

Bringing in the technological, ethical, educational and social-structural for a new education data governance

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ABSTRACT

The need for a comprehensive education data governance – the regulation of who collects what data, how it is used and why – continues to grow. Technologically, data can be collected by third parties, rendering schools unable to control their use. Legal frameworks partially achieve data governance as businesses continue to exploit existing loopholes. Education data use practices undergo no prior ethical reviews. And at a personal level, students have no agency over these practices. In other words, there is no coherent and meaningful oversight and data governance framework that ensures accountable data use in an increasingly digitalised education sector. In this article, I contextualise the issues arising from education data transactions in one school district in the United States. The case study helps to contextualise what needs governance, who may access education data and how the district governs data use and transactions, emphasising the need for a coherent education data governance but also the limitations of such isolated efforts.

Keywords: Education data governance; edtech; children; data privacy; ethics

Introduction

The need for a comprehensive education data governance – the regulation of who collects what data in public education, how it is used and why – continues to grow (Ash-Brown 2021; Day 2021). The recent health pandemic propelled the digitalisation of education through an explosion of commercial education technologies (edtech) coming into the classroom (and outside it), which have enabled a constant torrent of data generation. As a result, concerns continue to grow regarding student surveillance (Williamson 2019; Hillman 2022), behavioural control (Andrejevic and Selwyn 2020), digital rights (Livingstone, Atabey, and Pothong 2021), and students' and teachers' role and voice in the classroom (Hillman et al. 2021). In their effort to tackle post-pandemic learning loss, policies globally have let in the private sector of edtech providers into public education (Bozkurt et al. 2020; United Kingdom Department for Education [DfE] 2020), with no concrete solutions for governing their growing power and the constant generation of education data. The call for a comprehensive education data governance is steadily climbing up policy agendas in Europe, (Day 2021; Schaake 2021), the United States (Viljoen 2021) and elsewhere (Gulson and Sellar 2019).

Technologically, education data can be collected and stored by third-party commercial entities on their own servers and data warehouses, rendering school districts unable to control the use of data. Legal frameworks only partially achieve data governance as edtech companies

continue to exploit existing loopholes (Palfrey et al. 2020). Education data collection and use practices undergo no prior ethical reviews. And at a personal level, students have no agency over the practices of data extraction and use. In other words, there is no coherent and meaningful oversight, control and data governance framework that ensures accountable, transparent and ethical collection and processing of education data (Day 2021; Jim and Chang 2019).

In this article, I contextualise the issues arising from data collection in schools and the initiatives for education data governance developed in one American school district. The research method was qualitative in nature. It included interviews with the district's chief information officer (CIO) and senior database administrator (SDA); a review of fifty randomly selected, publicly available¹ data privacy agreements between the district and edtech providers; a review of the data management system of the district's data without access to real data; and analysis of other extant information relating to common data standard proposals, education policies on data collection and initiatives on data collection of individuals from childhood to the workforce. A standard data privacy agreement was signed between the district and the author to formalise the discussions even though no personal student data access was made. The correspondence was via emails, in-person interviews and video conferencing with the school district's CIO and SDA. Additionally, analysis and evaluation was carried out on the work and principles of the Student Data Privacy Consortium (the consortium), which is 'a special interest group' of school districts, state agencies, policy makers, and industry representatives from across the US that address "'tactical" student privacy issues' (SDPC 2019, 2). The consortium has developed a set of 'common expectations between school districts and marketplace providers' (SDPC 2021, 1) to streamline their contractual agreements with regards to data transactions, management and student privacy. These common expectations are presently used by over 10,000 school districts in the US, across Australia, New Zealand and the UK (SDPC 2018). As such, the present study is both reflective of the challenges posed by the growing digitalisation of education as well as the needs for scalable data governance solutions globally.

The case study helps to bring out three arguments surrounding education data. First, it sheds light on some of the data that are collected by third-party edtech providers in one school district; it gives context to what needs governance. Second, it demonstrates the multiple stakeholders that access education data – who accesses and how education data are used. And third, the case study helps to demonstrate why the district is part of 'a special interest group', the consortium, highlighting the need for a coherent and meaningful data governance but also the limitations that come with such an isolated effort. With this study I conceptualise a new education data governance framework by drawing from technological, ethical, educational and social-structural lenses and propose that a coherent framework is needed across all educational institutions, and throughout data's entire lifecycle.

Education data collection: brief context

Data collection in education has grown tremendously in the past several years both as a political response (Cunningham and Milam 2005; National Forum on Education Statistics [NFES] 2021; Voorhees and Barnes 2003) and as a result of the increasing use of edtech in the classroom. In this text, reference made to data encompasses 'the continuous generation and processing of large quantities of data' (Selwyn 2019, 79). The recent Covid-19 pandemic

¹ List of signed or refused data privacy agreements between edtech providers and the district: https://sdpc.a4l.org/district_listing.php?districtID=457.

propelled the digitalisation of education (Williamson and Hogan 2020); with that – more generation of data. The purpose here is not to make an exhaustive review of the emanating concerns. These have been well recorded elsewhere (Lupton and Williamson 2017; Selwyn 2018). However, a brief review of some of these concerns gives weight to the issue of education data governance that is at the centre of this paper.

Historically, debates related to data collection and use have evolved from hopeful (Cunningham and Milam 2005; National Forum on Education Statistics [NFES] 2021; Voorhees and Barnes 2003; Horn, Kane, and Wilson 2015) to worrisome (Zeide 2017; Hillman 2022). The hopeful narrative has been calling on more data as the means to improve decision-making in education by helping identify problems that can escape the human eye (DoE 2012). The hopeful narrative has manifested not only in hefty edtech investments (Adkins 2020) but also in continuous structural, pedagogical and curriculum reorganisation (Zeide 2017). Within the context of the US for example, the narrative that data can help improve education has long been coming, following the neo-liberal drive of the 1980s towards the privatisation of various sectors including public education (Strauss 2018). National opinion was on a changing course (Bork 1978 in Zuboff 2019) through public claims such as ‘Nation at risk: the imperative for educational reform’ (National Commission on Excellence in Education 1983) in which schools were depicted as failing. This narrative was closely accompanied by the consistent emphasis of the role of data in developing accountability measures, which would launch a free-market competition in education and naturally lead to the elimination of poorly performing schools. Put otherwise, a neo-liberal school market in which data enable accountable measures would let the best win. From this logic has followed another – that the need for more data leads to the need for more technologies and new methodologies of accountability measures. Standardising assessments is one example (Brady 2012). Standardising data collection is another. In the US, the federal government collects personal student information in the form of Statewide Longitudinal Data Systems (SLDS). SLDS collects data from birth throughout the schooling of a child under the premise that more data lead to more accountability and therefore better educational institutions (Strauss 2018). This model has been gradually manifesting internationally (Day 2021; Gulson and Sellar 2019; Courtney 2016; Proudfoot 2021).

Simultaneously, this unprecedented data generation has also opened doors for more worrisome debates. While these have led to the development of legal frameworks (such as the General Data Protection Regulation [European Parliament and Council 2016] in the European Union; the Family Educational Rights and Privacy Act [US Department of Education 2011], the Children’s Online Privacy Protection Act [COPPA 2013] in the US) and individual initiatives (e.g., SDPC 2018), issues persist in relation to data privacy and security (Brown and Klein 2020), commercialisation of education, ‘turbo-charged by the rise of data-collecting digital educational platforms’ (Molnar and Boninger 2020, 8), student profiling and surveillance (Williamson 2019).

What are education data and why it is important to know – seen through one case study

Some of the data generated from the wide variety of edtech products and services used in educational institutions today are collected at district level onto data management systems while other data are managed by edtech companies (Zeide 2017). Data can be scattered around silos at every level – school, district, state, as well as with third-party companies.

I begin with the case study of Cambridge public school district (CPSD) in Cambridge, Massachusetts, where research was conducted between 2018-2019 and followed up for updates in

2021 with the aim to [1] explore the education data type and transactions taking place at the levels of school, district and third-party edtech providers; [2] to map the data transactions that take place between school and edtech providers; and [3] to learn about the data governance mechanisms the district has developed to vet edtech providers and govern education data transactions, processing and use.

The CPSD case study helps to demonstrate good data governance practice and to contextualise the issues related to data governance and edtech in two distinct ways. First, while not exhaustive, it gives some visibility of the granularity and variety of data transactions between a school district and the hundreds of different edtech providers. Second, the unique case of this district lends an understanding of the offline data governance mechanisms it has set up to govern data transactions and protect student privacy. Specifically, the district forms part of the consortium, which is ‘a unique collective of schools, districts, regional, territories, and state agencies, policy makers, trade organisations, and marketplace providers, addressing real-world adaptable, and implementable solutions to growing data privacy concerns’ (SDPC 2021, 1) and operates across 31 states in the US. The consortium’s role and good practice is expressed through a number of tools that aim to achieve student data privacy. Some include offline legal contractual agreements and vetting of edtech providers to ensure that they adhere to the legal frameworks of COPPA and FERPA; that there is transparency and accountability about how the collected data are used.

While conventional in a legal sense, the data privacy agreements (DPAs) demonstrate two urgent needs that must be met in support of educational institutions and ultimately – students. The first one is the need for a school district to meet its responsibility over the security and privacy preservations of student data since legal frameworks do not satisfy this fully (Zeide 2017). Recent evidence has demonstrated that despite the legal impositions, edtech providers still find loopholes in the existing laws (Palfrey et al. 2020) and in the technologies themselves (International Digital Accountability Council [IDAC] 2020), and continue to share data with third parties. The second is the need to re-think scalable and sustainable education data governance framework that should be associated at legislative levels, not merely left to isolated and voluntary effort such as the consortium’s.

Types of education data typically collected in a public-school district

Data collected about students vary from demographics and personally identifiable information such as birth date, home address and unique identifier given to the student by the district or the school, to students’ emails, parents’ marital status, political inclinations and more (see Figures 1 and 2). For example, Pearson Inc., the publishing and technology company provides Q-global, ‘a system [that] organises examinee information, automates the scoring process, and generates score reports’ (Pearson Inc., n.d., 1) in compulsory education. The web-based system collects data such as test results and raw scores from assessments, student demographics and parental information, including living conditions and more (Figure 1). The reporting tool may also opt to collect data about students’ clinical and education history and related issues, as well as parents’ work and employment status history.

Aperture Education, a cloud-based system for measuring social-emotional learning (SEL) of youth through screening and assessments, collect standardised test scores, assessment data on social-emotional competences, student daily attendance, conduct or behavioural data, demographics such as birth date, gender, ethnicity, language information, student school enrolment, grade level, homeroom, special indicators, such as English language learner information, low

income status, student disability information, specialised education services, living situations and other information (Figure 2). The company also has the option to collect parental and teacher names.

These examples emerge from hundreds of other edtech providers whose products, in order to work, collect a variety of and often sensitive student data. Additionally, edtech providers may partner with other student management systems (SMSs) and platforms. For example, Aperture Education collaborates with Kickboard (Henry 2018) ‘to assist schools with collecting, monitoring and analysing data on student behaviour’ (1), while the latter also partners with Amazon Alexa (Pahos 2019), the virtual assistant technology.

Education data exchanges between a school district and an edtech provider should be seen from two levels. At a school-level, the granularity of data exchanges with third parties is substantial not only in the US (Data Quality Campaign [DQC] 2017) but elsewhere (Livingstone, Atabey, and Pothong 2021; Barassi 2021; Brown and Klein 2020). For CPSD, the data exchanges are supported through the DPAs. However, these have only marginal effect on what can be at stake for an individual child because of their data’s permanence and many third parties’ access to children’s data (Barassi 2021). Even in the presence of such binding contracts, the use purposes and data processing remain far from clear and straightforward and even less so under clear governance and oversight. The data governance mechanisms CPSD deploys are also unable to cover exhaustively the whole edtech market; teachers may simply choose to use a new edtech product without any prior vetting from the district (similar limitations are observed in the UK [Hillman in press]). Therefore, the existing education data governance efforts are further challenged by the highly dynamic, digitally rich educational ecosystem.

EXHIBIT "B"
SCHEDULE OF DATA

Category of Data	Elements	Check if used by your system	Category of Data	Elements	Check if used by your system
Application Technology Meta Data	IP Addresses of users, Use of cookies etc.		Schedule	Student scheduled courses	
	Other application technology meta data-Please specify:			Teacher names	
Application Use Statistics	Meta data on user interaction with application		Special Indicator	English language learner information	
Assessment	Standardized test scores			Low income status	
	Observation data			Medical alerts	
	Other assessment data-Please specify:	Test results and raw scores		Student disability information	
Attendance	Student school (daily) attendance data			Specialized education services (IEP or 504)	
	Student class attendance data			Living situations (homeless/foster care)	✓
Communications	Online communications that are captured (emails, blog entries)		Other indicator information-Please specify:		
Conduct	Conduct or behavioral data		Category of Data	Elements	Check if used by your system
Demographics	Date of Birth	✓	Student Contact Information	Address	
	Place of Birth			Email	✓
	Gender	✓		Phone	
	Ethnicity or race	✓	Student Identifiers	Local (School district) ID number	
	Language information (native, preferred or primary language spoken by student)	✓		State ID number	
Other demographic information-Please specify:		Vendor/App assigned student ID number		✓	
Enrollment	Student school enrollment			Student app username	✓
	Student grade level			Student app passwords	✓
	Homeroom		Student Name	First and/or Last	✓
	Guidance counselor		Student In App Performance	Program/application performance (typing program-student types 60 wpm, reading program-student reads below grade level)	
	Specific curriculum programs			Student Program Membership	Academic or extracurricular activities a student may belong to or participate in
	Year of graduation		Student Survey Responses	Student responses to surveys or questionnaires	
Other enrollment information-Please specify:		Student work	Student generated content; writing, pictures etc.		
Parent/Guardian Contact Information	Address			Other student work data - Please specify:	
	Email		Transcript	Student course grades	
	Phone			Student course data	
Parent/Guardian ID	Parent ID number (created to link parents to students)				
Parent/Guardian Name	First and/or Last	✓			

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Category of Data	Elements	Check if used by your system	Category of Data	Elements	Check if used by your system
Transportation	Student course grades/performance scores			Health conditions – optional	
	Other transcript data -Please specify:			Medications – optional	
	Student bus assignment			Marital status – may be required for some assessments	
Other	Student pick up and/or drop off location			Family information and history – optional	
	Student bus card ID number			Pearson qualification level – account owner's qualification level associated to the account	
	Other transportation data - Please specify:				
		Clinical history – optional			
	Education history and issues – optional				
	Work and employment status, history and issues – optional				
	Please list each additional data element used, stored or collected by your application				

Figure 1. Q-Global data collection.

Conceptualising education data governance through a technological lens

Edtech products generate large quantities of data that are siloed across disparate digital systems beyond the reach of educational institutions or students. The CPSD case study revealed that much of the data generated during a typical day at school remain with the edtech provider. As the SDA explained, 'students log into applications via their browsers, generally on Chromebooks, so all the application's data remain with the vendor'. To have full access and control of that data 'a lot of rules have to be enforced that vary by vendor'. More specifically:

There needs to be a broker between [CPSD's] student records database and the vendors. That broker is me right now ... A nicer, easier way of configuring per-application access rules would be great. Not having to do transformations (to accommodate vendors' data formats, Boolean formats, field lengths and such) would be great too. But I would need the broker application to be under my control. I personally would never trust a vendor to have and keep their end configured the way we want, even if they have the best intentions. Once the data are on vendors' systems it's out of our hands, so we limit that data as much as possible. We only want to send the data we choose, for the students and staff we choose.

EXHIBIT "B"
SCHEDULE OF DATA

Category of Data	Elements	Check if used by your system
Application Technology Meta Data	IP Addresses of users, Use of cookies etc.	
	Other application technology meta data-Please specify:	
Application Use Statistics	Meta data on user interaction with application	
Assessment	Standardized test scores	*
	Observation data	
	Other assessment data-Please specify:	Social-Emotional Competencies
Attendance	Student school (daily) attendance data	*
	Student class attendance data	*
Communications	Online communications that are captured (emails, blog entries)	
Conduct	Conduct or behavioral data	X
Demographics	Date of Birth	X
	Place of Birth	
	Gender	X
	Ethnicity or race	*
	Language information (native, preferred or primary language spoken by student)	*
Enrollment	Other demographic information-Please specify:	
	Student school enrollment	X
	Student grade level	X
	Homeroom	
	Guidance counselor	
	Specific curriculum programs	
Parent/Guardian Contact Information	Address	
	Email	*
Parent/Guardian ID	Phone	
	Parent ID number (created to link parents to students)	
Parent/Guardian Name	First and/or Last	optional
Schedule	Student scheduled courses	optional
	Teacher names	X

Category of Data	Elements	Check if used by your system
Special Indicator	English language learner information	*
	Low income status	*
	Medical alerts	
	Student disability information	*
	Specialized education services (IEP or 504)	*
	Living situations (homeless/foster care)	*
Other indicator information-Please specify:		
Student Contact Information	Address	
	Email	*
	Phone	
Student Identifiers	Local (School district) ID number	X
	State ID number	
	Vendor/App assigned student ID number	
	Student app username	Future - Optional
	Student app passwords	Future - Optional
Student Name	First and/or Last	X
Student In App Performance	Program/application performance (typing program-student types 60 wpm, reading program-student reads below grade level)	
Student Program Membership	Academic or extracurricular activities a student may belong to or participate in	
Student Survey Responses	Student responses to surveys or questionnaires	
Student work	Student generated content, writing, pictures etc. Other student work data - Please specify:	
Transcript	Student course grades	
	Student course data	
	Student course grades/performance scores	
	Other transcript data -Please specify:	
Transportation	Student bus assignment	

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Category of Data	Elements	Check if used by your system
	Student pick up and/or drop off location	
	Student bus card ID number	
	Other transportation data - Please specify:	

Category of Data	Elements	Check if used by your system
Other	Please list each additional data element used, stored or collected by your application	

* Items marked with an asterisk are currently collected as optional demographic data for subgroup reporting. Student username and password is anticipated to optionally available within the next 12 months for use by clients who want to use the High School self-report form of the DESSA.

Figure 2. Apperture Education data collection.

‘Configuring per-application access rules’ expresses the institutional need for a coherent education data governance rather than a personal judgment call. But it also demonstrates that education data governance is a technological problem that demands, at least in part, a technological solution. In the CPSD case, the district does not always have access to the data generated when students interact with a digital application or platform. Moreover, despite the consortium’s goal to evaluate edtech providers, it simply cannot encompass all of them exhaustively. The offline DPAs that an edtech provider is asked to sign are the evaluative

benchmark necessary to obtain in order to operate in a public school. The DPAs can impose legal terms and conditions on data access and processing. However, these remain limited in scope and scale in a highly dynamic digital learning environment where edtech applications change and new ones are introduced in the classroom all the time.

Propositions for technological solutions that can automate data governance have been in the making in the health (Agbo, Mahmoud, and Eklund 2019) and public sector (Sweeney 2019). While such technological solutions have aimed to decentralise, impose rules and automate the processes of data transactions and use, which in the case with CPSD is done manually through the DPAs, effort must be made to develop technological provisions that cultivate a novel and coherent education data governance framework – one that levels up with the ever-changing edtech tools. Importantly, even when privacy preserving data transactions are developed, these still leave out the question of ethical processing of data.

Conceptualising education data governance through an ethical lens

There are no clear ethical review procedures that edtech providers undergo for their product deployment or data processing and use as was clear from the DPAs analysed for this research. The DPA between CPSD and Aperture, for instance, makes no mention about relevant ethical reviews of the processes by which the company improves its software functionalities. Contractual agreements between the district and other edtech providers make no mention of how their products and services work around data use for analytics or product development. In any research setting involving human subjects – in this case, they are also minor – would be considered ‘high risk’ activities that necessitate prior ethical approval.

Any academic researcher will attest to the ethical procedures their intended research has to undergo. Specially organised ethical committees or boards review the intended research – its outlined objectives, methodologies, anticipated outcomes and how these impact on the human subjects involved. Ethics review is required for any study that involves human participants whether it is through surveys, interviews or the use of datasets containing sensitive or deidentified information (even if there is no intention to re-identify the data). Edtech providers, as it is understood from this research, do not obtain prior ethical approvals to repurpose any data, once captured. Research on whether edtech products undergo ethical data assessment are also meagre. In the UK, for instance, edtech products are evaluated mainly through data privacy impact assessments (DPIA) (Hillman in press). However, the process remains voluntary for edtech providers (ICO 2020). In Australia, data governance is expressed through the assessment of edtech products based on security, privacy, interoperability and online safety (National Student Interoperability Program [NSIP] 2020, 5). In the case with Cambridge school district, de-identified data:

may be used by the [edtech] provider, including through a third party, for the purposes of development, research, and improvement of provider’s educational sites, services, or applications ... (SDPC 2018, 4).

The conditions in which ethical go-ahead is given, rely on the imposition of the legal frameworks of COPPA and FERPA and CPSD’s contractual agreement to which the edtech provider commits upon signing. However, while FERPA provisions control for what data can be used, once collected, repurposing its use still remains ‘a grey area’. The CIO explains:

this is one area I push back on more than other people, because I have had parents come to me and complain that their child was using a software product that we vetted, we approved. And the provider is then doing research on the de-identified data. So, parents feel like that child was subjected to research that they didn't agree to, when in fact, I only entered an agreement for the service providers to provide that service. So yes, this is a grey area that needs further diving into in clarification.

It also becomes hard to find data misuse. In one case, the vendor of a popular math product used the collected data to carry out research on student learning and publishing papers. The CIO says: 'this use of collected data can be unethical even if there is no harm done; under our DPAs, you can't do that.'

Ethical reviews and conditions can form part of a coherent education data governance framework not only for the purpose of transparency but also with the intention to provide a more meaningful data education for stakeholders (students and teachers). This brings the question of data literacy.

Conceptualising education data governance through an educational lens

From the research it transpires that parents/guardians tend to remain generally unaware of the data transactions between district and edtech providers. The reason for this is not intentional but practical. While the DPAs are available online, and therefore anyone can view what data are collected and by whom, the applicability of retrieving the contractual agreements and reading through each one is less popular in practice. As the CIO explains, it will become unmanageable to attend to every parent's question or concern regarding every edtech application a student uses while applications used in class may change at any one time. Ultimately, schools are the primary data stewards (e.g., in the US [Privacy Technical Assistance Centre 2015] and in UK [ICO 2020]), which explains why the CPSD imposes the DPAs partly to ensure good governance of data.

On the one hand, parents may become alarmed by the breadth and depth of data collection by an ever-changing list of edtech providers and about something they may know very little. Additionally, the logistics behind gathering individual consent, the need to explain or subdue panics, can potentially lead to a loggerhead and stagger CPSD's edtech vetting. It is for that reason, the CIO says, the consortium was set up – to develop resources that address questions relating to data and privacy literacy. However, beyond resources, more transparency, co-partnership with students and consciousness about data's impact on education is necessary as part of effective data and privacy literacy efforts (Hillman 2022).

Education data governance should be conceptualised with data education and literacy in mind, not only as to what data are collected and why, but also for the implications of data processing and long-term impact on the structure and even purpose of education.

Conceptualising education data governance through a social-structural lens (governing data processing and use)

Education as a social structure determines the process of what is taught, how it is taught, and what is learned (Dornbusch, Glasgow, and Lin 1996). Re-thinking education data governance through a social-structural lens demands a critical view of how education data may impact what is conceptualised as learning and the social structure of the learning processes. It follows to

ask, what data can learning processes go without? For example, what is the purpose of collecting ethnicity data in order to generate score reports as in the case with Pearson's Q-global platform (Figure 1)? Within the social structure of the learning processes, whose interests does such data serve?

From the case study it was understood that a school district requires education-related data at a number of levels. At a micro level, teachers refer to data for the purpose of instruction, pedagogical intervention and progress monitoring. Many edtech applications provide digital dashboards that display data visualisations, analytics and recommendations. The SDA says:

Teachers use different systems for different purposes – assessments, behaviour, collaboration, etc. Those systems fill their needs. The overhead of tracking student performance in those systems to have the complete picture is apparently a worthwhile trade-off. Having some of the external systems' data in the main student information system would be convenient, but teachers' perspective, training and wisdom is still needed for the final integration for parents and administrators.

At a district, state and federal level, data systems enable educational institutions to provide accountability reports. Issues arise when not all edtech providers share the generated data back with the school district. As the SDA says, some send out the so-called 'canned' reports, which come in incompatible files with data that are condensed, summarised and unfit for integrating them to the district SMSs. Furthermore, the administrator, acting as the data broker between the edtech provider and the student records database, must be able to configure the integration of edtech generated data with the school district database, which is not always possible. The SDA gives an example with Clever, a student management system: it 'is not nearly customizable enough for our needs, among other concerns' and elaborates:

A nicer, easier way of configuring per-application access rules would be great. Not having to do transformations (to accommodate their data formats, Boolean formats, field lengths and such) would be great, too. But I would need the broker application to be under my control. I personally would never trust a vendor to have and keep their end configured the way we want, even if they have the best intentions. Once the data are on vendors' systems it's out of our hands, so we limit that data as much as possible. We only want to send the data we choose, for the students and staff we choose.

Other providers do not share data for proprietary reasons. More recently, the CIO says, the district has piloted a project that aims to design a 'hub' architecture for data integration across edtech providers, the district and the state. This would allow the district to generate its state-required accountability reports. The pilot project's long-term goal is to relieve the district from having to manage data integration for interoperability while preserving student privacy.

It is precisely this goal of data interoperability that demands further critical analysis and meaningful oversight. Data interoperability leads to predictive analytics, student profiling and behavioural modification.

In the US, the Common Education Data Standard (CEDS, n.d.) is a data interoperability template available for districts and states to adopt and implement (NCES, n.d.). CPSD, too, aligns with this template. CEDS is a statewide 'initiative ... to streamline the understanding between and across P-20W' (National Centre for Education Statistics [NCES] 2019, n.p.) – data across the early years, kindergarten, primary, postsecondary and workforce institutions and sectors.

CEDS's proposed 'common language' (NCES 2019, 2) contains hundreds of data elements (Figure 3 shows some of them [CEDS n.d.]). However, this common language of data raises a number of concerns.

First, this common language of data not only streamlines what information to collect and how to organise it; it determines what counts in education and how to count it. However, if education is seen as a social structure of what is taught, how it is taught, and what is learned with the primary goal to serve the interests of the child, then does this data language serve these same interests? Therefore, a meaningful data governance framework also requires pedagogical and curriculum expertise to critically evaluate how the data-driven language and its capacity to enable predictive analytics, student profiling and behavioural modification may be impacting or even transforming education. For, the data-driven language imposes its own 'grammars of action' (Agre 1994) on the structural and social arrangement of education to the extent that data can 'oversimplify the activities they are intended to represent' (747).

Second, the language of data interlocks an expanding network of third parties that adopt it. The CEDS Data Warehouse (CEDS 2020, n.p.) 'has the capacity to support the full P-20W data pipeline'.

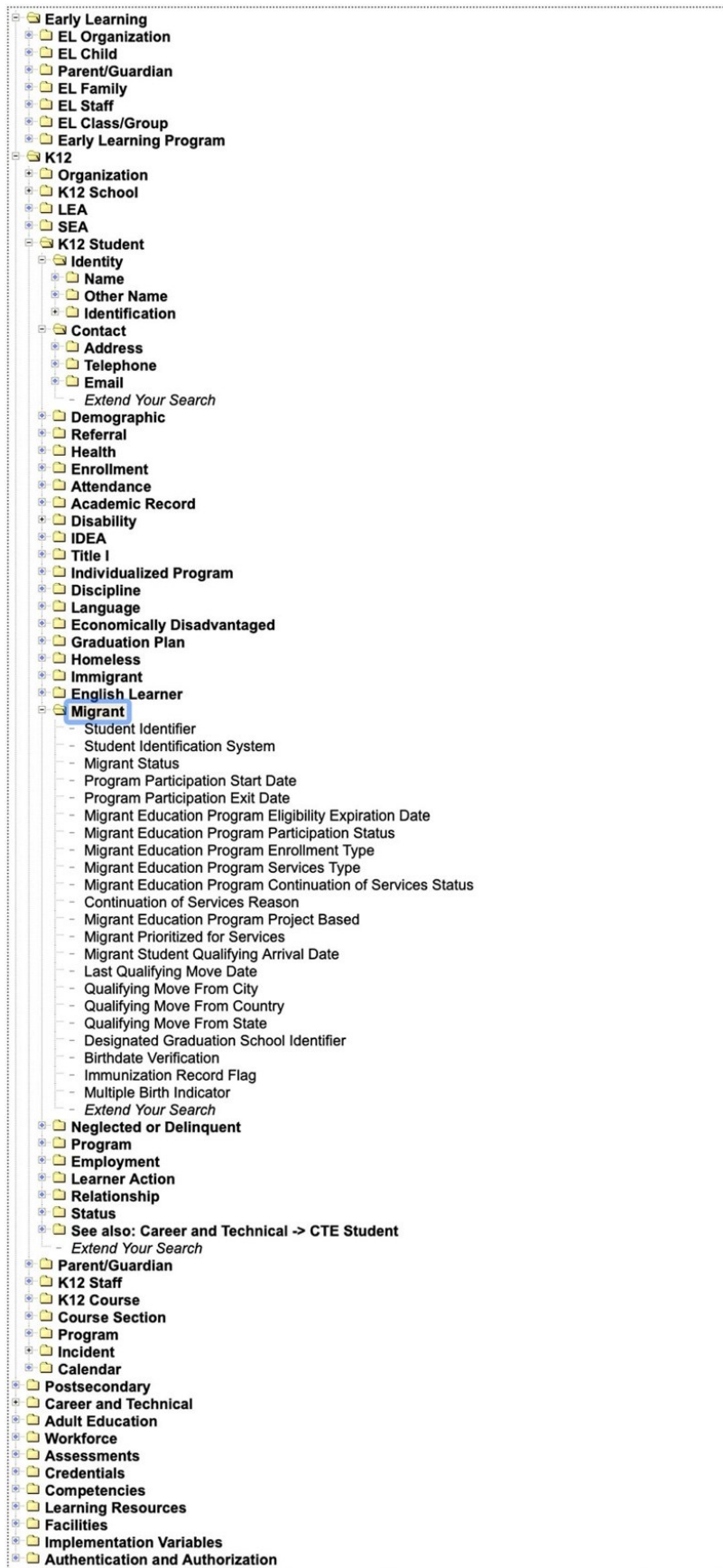


Figure 3. Some of CEDS's data elements, detailed.

It partners with learning agencies, public and private higher education institutions, the US Department of Education, the US Health and Human Services and the US Department of Labour; education data standards organisations (including CPSD's own Access 4 Learning[A4], former Schools Interoperability Framework [A4L]²); as well as powerful members of the private sector (CEDS, 2021, 3). Some are directly related to education; others are not (InnovateEDU 2021). For example, the Gates Foundation, of the Microsoft founder, has long been a proponent of common data standards in education, by funding various projects dedicated to this goal. Project InBloom for collecting student data failed following parental outcry (Bulger, McCormick, and Pitcan 2017). However, two others that are striving for 'pathways data' (DQC 2021, n.p.) – the Data Quality Campaign (DQC 2012, 2014, 2021) and Chiefs for Change (CFC), a bipartisan lobby group (The Gates Foundation 2019) – carry on. DQC and CFC push aggressively for data alignment and student tracking (CFC 2021) while they also partner with CEDS.

Third, the language of data enabling data interoperability has led to data pipeline development across districts and states and a new way of thinking about education. States are developing datamarts – dashboards – for access to 'targeted sets of data related to specific topics or questions' (NCES 2019b, 1). Kentucky, Minnesota and North Dakota, for example, have datamarts connecting secondary, postsecondary and workforce data (NCES 2019a). Others are introducing data 'lakes', an euphemism for a warehouse or a repository, 'capable of ingesting, storing, and providing data from a large number of sources and for a wide range of users and uses' (NCES 2019b, 1). Yet others have been promoting data 'backpacks' or electronic student records that contain all sorts of academic and personal student data – test scores, behavioural patterns, 'non-cognitive variables that impact achievements, as well as an 'early warning system', self-management skills, behaviour/character education, and a record of community service' (Bailey et al. 2015³, 2). In the UK, too, data interoperability, learner and workforce data alignment has been envisioned (DfE 2021).

In other words, the language of data and the capacities stemming from data interoperability have enabled for a direct link to be made between education and industry (the labour market). For example, aligning education with industry through the common language of data has led to clustering Washington (Workforce Training and Education Coordinating Board 2019, 2021) and Virginia (GO Virginia Foundation 2020) into industrial zones. From there, education policies propose hyper-specialised education and training depending on which zone a student comes from (Virginia Business Higher Education Council 2021). In UK, learning-to-earning

² CEDS's collaborators include some of the leading education data standards and SMSs used in the US including Ed-Fi Alliance, IMS Global and A4L/SIF (CEDS 2021). SIF specifically is common among Anglo-Saxon countries (A4L 2019) and used by CPSD. These three entities are funded by leading corporations. Ed-Fi Alliance is a subsidiary of the Michael & Susan Dell Foundation, of Dell, the computer software company. While Ed-Fi Alliance partners with IMS Global (2016) in providing single rostering across the US. The latter also receives financial contributions from the Gates Foundation (IMS Global 2014).

³ The Foundation for Excellence in Education (n.d.), the paper's publisher, was founded by former Florida governor Jeb Bush, also founder of the advocacy group Chiefs for Change (Layton 2015), which is partnering with Data Quality Campaign in the common goal for common data standards and data pipeline development (DQC 2021). CFC is funded by Bill Gates (Gates Foundation 2019), the long-time driver behind common education data standards.

models that align education with industry demands with the help of data are also on the way (DfE 2021). In a word, a common data-driven language allows for policy and industry to ‘speak’ about what needs training depending on what labour is presently in demand.

This model, however, suggests that education data serve first and foremost industry and its labour demands, which may not necessarily align with the interests and demands of a young learner. This model therefore begs to question whether data pipelines reduce public education into the sole means for labour production – and therefore even class (re)production (Hillman and Bryant, 2022).

Lastly, the language of data has the capacity to modify the conditions, which shape a learner’s behaviour. Education data present learning as the function by which what is taught, how it is taught and what is learned is quantified through numbers. The learning process becomes an if–then uniform pattern that is formulaically predetermined since everything, no matter what, has to amount to a quantifiable number – data. This assumes that education data will benefit the system – be that of education or industry – on which the student is a reactive, modifiable participant (a node). If data become the central voice of expression and force that drives one’s learning trajectory it can limit the agency of a developing individual whose interests can change at any time.

In the present case study, data interoperability for greater visibility of the teaching and learning processes is seen more as an opportunity to adapt the learning process than as a concern that students will be pushed aside as reactive participants. However, there is not enough evidence that the former is happening and not the latter.

Conclusion: education data governance that prioritises learner voice and role

A clear rationale behind a meaningful and coherent education data governance framework should depart from clear answers about who benefits from education data generation, interoperability and use. This article attempted to look at a possible coherent design for an education data governance framework through technological, ethical, educational and social-structural lenses, which should prioritise learner voice and choice. While each lens has merit, in isolation, educational (through data curriculum or pedagogy), ethical (prior review standards and procedures), technological (through blocking or anonymisation) and social-structural efforts leave little plausible strategies for a scalable and sustainable solution to education data governance.

First, systematic approach to empirical research is necessary to understand teachers’, families’ and students’ knowledge, attitudes and perceptions towards education data specifically and edtech more broadly. What sort of learning environment do students wish to be a part of and what learning environments do teachers, education policymakers, school leaders and parents wish to promote? Answers to these questions will help navigate the kind of education data governance framework and policies these same stakeholders can design.

Second, a well-thought human-centred education data governance framework should account for what families and states want to see as policy continues to invest in the digitalisation of education. Edtech carve their way into the education sector with little substantial evidence of how effective they are (Boninger, Molnar and Saldaña 2020) and for whom. Following the global health pandemic, pressures to avoid an educational crisis opened dangerous doors to powerful commercial entities with their own views to learning (Fullan et al. 2020) and appetite

for privatising education (Williamson and Hogan 2020). Such concerns should not compromise well-thought decisions, for which states and families pay a hefty price (Saltman 2018) with the risk of students paying an even heftier one if such technological solutions fail to deliver up to their promises.

Third, at conceptual and social-structural level, data interoperability for predictive analytics, profiling and behavioural modification can lead to further consequences on the social order and sociality of an educational ecosystem. Data-driven adaptive edtech products and services can challenge older forms of knowledge, expertise and judgement and risk sidelining educators and learners by reducing their autonomies. It follows that data interoperability has the potential to restructure not only how learning happens, for whom and why in whichever way it does, but also the social organisation and governance under which it happens (opening doors to commercial entities to build their own worker pipelines through the means of public educational institutions). Addressing what forms of education data governance are needed in the fast-changing educational ecosystem therefore demands deliberation on many fronts simultaneously. It is an ambitious project that requires human leadership and participation regardless of what the technologies of the day may be.

Collective and human effort must underpin an innovative data governance architecture including education scholars, edtech critics and experts who have long worked in the space and continue to provide evidence about what is wrong and right with edtech specifically and in the educational processes more broadly. Education partially is meant to provide and generate more knowledge; motivate and lead individuals to find their sense of purpose. The focus of learning therefore should remain the departure point on which a new education data governance framework should be re-thought together with ethical, educational, technological and social-structural considerations in its foundation.

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