

Biometrics in schools: the role of authentic and inauthentic social transactions

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Biometrics have always been part of the social world, but it is only recently that we have moved from an instinctive human model to a digital one. Anyone who has been a school student will be aware that, along with eyes in the back of their heads, teachers are supposed to have a mythical sixth sense that means they are able to smell potential trouble a mile off, or identify potential culprits by individual gaits as they attempt to escape. Teachers have also long been regarded as societal experts in identifying homework and examination cheating, in the form of informally analysing patterns of handwriting and pencil use, as those of us who have attended school ourselves may recall. However identification techniques in school are currently in a process of being corporatised and commoditised, with biometric technologies being at the forefront of these developments. This chapter discusses the social and theoretical context for such change.

Recent introductions to identification technology in the education sector have been extensive. They include software such as Turnitin, which is designed to track whether text has already appeared online or in another person's work, and been cut and pasted into documents. In addition, hardware developments such as platen readers and fingerprint algorithms have ensured that biometric identification techniques in schools have moved beyond the instinctive and, as digital tools, become significantly more formalised and supposedly reliable, although this may not always be the case (Phillips, Martin, Pato and Millett, 2010; Rise Project, 2016).

Overall, biometric developments have been capitalised upon by the commercial sector and exploited in various respects by school administration systems (Casella, 2003). Biometrics in schools bring with them both advantages and disadvantages as they begin to change the relationship between institutions and the children in their care. This chapter discusses the current state of research in terms of biometrics and social identity¹, the commercial pressures to adopt biometric systems, and the growing relationship with data privacy issues. It analyses the potential problems surrounding uncritical adoption, and discusses how this might inform future data privacy policies. The chapter then identifies three key social issues relating to biometric use in schools, and offers related theoretical perspectives. Finally it identifies biometrics as an area of social and legal risk for the future.

TYPES OF BIOMETRIC

Over the last decade, the use of biometric authentication has become more widespread throughout society. This includes using fingerprints as verification tokens on mobile phones, the use of facial recognition software used at passport control, and as part of closed circuit television (CCTV) technology. Many other methods have been developed, including:

- DNA sequencing
- Visual biometrics of ears and eyes such as iris or retina scanning
- Finger or hand geometry
- Gait analysis
- Odour recognition
- Behavioural biometrics (for example handwriting or typing patterns), and
- Vein recognition systems such as palm vein readers.

(Battacharyya *et al*, 2009)

The field of biometrics is a lively and expanding one, and schools represent a significant market. Bryce *et al* (2010) and Darroch (2011) have identified that biometrics offer schools significant benefits in terms of reduced administration costs, destigmatisation of welfare recipients, and the impression of technological modernity and convenience for students. Hope (2007) has described this development as the ‘silent, continuous and automatic monitoring of an individual’s everyday life’. However accuracy, equipment maintenance and database management can present difficulties (Kindt, 2007; McCahill and Finn, 2010). This has led to privacy concerns.

BIOMETRICS IN SCHOOLS – ADOPTION AND PRIVACY CONCERNS

In terms of biometric use in schools, it is hard to find accurate, precise and up-to-date information about their adoption and global spread. Darroch (2011) indicated about 2000 secondary schools in the UK had adopted biometric technologies (for example fingerprint readers, palm vein readers and facial recognition systems), which constitutes roughly 40% of the overall total. In addition, 2000 UK primary schools also appear to have adopted biometric technologies, which represents 10% of the total. Three years later, it was estimated that a total of 1.28m UK secondary school students had been fingerprinted (Big Brother Watch, 2014), again representing 40% of the student body, and largely static commercial growth. However biometric use is not confined to UK schools. Although we don’t have accurate figures for US adoption, market growth in US schools is predicted to be 23.65% over the period 2014-2019 (Technvaio, 2015). This is despite the fact that states such as Arizona, Illinois, Iowa, Maryland, Michigan and Florida have banned their use for students (King, 2016). There is more resistance to the use of biometrics outside the UK and US. For example, although biometrics systems have been used in the Netherlands, France, and Belgium for some time (Kindt, 2013) in 2005 the French ‘Group Against Biometrics’ smashed palm readers in schools (Atanasiu, 2014), and over a decade later, the French Government is currently debating a bill to restrict the use of biometric technologies in a number of contexts such as schools (Biometrics Institute, 2016). Similarly the Director General of the European Union’s Directorate for General Justice raised strong concerns regarding the use of biometric technologies in UK schools, in a formal letter to the UK’s Permanent Secretary (Le Bail, 2010). Biometrics are therefore certainly not universally accepted in the context of schooling.

Darroch (2011) has exposed the potential for privacy problems arising from the misuse of personal data held within biometrics systems in an educational context, as a consequence of data being linked with existing databases. The phenomenon of cross-referencing in this way has been labelled ‘function creep’ or ‘surveillance creep’ (Anderson *et al*, 2006; ICO, 2007; Boyce *et al*, 2010; Dowty, 2008). In reality, the scope for misuse is currently somewhat limited. Many algorithms derived from fingerprints collected in schools (by far the most common form of biometric in use in this context) are comparatively rudimentary, with just 10 or 12 data points being recorded, which limits the useful scope for later reconstruction, for example by reverse engineering the fingerprints from analysing the digits in the algorithm (see Adler, 2007 for an example of this using facial biometrics, and Oh *et al*, 2016, for an account of the possibility of building an identity from multiple partial matches). However looking further into the future, the principle of cross-referencing personal data does present some concerns, particularly as the technology develops in sophistication and becomes more widespread. It is likely in the future that there will multiple algorithms in play for individuals derived from fingerprints existing in a number of locations, such as national identity, border, health and educational contexts. In such cases it might be possible to carry out a form of what Ross *et al* (2006) describe as ‘fingerprint mosaicing’, allowing an individual to be tracked

and identified across systems. Biometric technology is therefore often seen as controversial by many groups and institutions with particular privacy concerns.

The development of legislation with respect to biometric data has been slow to respond to these concerns, as until now, biometric data have been routinely grouped with other types of personal data for the purposes of protection, for example as they are in the UK's Data Protection Act (1998), something that has been discussed at length elsewhere (for example Taylor, 2013). The UK's Act is the implementation of an EU Directive and therefore resembles parallel legislation in each of the European Member States. It is also very similar to Acts in Commonwealth countries such as Australia and New Zealand. These Acts were all passed during the same decade, and designed as a means of clarifying the responsibilities of data controllers at the time. In turn, the US has relied on the 1974 Family Educational Rights and Privacy Act (FERPA) for addressing the issue of biometrics in schools. This allows parents to inspect, review and correct data, as well as asking for certain forms of data to be withheld if necessary (known as 'directory data', this mainly involves routine personal data such as name, address, date of birth, and so on). However FERPA is clearly very different to the UK Act in that it applies specifically to the situation of schools and universities, and consent is placed fairly centrally. This has been addressed in the UK to some extent through the introduction of the Protection of Freedoms Act (2012), where explicit parental consent is required in order to collect the biometric data of children, but the 2012 Act is not as detailed in its scope as FERPA, nor as specific.

The new European General Data Protection Regulation (GDPR) moves closer to this US model, at the same making provision for more complex and widespread uses of such data in the future. In the classifying biometric data as particularly sensitive, along with genetic information (European Parliament and Council, 2016). In the Regulation, Section 3, Article 33 2c *Data Protection Impact Assessment and Prior Authorisation* it is stated that there is a specific risk in the case of "personal data in large scale filing systems on children, genetic data or biometric data", for example. Article 4 of the same Regulation defines biometric data specifically as 'any data relating to the physical, physiological or behavioural characteristics of an individual which allow their unique identification, such as facial images, or dactyloscopicⁱⁱ data. With the clear framework for data retention (and indeed erasure) elsewhere in the legislation, there is also concern given to accuracy, control, security, and proportionality in terms of their use. In terms of proportionality, there is a presumed bias in the legislation against the use of biometrics where an alternative, less invasive technology might be appropriate. This caution may go some way to reassuring concerns about the overuse of biometric technologies in schools, albeit just in European member states and the European Economic Area.

BIOMETRICS - SCHOOL DINNERS AND BEYOND

In UK and US schools, fingerprints are primarily used for accounting functions (e.g. payment for school meals) or for taking out library books. A more recent development is the use of biometrics for identity verification for examination and assessment purposes, sometimes also as an adjunct to digital invigilation systems, but this tends to be a characteristic of biometric use in places such as East and West Africa, and more commonly used in high school or university (Mayhew, 2016). Research in this area is also being supported by the European Union through its project 'Adaptive trust-based E-system Assessment for Learning' (TeSLA)ⁱⁱⁱ. This is a €7 million project led by Universitat Oberta de Catalunya (UOC) involving a consortium of 17 European organisations, which uses keystroke and facial recognition technologies to verify identity and reduce cheating by university students. This is

an example of technology that has potential for future use in the context of public examinations in schools. In Pakistan, on the other hand, biometric systems in education have been used as an anti-fraud measure backed by the World Bank, to combat the phenomenon of the ‘ghost’ or fictitious teacher (Biometrics Daily, 2016). This is when fake or former workers exploit regional administration shortcomings by drawing or continuing to draw salaries they are not entitled to, depriving existing schools of significant funding. Overall there seems to have been less resistance to fingerprinting adults for the purposes of university examinations or combating fraud in education, in comparison to fingerprinting children.

THEORETICAL PERSPECTIVES ON SCHOOL BIOMETRICS

The use of biometric monitoring systems represents a response to a number of complex social issues, of which three are particularly noteworthy: growing school size, power and control, and biometrics used as a proxy for modernity and efficiency. Different social, historical and ideological factors influence the way biometric systems are deployed in each context, and the practical and theoretical positions in each case will be mapped out here and discussed.

It should be noted that these three theoretical lenses have been chosen as each provides a useful perspective; they are not designed to present a complete theoretical framework. In fact, there is a danger with relying too heavily on what Clarke et al (2007) term ‘epochal approaches’ that use a single overarching theory in order to explain social policy and social change (in this case they referred to neoliberalism as a project of modernisation, Marxist political economy and Foucauldian governmentality). An epochal approach indicates the end of an era and the beginning of an alternative one. Adopting such an approach here would mean that some of the nuances of this type of technological development and deployment would be understated. However using three lenses instead allows us to interrogate the apparent banality of the organisation of groups of children in the context of schooling, and how biometrics relates to that.

Growing school size and social identity

The first issue is the increasing size of many schools, and the increasing depersonalisation that is associated with this, reflected in the adoption of technologies such as biometrics. This may be at the expense of high quality adult-child relationships as school environments undergo extensive social restructuring.

In many countries, the average school increased in size substantially over the latter half of the 20th century, a trend which continues today. For example, in the US, the number of students in high schools with over a thousand students grew from 7% to 25% between 1954 and 2004, and the number of students in high schools with over a thousand students doubled in the decade between 1989-1999 (Nguyen, 2004). While large schools present economies of scale, many researchers have established a link between enhanced educational attainment, engagement and behaviour in smaller schools, containing roughly 300 students in primary or elementary schools and 600 students in secondary or high schools, as opposed to larger ones, containing over 500 in primary or elementary schools and 900 in secondary or high schools (Barker and Gump, 1964; Pittman and Haughwout, 1987; Fowler and Walberg, 1991; Lee, Bryk, and Smith, 1993; McMullen, Sipe, and Wolf, 1994; Lee and Smith, 1997 and Klem and Connell, 2004). This is especially the case when variables such as socio-economic status are carefully controlled for (Welsh and Zimmer, 2016). On this basis, larger schools appear inherently more difficult to manage effectively.

Also conscious of the impact of large schools on children, a group of English educationalists founded the Human Scale Education movement in 1985, and this had a parallel movement in the US in the form of the Coalition of Essential Schools (Wallace, 2009). A concern here is the quality of pastoral relationships in schools between teachers and their students, something which starts to change and potentially becomes less human once a school becomes larger (Fielding *et al*, 2006). It is possible to imagine a situation where teachers, administrators, librarians and school meal supervisors become less familiar with the identity and disposition of individual students over time, as the overall scale of the schools that they work in grows. In such cases we see face to face interaction replaced with increasing numbers of technologies, such as RFID^{iv}, GPS^v, CCTV^{vi} and so on. It is in this context that the use of biometrics represents a simplified form of identification, with the personal knowledge of the teacher or colleagues replaced by the use of the body as identity token, as part of a highly technicised surveillance protocol. The genetic structure of the body therefore represents the identity of an individual within a social institution that seeks to control and monitor it (Deleuze, 1992; McCahill and Finn, 2010). In this way, the body has been corporatized.

Power and Control

This desire to monitor at a corporate level is related to the second issue, namely that of power and control in schools. For the purposes of this analysis, it is not enough to see power in this context as a simplistic David v Goliath-type struggle between the weak and the strong. Such a routine classification of power as directly equivalent to domination can, in my opinion, be a significant problem for the contemporary sociology of education. Instead, I consider it more useful here to examine the varied role of power relations, as Foucault classified them. This approach allows us a more nuanced understanding of the social processes at work. Foucault makes a clear distinction that is helpful for our purposes here, namely between **disciplinary** and **regulatory** politics, which he argued represent two versions of power in the context of managing of people or populations. At a national level, compulsory schooling would be an example of regulatory politics, and something that we need not concern ourselves with for the purposes of this chapter. What is more important is the role of disciplinary politics, in which groups of school students are controlled by school administration in order to achieve a particular objective. As Foucault might say here, biometrics systems just represent an ‘apparatus of security’ (Foucault, 2010), optimising certain aspects of school life, not a struggle against domination in their own right by the end users.

The concept of disciplinary politics is nested in what Foucault would call ‘Biopolitics’ (2010) in which the school becomes a site for Government regulation driven, in this case, by neoliberal economic forces. Here, commercial processes surrounding biometric systems procurement influence the school’s disciplinary practices. In turn this makes it appear desirable and necessary for a school to develop large-scale and highly technicised systems of student management that lend themselves to such systems. This is chosen over what is commonly termed by schools and caterers a ‘family’ model of meals, where children are served in small groups at table, for example. In this way, disciplinary power concerns itself with the control of individuals performing a physical function.

Increasingly, the field of social relations has concerned itself with the role of the physical body within the context of urban society (Adelmann and Ruggi, 2012). The trend towards cafeteria systems and biometric payments is an example of the urbanisation of the school meals process, just as biometric entry and exit systems to school buildings echo the highly urbanised border control arrangements of nation states. The situation of the body within this process of urbanisation merits particular attention. If we look beyond Foucault’s biopolitics, Bourdieu,

for example, sees the body as a means by which social power and relations can be constructed (Bourdieu, 1978: 832). His view of the body in sociology is admittedly rather more linked to the idea of what he terms ‘physical capital’, where the embodiment of physical perfection in the social sense equates to the achievement of high social status (an example of this might be the way Olympic athletes become celebrated and well-known). However it is possible to develop this idea further. To do this, we need to consider the areas where Bourdieu’s intellectual concerns regarding social identity (1977, 1978, 1984) start to overlap with those of Baudrillard (1988) in terms of the relationship with consumption. Bringing a postmodern perspective into the analysis in this way is helpful in understanding what seems to be a fundamental shift in the philosophy of surveillance amongst the surveilled (and those who commission surveillance systems in schools).

The process of biometrically tracking children in schools, of controlling their bodies in this way, involves consumption and domination at different levels. The children are seen as consumers of education and, in association with this, resources such as school meals and library books. In turn, the schools are customers or consumers of biometric systems in a marketised school funding economy, where business can sell systems to schools in response to this desire to consume. Here, however, the positions of Bourdieu and Baudrillard divide. On the one hand, Bourdieu (1984) might see consumption dictated by taste and social class (explaining why some children and their parents choose to bring in their own school meals, or ask for swipe cards instead of being fingerprinted)^{vii}. Baudrillard (1988), on the other hand, might see the act of consumption in this context as socially and politically neutral. Similarly, Bourdieu might consider parents assembling a wholefood, organic packed lunch, supposedly superior in nutritional content to the school-provided meals, as a way of further ensuring the embodiment and class-related manifestation of taste (we could even see this as a means of turning social, cultural and/or intellectual capital into physical capital). Baudrillard might point towards some of the packed lunches being of inferior nutritional content, being given to children because ‘they just prefer them’, or ‘they can skip the lunch queue’, and explain that this represented a case of consumption, again, being socially and politically neutral. In the theoretical school dining room of Bourdieu, therefore, class domination starts to be mirrored in the choices children and their parents are making surrounding identity verification protocols and an opt-out mindset.

In Baudrillard’s theoretical postmodern school dining room, we see an apparent massification (a scaling up of the size of facilities along with a blurring of the role of the individual) in terms of food, as well as identity. This provides a useful framework for the private, commercial sector to persuade schools that they need biometric systems. Such use of biometric systems is predicated on an assumption of social neutrality and an equal exchange between producers and consumers at various levels. In such a context, biometric use in schools becomes a mere convenience, and issues of power and control do not feature, which is likely to be a key aspect of its widespread adoption in schools. This is reminiscent of Foucault’s idea of such things representing an ‘apparatus of security’ rather than automatically representing a means of domination. For many people, biometrics just represent a tool, and the philosophical underpinnings of their use are of little consequence. The role of identity within them has been rendered as insignificant as possession of a car key or a bus ticket. In this way, biometric systems become reified and attain a status in their own right, quite apart from human considerations. It is an asocial system that decides whether you can have lunch or not, and in some schools, even what you might be able to choose, rather than a person. Children and young people become habituated to these systems and in turn become tomorrow’s compliant ‘silent majority’, as Baudrillard might put it (2007), shuffling passively along the lunch queue of life.

Reducing biometrics down to the concept of a tool does not, however, tell us much about the true social context of their use. In the case of biometrics, one reason is that it is not always helpful to see engagement with biometric verification processes as a group activity. Another framing of the issue is to see it as a collective of individuals undertaking transactions independently of one another, albeit in a similar way. If we take this point of view, it is in fact possible to map the nuances of biometric exchange more effectively, particularly with respect to their reciprocal nature.

It is helpful at this point to look at the work of the sociologist Homans (1958), who gave considerable thought to issues surrounding reciprocity, closely connected to work carried out by anthropologists such as Lévi-Strauss. Homans was one of the first people to develop a systematic theory of social exchange (Ekeh, 1974; Blau, 1968). While the field has undoubtedly moved on, in his early work, Homans presents a classification framework that differentiates between different forms of social exchange, derived from the psychological literature as well as his own empirical work. It is useful for us here as a simple mechanism for distinguishing between the different forms of exchange taking place when biometrics are used in school, as well as identifying more closely the conceptual space where the asocial is so prevalent.

Theory of social exchange in school biometrics, derived from Homans (1958)

FIGURE 1 HERE

Here we see that the profit motive inherent in the provision of biometrics systems to schools embodies a different relationship from that experienced between parent, child and school. The procurement of biometric systems is rooted in neoliberal policy, and based on the notion of a profitable exchange (as Homans would classify it) in which one party seeks to achieve extraordinary benefits from the other. The latter, on the other hand, is a more altruistic relationship in which social exchange is more of a zero-sum game for both sides, in this case access to food or library books (for example) without too many problems. In the use of biometrics in schools, we can see from this diagram that it is possible for biometrics to achieve a number of objectives for a number of parties at once, without being inherently ‘good’ or ‘bad’. What these objectives might be depends on their status as interpersonal or intrapersonal transactions. Whether they are equal or unequal depends largely on the position of the transaction in relation to the diagram, and I use the terms authentic and inauthentic here (in a democratic sense rather than a technological one) in order to differentiate them in this respect. An **inauthentic** transaction, as I classify it, is an example of when a school as broker starts charging parents an additional fee for facilitating the third party biometric service, without making this clear, or selling children’s school meal and library use data to third parties, or allowing third parties access to fingerprint algorithms. In this case, the dividing line between the interpersonal vs intrapersonal, and profitable vs fair has been blurred, via an abuse of power and associated inequality. This is why strong privacy regulation is necessary (as discussed earlier in the chapter) and why it needs to be clear to all parties what children’s data privacy rights are. Another approach to biometric use might be if a committee of parents/teachers/students decides on a collective and democratic basis that their use might be highly convenient or expedient to the group, with everyone in agreement. As part of this decision, responsibility for privacy issues is shared (although it may be delegated as a practical day-to-day matter). Nevertheless the required standard of consent is significantly higher, and engagement with the decision-making process more widespread. This type of use can be

classified as an **authentic** transaction. Hence in situations where data categories are kept clearly distinct from one another, as part of authentic transactions, we can see biometrics in schools as being fundamentally asocial, adopting a neutral stance, technically speaking, at least. Of course, there is a further debate to be had regarding whether such surveillance technologies can even be seen as really neutral. This is particularly relevant here because fingerprinting has connotations of criminality, being rarely applied to adults other than in border control and judicial situations. The very act of fingerprinting consequently makes children look and feel like a distinct group who are routinely asked to give up very personal data. This calls any supposed neutrality into question, and also impacts on issues of trust.

Considering trust in this context is important. As Dowty (2008) argues, the perceived ‘otherness’ of children leads them to be objectified by adults in particular ways which has an effect on their relationships with adults and the ability for them to negotiate social relationships where trust needs to be an issue. If a child cannot be trusted to make his or her own food choices reliably at lunchtime without a parent logging onto a system to see what has been eaten, then this risks undermining a child’s ability to learn to make the correct food choices independently. Rooney (2010) calls this a form of discretionary power, and one that needs to be learned in a safe environment such as the school cafeteria if children are to develop what she describes as an ‘active and creative sense of selfhood’. McCahill and Finn (2010) go further and argue biometric school lunch systems can also have a negative effect on child-to-child interactions as well; if you are no longer able to buy your friend lunch because he or she has lost or forgotten their own money, this means you are not able to develop the human interaction skills that help you to decide whether someone is a good or a bad risk and therefore worthy of your trust. In this way we see social power and control tacitly embedded in the use of biometric systems in school (Selwyn, 2012), at the expense of opportunities for child development. In the light of this, it is hard to see a biometric system as neutral.

Nevertheless, whether neutral or not, extensive adoption of biometric technologies by schools to control and monitor the activities of children takes place in spite of the fact that children’s bodies are not well suited to the capture of reliable biometric data, being in a process of change (Kindt, 2007). There are some additional serious technical issues here that need consideration. As part of setting up a biometric system, individual schools need to set False Accept Rates (FARs) and False Reject Rates (FRRs) for duplicate and non-registered fingerprints, and it is difficult to do this accurately as so many children’s fingerprints are fundamentally similar. This means that in a school of, say, 1000 children, there might be as many as 20-30 children who repeatedly experience accounting mistakes related to their identities, something that follows them through their time at that particular school. Indeed, in recent research where we talked to schoolchildren in the South West of England, we found this to be a common problem for several of the students in our focus groups (Leaton Gray and Phippen, 2017). Yet even though we know that growing shapes do not fit conventional surveillance protocols particularly reliably, we try to impose an adult, fixed identity on them, what van de Ploeg has termed ‘the informisation of the body’ (van der Ploeg, 1999) with the ‘body as password’ (Lyon, 2009: 113). Within this, the human gaze is replaced with an automated spatial demarcation of where a particular body is allowed to be at any given time. Despite the fact that their bodies do not fit these technologies, children are subjected to them more frequently than adults might be. This is because they are seen as being vulnerable, needing more supervision than adults, and their rights to privacy are seen as less significant – an example of the ‘otherness’ of children (Dowty, 2008). In this way, it could be argued, they are being prepared for a life of submitting uncomplainingly to digital identity verification systems as they attempt to move about, the ‘docile bodies’ of Foucault (1975) corralled and marshalled by others in an inauthentic manner.

Biometrics as a Proxy for Modernity and Efficiency

The third and final issue is the use of biometrics as a proxy for modernity and efficiency in schools, with associated consequences for school branding and status. This is linked to various underlying trends associated with the school marketization movements in various countries. The UK offers a prime example of this, as a consequence of a complex policy situation which allows companies to develop new school buildings and products for long-term lease to the public sector. This has been instrumental in the widespread adoption of biometric technologies nationally.

The background to this is that many UK schools have been able to manage their own budgets for nearly 30 years via the Local Management of Schools provision (LMS) in the UK's 1988 Education Reform Act. They have also been undergoing extensive redevelopment over the last two decades as part of the Building Schools for the Future programme dating from 2005/6 and linked to school reform initiatives generally (although largely scrapped in 2010 by the then Secretary of State for Education, Michael Gove). There has also been a general trend towards refurbishing ageing buildings often erected hastily in the aftermath of World War II, and substantially neglected for several decades afterwards. It is now relatively common in UK schools for biometric systems to be installed as part of a competitive tender process for redecorating a school dining room, as an adjunct to interior design, as in the case of the secondary school in Wigan in the north west of England, outlined below. Here we have an example of a biometric system acting as a kind of technological status symbol, contributing to an overall sense of progress and improvement in the dining room environment.

The old canteen was plain, boring, colourless and wasn't a very nice place to eat as there was mess everywhere, drinks spilt etc. However the new canteen, is a nice environment to eat food in. It has brightly coloured benches, vivid colours and more space on the benches to sit with your friends. The pictures on the walls make it look modern and classy. Students and teachers can now pay with an image of their fingerprint on a scanner, called biometrics, making the canteen look even more posh and much more efficient as students are not having to find the correct money to pay for things.

(Newsletter, Golborne High School, 2016)

The more heavily involved the private sector is in a school, the more likely it seems that biometrics technologies will be used. For example, ten years ago Todholm Primary School in Paisley installed a palm-vein reader in its dining room. The particular school in question had been fully developed via a Private Finance Initiative (PFI) by Amey PLC. PFI was a type of financial deal invented in 1992 under a Conservative Government, in which public sector developments were financed by private capital, and then leased back to the public sector over a period of at least 25 years. In this case, Amey had a partnership with Glasgow City Council to develop several schools with a £100m build value (Ball, 2007), and in the course of this, they worked with Yarg Electronics and Fujitsu to develop the technology. They were then in a position to sell the technology to Glasgow schools, as well as Amey PFI schools further afield. Todholm Primary School therefore presented a useful platform for piloting the technology for commercial use, with associated regulatory and financial concessions for the developer, and it was readily adopted. In an associated media article at the time the managing director of Yarg Electronics said,

"The kids love it," said Cunningham. "It's the whole James Bond thing."

(Williams, 2006)

It is here that we see technological developments at their most visible, driven by a desire for schools to be seen at the cutting edge of technology. This is very similar to what Lodge (2012) describes as biometric 'group think' which trivialises the applications of biometrics without a full understanding of its impact in this regard. It brings serious consequences. In the current economic climate of privatisation and competitive tender, driven by neoliberal economic values, children and their schools are being leveraged. This is being done in order to create new products and services that can be profit-bearing for commercial organisations, and sold as futuristic technological devices, that act as a symbol of modernity and efficiency. However if we look back to Homan's concept of profitable vs fair exchange, we see here that a lack of transparency has led a blurring of categories, rendering such transactions inauthentic, according to the definition in this chapter. Children and schools are being commoditised in new ways without this being made explicit, in this case by the queue for school dinners being *financialised*, as Lazzarato (2009) would put it, in a neoliberal sense. Homans would describe this blurring as an unstable social situation. The question here is, what impact might this have on society moving forwards?

FUTURE PROJECTIONS

Biometrics are a controversial development in 21st century schooling and one that can engender somewhat polarised views, ranging from the largely practical in terms of convenience, to biometrics representing something of an identity battleground. The problem in classifying their use is that existing sociological models fit relatively poorly when describing them. On the one hand, it is tempting to discuss issues of inequality, perhaps in terms of dominance, power, neoliberalism and children's data privacy rights, as indeed has happened in this chapter. All of these things are, of course, important. On the other hand, the biometrics industry might well argue that while biometrics represent an example of a technology that effects a profound change on society, in the way that the typewriter perhaps did, they may not in themselves be necessarily harmful. Where difficulties arise, the industry would say, it is when poor administrative and communication practice happens in general, with consequences for mutual trust, as Lodge (2016) and Rooney (2010) rightly point out. Yet this tension between potential identity battleground and industry makes a clear differentiation between authentic and inauthentic uses of this 'apparatus of security' even more crucial in understanding the full context of biometric use.

For example, if some children are unhappy with being confused for others by the system, or rejected unfairly, because of inauthentic uses, then schools need to take that seriously and ensure full inclusion by setting their systems more sensitively. They also need to persuade providers to develop systems that meet the school's and children's needs fully, rather than simply buying into whatever system a provider might feel like selling them at any particular time. This is because, as Lodge and Nagel explain, systems reflect the ideological biases and preoccupations of their creators (Lodge and Nagel, 2016), something that conflicts with the desire for administrative neutrality, and which needs much greater consideration by those in charge of procurement for schools. In the case of large-scale biometric adoption, biometric use often has more to do with schools wanting to give the impression of modernity, an Achilles heel often preyed upon by businesses seeking to make a quick return from their investments in technology development. Our schools, and their students, deserve better than

this. Schools are not just remote societal institutions, but also stand *in loco parentis*, and as such, have a moral responsibility to encourage and nurture worthwhile human relationships amongst the children in their care, and the adults that look after them.

There are other issues on the horizon. As big data looms as a potential analytical framework for everyday life, parents and children also need to be convinced that their personal data are secure and that they have a sufficient degree of agency in deciding whether to give this out, and how to go about checking accuracy. Currently the balance between individual access rights, data privacy rights and provider responsibilities is not particularly well-balanced, despite the best efforts of legislators. This is even the case in the United States where in other contexts, children's personal data are relatively securely protected, on account of the Family Educational Rights and Privacy Act (1974), mentioned previously in the chapter. This lack of balance, even in the face of relatively strong legislation, has the effect of undermining the democratic rights of end users on the grounds of a lack of democratic engagement. In turn this undermines user trust, and with it the ability of children to develop interaction skills that allow them to assess negotiation and risk in personal relationships, as discussed earlier. Phippen (2012) has described this anti-risk phenomenon as the advent of 'Generation Safe' – over-protected and over-reliant. Do we really want our children to be so in awe of technological systems that they are unable to develop the skills to question their use, or advocate for alternatives? Are we really happy to create a society in which our identity and relationships are mapped out in tidy little binary algorithms and little else? What are the long-term consequences of encouraging child compliance with systems at all costs? The worrying aspect of this is that we don't even seem to have asked ourselves these questions, yet we have allowed biometrics to proliferate in schools.

Therefore it seems the biggest challenge in the future seems to surround how far biometrics become embedded within schools. We might be lucky. If school size stabilises or even becomes smaller, due to declining numbers of school aged children in the population, then as systems they look increasingly redundant. Similarly, if there is less of a trend towards a highly regimented education system with a great emphasis on bells and rigid timeframes for tasks (an organisation structure that dates back to the early days of universal schooling in the 19th century), then school lunch sittings perhaps become less necessary and a more personal relationship between students and lunch providers more possible, again rendering biometrics less significant in their most popular context.

However the danger is here that companies start to look for different uses for their products in order to ensure future profitability, with new functions being seen as supposedly 'essential'. For example, it is possible to imagine a future scenario where a child's fingerprint acts as a gateway to passport information, health data, geolocation data and payment, in order to organise and manage school trips. Whether this is desirable is quite another question, of course, and once again opinions will vary according to the vested interests of any stakeholders, but the primary concern is that things become increasingly seen as 'necessary' with putative security and safety invoked at the cost of privacy.

Key to the future use of biometrics will be the trust that individuals and groups are able to have in such systems, and whether it is grounded in an essentially fair, balanced, and humane system. Currently whether this is the case is not always clear, and it is the job of developers and providers to ensure that biometrics work to enhance the social world of the school, rather than simply corporatize it. Otherwise the case for adoption will remain unconvincing to

many. The sheer banality of maintaining day-to-day order in schools must not blind us to the need for trust.

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i In this chapter the word ‘identity’ should be read in the sociological context rather than its conventional meaning in terms of biometric identification.

ii Fingerprint

iii <http://tesla-project.eu>

iv Radio-frequency identification (RFID) is a technology that uses electromagnetic fields to identify and track tags attached to objects, including clothing.

v The Global Positioning System (GPS) is a satellite-based navigation system placed into orbit by the U.S. Department of Defense.

vi CCTV (closed-circuit television) is a system where signals are not publicly broadcast but are monitored for surveillance and security.

vii An excellent account of perceived relationships between social class, family display and lunchbox preparation can be seen in Harman and Cappellini (2015).