access to attendance and behavioural data on millions of children confers it with tremendous surveillant capacity to report detailed and comparative analyses that could be used to measure teachers' and schools' records on the management of pupil behaviour. ClassDojo's founders have stated publicly that selling data back to school leaders and local authorities is a possible future technique for monetizing the platform (Wan 2014).

All technical platforms can be understood to translate the worldviews and presumptions of their designers into the intended practices of their users (Gillespie at al 2014). The founders and designers of ClassDojo have translated their idiosyncratic Silicon Valley worldview into the practices of teachers. This makes available new subjectivities for teachers and school leaders to occupy. Teachers using ClassDojo are conferred new responsibilities as data workers by the platform, becoming responsible for data collection in the classroom that will ultimately contribute to big datasets that could be analysed and then 'sold' back to school leaders as premium features. This increases the 'digital labour' of teachers as they are required to award a stream of points to each individual child, and as the communication mechanisms make them available for 24/7 communications from parents. It also makes school leaders into data-demanders for whom ClassDojo is an essential source of quantified insight into classrooms, and parents into data consumers of reports on their children's progress. Whether teachers will find themselves mandated to participate, rather than voluntarily opting-in, as ClassDojo extends to ease consolidation of data collection and measurement across full schools, remains an empirical question—though indications are that digital labour is already becoming a primary facet of teachers' work (Selwyn 2016).

The way the technical platform of ClassDojo operates, and the work of the people who build and use it, is all governed by particular forms of regulation and policy, while simultaneously challenging and reshaping those policies. As van Dijck (2013: 42) notes, 'Each single platform adjustment taps into a larger scheme of normative and regulatory change' and 'platforms' architectures and regulatory protocols influence society's legal norms, such as trust or privacy.' Data privacy is an area that the ClassDojo organization is especially keen to promote, not least following a critical article in the *New York Times* in 2014, which the ClassDojo company vigorously countered in an open letter entitled 'What the NYTimes got wrong.' Its website features an extensive privacy policy, the product of its privacy advisers. This policy is regularly updated, organized on the website to detail exactly what information the platform collects, its student data protection policy, and available opt-outs. Notably, ClassDojo claims that it deletes all pupils' feedback points after 12 months of inactivity, unless students or parents maintain accounts. Where schools or individual teachers have set up accounts to which parents have subscribed, then a persistent record of the child's personal information is retained.

ClassDojo claims complete compliance with US data privacy regulatory frameworks such as FERPA (Family Educational Rights and Privacy Act) and COPPA (Children's Online Privacy Protection Act). FERPA is a Federal law that protects the privacy of student education records, while the goal of COPPA is to place parents in control over information collected from their children online. ClassDojo's 'privacy center' displays 'iKeepSafe' privacy seals from both FERPA and COPPA. iKeepSafe (Internet Keep Safe Coalition) is itself a nonprofit international alliance of more than 100 policy leaders, educators, law enforcement members, technology experts, public health experts and advocates, and acts to ensure that both FERPA and COPPA are enforced. Zeide (2016) however, has questioned the effectiveness of FERPA and COPPA instruments to adequately deal with the emerging challenges of educational data collection. Beyond domestic privacy policy in the US, the ClassDojo privacy policy states its compliance with the US-EU Safe Harbor framework set forth by the US Department of Commerce regarding the collection, use, and retention of personal data from European Union member countries. The European Court of Human Justice, however, declared this agreement invalid in 2015, to be replaced by the EU-US Privacy Shield in 2016. With the scheduled introduction of new data protection laws in the UK in 2018 too, ClassDojo is having to adapt constantly to changing child privacy and protection regulation—much of it subject to critical contestation (Livingstone

2017)—though arguably platform operators such as ClassDojo are also stretching the limits of existing data protection instruments.

ClassDojo subscribes to the principles of 'privacy by design,' an approach which encourages the embedding of privacy frameworks into a company's products or services. Its CEO has co-authored an article on 'privacy by design,' led by ed-tech 'privacy entrepreneurs,' with the chief executive of the Future of Privacy Forum (Polonetsky & Chaudhary 2015). The FPF is a Washington DC-based think tank and government lobbying group that 'helps fill the void in the "space not occupied by law" which exists due to the speed of technology development' (fpf.org). FPF has its own student privacy program to produce 'policy guidance and scholarship about finding the balance between protecting student privacy and allowing for the important use of data and technology in education' (fpf.org/issues/k-12-education/), and produced the Student Privacy Pledge endorsed by President Obama in 2015, to which ClassDojo is a signatory. The founders of ClassDojo have therefore situated themselves among a network of data privacy entrepreneurs and lobbying groups in order to ensure compliance with existing federal law, while also acting to steer privacy policy development to keep track with technological development.

Besides privacy policy and regulation, ClassDojo is also shaped by education policy. A distinctive policy discourse of 'character' education and 'social-emotional learning' frames ClassDojo, especially in the US. The US Department of Education has begun to emphasize concepts such as 'character,' 'grit,' 'perseverance,' 'personal qualities' and other 'non-cognitive' dimensions of 'social-emotional learning'—notably its 2013 report *Promoting grit, tenacity and perseverance* (Schechtman et al 2013). ClassDojo is directly promoted in it as 'a classroom management tool' that helps 'teachers to track and reinforce good behaviors for individual students, and get instant reports to share with parents or administrators.' The ClassDojo website also suggests its behaviour points system can be customized to use categories from PBIS (Positive Behavior Interventions and Supports) to apply rewards. PBIS is an initiative of the US Department of Education that supports the adoption of the 'applied science' of Positive Behavior Support in schools and emphasizes social, emotional and academic outcomes for students.

Controversial attempts have been made to make the measurement of these 'personal qualities' of non-cognitive and social-emotional learning into school accountability mechanisms in the US (Adams 2014; Zernike 2016). These new school accountability systems are compatible with the Every Student Succeeds Act (ESSA), the US law governing K-12 education signed in late 2015 to replace No

Child Left Behind (NCLB). ESSA mandates that each US state department of education records one 'non-academic' measure of learning, enables states to focus on competency-based and personalized learning, and promotes the role of the educational technology sector in supporting such changes (Curtis 2017). ClassDojo is an ideal educational technology to support ESSA, focusing as it does on students' non-academic learning rather than solely on the standardized testing underpinning NCLB.

Through its connections with the social-emotional learning policy agenda, ClassDojo has located itself as an indirect technology of government that can help schools to enact ESSA. In turn, those schools are increasingly being held accountable for the development and effective measurement of those qualities. The notion of the measurably 'good' teacher, student or school is being shifted as calculations performed on students' test scores are paralleled with the collection of data about 'good' behaviour, and its use as proxy indicators of 'personal qualities' of social-emotional learning (Duckworth & Yeager 2015). Influential think tanks offering policy guidance on ESSA have recommended that all US states develop specific social-emotional learning and character development standards and benchmarks to guide pedagogy and improve accountability (AIE/Brookings 2015).

ClassDojo already encodes standards of character development and social-emotional learning qualities in its app, acting as an indirect best practice policy model and a diffuser of the social-emotional learning agenda into the practices of schools (Williamson 2017). It may even be prefiguring official policy. With venture capital funding from its investors driving its development and growth, ClassDojo has already distributed the vocabulary of character development social-emotional learning worldwide, and influenced the uptake of related pedagogic practices among millions of teachers. 'If we can shift what happens inside and around classrooms then you can change education at a huge scale,' ClassDojo's CEO has stated (Rodriguez 2016). ClassDojo is a 'lifeline directly to classrooms,' able to reach millions 'of students without bushwhacking through the red tape of school boards or superintendents' (Dobo 2016). Likewise, its product designer has added, 'We look for an idea that can be powerful and high-impact and is working in pockets, and work to bring it to scale more quickly … incorporated into the habits of classrooms' (Newcomb 2017). It has done so through producing highly attractive content and distributing it directly to teachers through its social media networks on the Facebook, Twitter and Instagram platforms too, rather than working through official policy channels and the bureaucratic organs of state administration.

Markets, finances & investment

All data assemblages function within a particular political economy (Kitchin & Lauriault 2014; van Dijck 2013). ClassDojo is part of a significant growing marketplace of educational technologies. ESSA gives states in the US much more flexibility to spend on ed-tech, which has been growing as a sector at extraordinary rates in recent years. An estimated US$2.3billion of venture capital was invested in education technology companies in the K-12 space in the US between 2010 and 2015 (EdSurge 2016). ClassDojo's arrival has coincided with, and benefitted from, a political economy context in which education technology investment has begun to enjoy federal political support. ESSA will distribute funding to districts demonstrating they are supporting 'student growth' in social-emotional learning and 'well-rounded' students through the deployment of classroom technologies (Curtis 2017).

The ed-tech marketplace is being supported vigorously in Silicon Valley (Singer 2017b), particularly through networks of venture capital firms and entrepreneurs and business 'incubator' and 'accelerator' programs that support startup ed-tech companies to scale-up. ClassDojo was first developed through the Imagine K12 accelerator program for ed-tech startups in 2011; by 2013 it announced $1.6million in seed funding and later an additional $8.5 million, before securing another $21million in venture funding in spring 2016. Its investors include over 20 venture capital companies and entrepreneurial individuals, including Imagine K12 itself (now merged with Y Combinator, a leading Silicon Valley startup accelerator), General Catalyst Partners, GSV Capital and Learn Capital, 'a venture capital firm focused exclusively on funding entrepreneurs with a vision for better and smarter learning.' Learn Capital is a key investment catalyst in the sector; its biggest limited partner is Pearson, the world's biggest edu-business, which links ClassDojo firmly into the global ed-tech market. Many of ClassDojo's investors also sit on the ClassDojo board.

Investment in ClassDojo has followed the standard model for startup funding in Silicon Valley. It first received seed funding from Imagine K12 and others, before securing Series A investment in 2013 and Series B in 2016. While seed funding refers to financial support for startup ideas, Series A funding is used to optimize a product and secure its user base, and Series B is about funding the business development, technology, support, and other people required for taking a business to scale. Sometime after 2017, ClassDojo will aim scale fast and wide through

Series C funding—investment at this stage can reach hundreds of millions of dollars, sometimes involving mergers, acquisitions and the involvement of major hedge funds and investment banks—to consolidate its market dominance.

However, to date it remains unclear what return investors in ClassDojo can expect. The company reported no revenue after five years of operation in 2016. The founders of ClassDojo have regularly reiterated that selling student data for advertising is not in the business model. The ClassDojo helpdesk describes 'new, premium features that parents or school districts may be interested in paying for' while its founders have outlined plans to generate revenue through distributing 'freemium' content:

> 'Schools are paying hundreds of thousands of dollars for curriculum and software that's delivered in boxes. … With the kind of reach that we've got here and if we can really power every classroom in that kind of scale, we can eliminate so much of that cost. … It's a huge distribution platform to reach parents. … We want to, in the long term, enable parents to be consumers for their child's education.' (Rodriguez 2016)

The plan to distribute freemium content to schools and parents alike would certainly disturb the existing educational content and software distribution market dominated by global publishing companies. However, beyond pushing content to consumers, ClassDojo's vast behavioural database might also be monetized without compromising its commitment to never sell data for advertising. Its reference to offering premium features to 'school districts' offers significant clues to a business model designed to treat schools and districts, not just classroom teachers and parents, as customers too. 'There's a macro-trend happening where schools want to collect more data about behavior,' CEO Sam Chaudhary has stated, noting that both schools and education authorities might pay to receive more detailed data about student behaviour than the current whole class reports leaders can generate from the platform (Wan 2014).

The ClassDojo success story in schools is reflected and enabled by its success as a product of venture capital, all framed by a buoyant marketplace of ed-tech development and finance driven by the new opportunities of ESSA. This marketplace is also itself framed and supported by specific kinds of Silicon Valley discourses of technological disruption and solutionism. Many Silicon Valley companies and entrepreneurs have latched on to the education sector in recent years, seeing it in terms of problems to be solved through software. In particular, Silicon Valley has become the epicentre for the diffusion of discourses of social-emotional skills, character and resilience, all qualities it seeks to foster in its own workers through psychological 'employee optimization' programs and aims to

reproduce through its interventions in public education (Williamson *forthcoming a*). The marketplace in which ClassDojo is located, therefore, discursively emphasizes the disruption of education systems and institutions in order to enable them to 'debug' the psychological fragilities of individuals. Having positioned itself in relation to emerging education policy priorities around non-academic learning, too, ClassDojo appears to offer an effective platform for shaping the student subjectivities deemed appropriate both by the Silicon Valley culture of its investors and by education policy alike.

Expert knowledge & discourse

All data assemblages are framed by supporting discourses (Kitchin & Lauriault 2014). As noted above, an emerging educational discourse is that of personal qualities, social-emotional learning and character education (Tough 2016). Influential international organizations including the OECD and World Economic Forum have become key sites for the global diffusion of social-emotional learning discourses (Williamson *forthcoming b*). ClassDojo has been situated by its founders as part of this movement. Its CEO has argued 'Education goes beyond just a test score to developing who the student is as a person—including all the character strengths like curiosity, creativity, teamwork and persistence,' and has cited a number of 'thought leaders' as inspiration for the platform, including Angela Duckworth and Carol Dweck (Meads 2013). Duckworth has established the Character Lab where she researches and promotes 'personal qualities' of 'grit' and 'self-control' as dimensions of human character (Duckworth & Yeager 2015), while Dweck (2015) has popularized 'mindset theory,' the idea that successful learners with 'growth mindsets' are open to challenges, hard work and personal self-development. Mindset theory has become popular in educational practice, consultancy and policy worldwide, despite its evidence base and effects sizes being highly contested among psychologists (Singal 2017).

In January 2016, ClassDojo announced a partnership with the Project for Education Research That Scales (PERTS) at Stanford University, a research centre led by Carol Dweck and the intellectual home of mindset theory. The partnership between ClassDojo and PERTS takes the form of a series of short animations on the 'Big Ideas' section of the ClassDojo website that help explain the growth mindsets idea for teachers and learners themselves. According to ClassDojo web analytics reported on its website, through the videos—which are high-production updates of instructional resources previously disseminated through Dweck's

Mindset Works spin-out company—'15 million students are now building a growth mindset.' In September 2016, ClassDojo launched a second Big Ideas series, focused on 'Empathy,' in partnership with the Making Caring Common project at Harvard University's Graduate School of Education. A commentary on the launch of the empathy videos explicitly linked it to worldwide policy shifts to focus on teaching social and emotional learning, character, and non-cognitive skills (Anderson 2016). In May 2017, ClassDojo then announced a partnership with Yale University's Center for Emotional Intelligence, with a new coproduced series on 'Mindfulness,' in which, according to its product designer, 'the characters model for the kids the behavior you are trying to instil' (Newcomb 2017).

Through its Big Ideas, ClassDojo is increasingly aligned with psychological and behavioural norms associated with mindset theory, mindfulness and other qualities of social-emotional learning, both by teaching children about them through its Big Ideas videos and, through the app and its rewards, by compelling children to conduct themselves in ways appropriate to the development of those normative qualities. Ecclestone (2016: 2) describes current developments related to children's emotions and behaviours as the application of the 'psy-sciences' to public policy, and 'the normalization of government-sponsored psycho-emotional intervention' in schools. ClassDojo is perhaps the most successful platform for diffusing and normalizing psycho-emotional intervention at global scale.

Crucially, its emphasis on personal improvement and behaviour modification links ClassDojo closely with wider governmental 'behaviour change' agendas emerging from the political take-up of behaviour science and 'nudge theory'. Governments worldwide are increasingly making use of psychological and behavioural insights into citizens' behaviours as the basis for designing policies and services that are intended to modify their future behaviours, including within education policy (Ecclestone 2016). A recent policy report on behaviour science implications for education highlights Carol Dweck's work on mindset theory, linking her notion that 'the brain is malleable and that through hard work, intelligence can be improved' to the idea that students might be 'nudged' through small interventions aimed at 'decreasing the likelihood that small failures cause students to believe that academic success is unachievable' (Lavecchia et al. 2014: 67). In this sense, the governmentalization of mindset theory and similar concepts informed by positive psychology and behaviour science can be understood as a form of 'psycho-policy.' Friedli and Stearn (2015: 42) have described new 'psycho-policy' approaches that emphasize 'psycho-compulsion,' which they define as 'the imposition of psychological explanations … together with mandatory activities intended to

modify beliefs, attitude, disposition or personality.' Emerging governmental psycho-policy agendas around measuring and intervening in children's social and emotional skills in schools are part of this behaviour change movement, all rooted in often-contested psychological explanations. Informed by the application of the psy-sciences to public policy, they represent an instantiation within education of psycho-emotional intervention, nudge theory and psycho-compulsion techniques that are designed to change how children feel and behave through changing what feelings and behaviours teachers value and reward in the classroom.

Behavioural and social-emotional measurement is becoming more and more attractive to government departments as an accountability mechanism, particularly with the US introduction of ESSA and the expansion of positive psychology and nudge theory into educational discourse worldwide through policy influencers such as the OECD and WEF. Through its partnerships with psy-science thought leaders on social-emotional learning, ClassDojo acts as a nudge technology of psycho-compulsion which might support quantifiable growth in non-cognitive learning. By normalizing the behaviour change agenda within schools through social-emotional learning intervention at worldwide scale, ClassDojo translates and aligns the aspirations of departments of state with the commercial ambitions of technology companies, the scientific expertise of psychologists, the institutional goals of schools, and the individual practices and projects of teachers, children and parents alike. It invites schools to classify and treat children according to psychologically-defined (yet contested) standards and norms of social-emotional learning. Teachers can then enforce and reproduce these norms by measuring children against psychological standards encoded in the app and, supported by the materials and discourse shared by ClassDojo and its communities, by nudging children toward particular psychologically-defined desirable behaviours.

Discussion: The ClassDojo platform behavioural economy

The sociotechnical elements surveyed in this article contribute to the assembly of ClassDojo. By disassembling the single platform itself, and reassembling something of the wider ecosystem of people, policies, markets and expertise that it interpenetrates, it has become possible to see how ClassDojo is part of a re-engineering of public education. It reflects a long process of marketization, privatization and commercialization in public education which is currently most visible in the expansion of for-profit data-based surveillance technologies in schools and classrooms (Boninger & Molnar 2016). As it extends its scope to

encompass more and more aspects of schooling, ClassDojo is becoming an infrastructural underlay to the classroom, school communication, and student monitoring. For many schools, ClassDojo now *is* their main platform for communicating with parents. It exemplifies how technical platforms are being projected into the public schooling systems of countries worldwide through venture capital, partnerships and entrepreneurship approaches that originate in Silicon Valley. As a public sphere platform for education, its business model depends on creating a platform for the activities of teachers, children, school administrators and parents alike—one that its founders and investors are seeking to monetize through relentless function creep and the addition of for-pay features. It shows how privacy laws are mutating as platforms such as ClassDojo stretch the legal boundaries of student data collection and work with partners that can steer privacy development to track technical development. It demonstrates that the behaviour change agenda is being inserted into classrooms to nudge schoolchildren to behave in ways sanctioned by government departments and legitimized through psychological expertise. With government policies increasingly targeting social and emotional learning as a new school accountability measure, ClassDojo is part of the wider governmentalization of behaviour change and the emergence of policies of psycho-compulsion, nudging children toward desired and psychologically-defined behaviours. It is, ultimately, becoming a global curator of educational discourse, actively reshaping how learning is conceptualized and valued in accordance with the visions and values of its founders and their sources of inspiration.

As a global curator of educational discourse, ClassDojo raises significant questions about subjectivity. It positions teachers, school leaders and pupils as particular kinds of subjects in what might be thought of as the ClassDojo platform behavioural economy. By this I mean that ClassDojo transforms schools into little data markets, or digital micro-economies, where behaviour is awarded a particular kind of exchange value and utility. By comporting themselves in ways that are appropriate to occupying measurable personal qualities defined by psy-science expertise, student users are able to turn their behaviour into a source of value that can be exchanged for positive points. In this way, students are positioned as little behavioural economists of the self, psychologically nudged by the ClassDojo platform to calculate about their behaviour and adjust it according to the incentives and rewards on offer. Teachers, meanwhile, become both data entry clerks and classroom nudge operatives, using the allocation of behaviour points to collect data on behalf of ClassDojo and building up a statistical avatar of each individual child, while then using those data to identify, intervene in, and modify their behaviour

accordingly. Finally, school leaders are positioned as data-demanders and data-users, compelling teachers to collect the data and then inspecting it for patterns.

Within the ClassDojo platform behavioural economy, then, behaviour has value for students, teachers and leaders, but it also generates value for the Class Twist company as it seeks to monetize the platform. Although ClassDojo's premium features had not been announced at the time of writing, it seems likely that it will begin offering schools and education authorities for-pay access to detailed behavioural profiles that might be used for purposes of identification, diagnosis and intervention. ClassDojo's datasets are sufficiently extensive that it could conceivably provide detailed comparative analyses of schools that might be used for governmental purposes. ClassDojo could therefore become part of the existing infrastructure of accountability, extending school measurement from aggregated test scores to individual character and mindset. This would make 'psychological conditionality' part of the educational infrastructure of accountability. Informed by behaviour science, psychological conditionality requires individuals to demonstrate certain kinds of characteristics and feelings, defined in accordance with state-approved psychological criteria, in exchange for state support (Friedli & Stearn 2015). ClassDojo certainly requires individual students to demonstrate certain characteristics and feelings in exchange for points and rewards. Schools are increasingly under pressure to perform to the demands of psychological conditionality too, by being required to demonstrate their students meet standards of social and emotional development. Indeed, under ESSA, US districts are required to demonstrate measurable development of 'well-rounded' students and 'student growth' to secure grants. Schools are in this sense being 'conditioned' to nurture specific personal qualities such as growth mindset, character and mindfulness, which can then be measured in exchange for state support.

In this context, ClassDojo is a private platform mediating in the re-engineering of public schooling, but it is also an instrument of arms-length governance that has seduced millions of teachers to nudge students' behaviours according to the psychologically-defined and government-endorsed measures that condition schools. Critically, as a popular sociotechnical platform for the penetration of psy-science into schools, ClassDojo is seeking to make social-emotional learning into the key purpose of public education and, through coercive uses of psychological nudging, is aimed at the imposition of positive feelings in the classroom. Whether one subscribes to the social-emotional learning agenda or not, ClassDojo is evidence of how it is being diffused into schools worldwide through the involvement of Silicon Valley startup companies and venture capital investors,

which reflects their worldviews and presumptions about how and what to value in public education.

Conclusion

ClassDojo is prototypical of how education is being reshaped in a platform society and by the business model and political economy of platform capitalism. Business and technology entrepreneurs have long sought to intervene in public education, but today's Silicon Valley companies are producing platforms and apps that can be marketed directly to teachers through social media and deployed in classrooms without the encumbrances of bureaucratic policymaking (Williamson *forthcoming a*). Driven by ambitions to become the Netflix, Facebook or LinkedIn equivalent for public education, in just six years ClassDojo has transformed from an app to a social media platform for schools, and is further seeking to scale up into a new kind of data infrastructure centred on the measurement and inculcation of desirable student behaviours. Like any digital data assemblage, ClassDojo is mutating and evolving in response to the various elements that interpenetrate it. ClassDojo is not being 'scaled up' in a simple linear manner, but messily and contingently, through a relational interweaving of human actions and nonhuman technologies, materials, policies, discourses and standards, to become a public sphere platform in education. Importantly, ClassDojo is working within state education systems, but also exceeds state control. It is anticipating policy discourses through direct outreach to teachers via social media, and diffusing its vision of public education—centred on social-emotional learning—to schools globally.

As a mutating prototype of education in a platform society, ClassDojo is indicative of further potential and emerging shifts in the educational policy and practice:

— Increasing penetration of private-sector 'public sphere platforms' into state education systems, institutions and practices, and an escalation of the political economy of platform capitalism within public education provision
— Circumvention of bureaucratic policy processes, and the pre-emption of policy discourses through the implantation of new learning technologies in classrooms and direct social media interfaces with teachers
— Provision of free apps and platforms for the use in classroom practice and school administration, with the addition of 'freemium' features as a way of monetizing startup companies through school budgets

— Disruption to existing education technology and publishing monopolies by venture-backed Silicon Valley startups

— Governance of public education via Silicon Valley venture capital sources and beneficiaries, and the translation of Silicon Valley presumptions, values and worldviews about education into practices and routines of schools via platform programming

— Intensification of data extraction, analysis, and control by competing education platform operators, which depend on the 'network effect' of growing their user base and extracting data about their use of the platform

— Exacerbation of student privacy dilemmas, as popular apps and platforms stretch the limits of existing privacy and data protection instruments and platform operators form alliances with powerful lobbying groups to become 'privacy entrepreneurs' steering regulatory change

— Deference to the psy-sciences—especially positive psychology and behaviour sciences, and supported by influential think tanks and international influencers—to define the 'standards' and 'benchmarks' by which pedagogic inputs are to be planned and learning outputs measured

— Escalation of accountability and performance ranking through the measurement of student data beyond narrow forms of testing

— Further infrastructuralization of successful educational apps and platforms as, pushed to monetize their products by investors, designers build function creep into their business models and become integral to school routines, and hard to remove from existing public education infrastructure

As global platform operators such as Google, Facebook and Amazon increasingly compete for school business, it is likely that public education will become more and more platformized, and that some of these platforms will become infrastructuralized to the extent they become essential prerequisites to the everyday administrative, pedagogical and communicative functioning of schools worldwide. Disassembling platforms into their sociotechnical parts, and reassembling the ecosystems they interpenetrate, is an essential first methodological and analytical step to examine the transformation of education in an emerging platform society.

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