Datafied at four: the role of data in the formalisation of early childhood education in England

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This paper examines processes of datafication in early childhood education (ECE) settings for children from birth-five years in England and how this relates to increased formalisation. Unusually, ECE in England includes a standardised curriculum and formative and statutory assessments; thus it has been described as subject to both datafication (Bradbury and Roberts-Holmes, 2017c) and 'schoolification', a term used to describe the adoption of school-like practices and values in ECE (OECD, 2006). Using interview data from ECE settings over the last decade and a theoretical framework drawing on Foucault (1979) and Deleuze (1995), the paper sets out the ways in which settings in schools and nurseries are subject to the demands of data, and how this produces data-driven subjectivities for both teacher and child. These developments are then linked to aspects of 'schoolification' including more formal teaching, a focus on literacy and mathematics, and use of 'ability' grouping.

Keywords: datafication; assessment; early childhood education; schoolification

Introduction

Early childhood education (ECE) in England is an international outlier in terms of the extent of statutory assessment and a formalised curriculum. Unlike in the rest of the United Kingdom, settings in England for children from birth to five years, including schools, are required to follow the Early Years Foundation Stage framework (EYFS) and children are assessed regularly against developmental stages, with a final assessment at the age of five, the EYFS Profile. Children are not required to attend school until the academic year they turn five, when they attend Reception classes in schools, but many younger children attend nursery settings in schools and private and voluntary nurseries[i]. Recent developments have included an attempt to introduce a new assessment on entry at age four, called Baseline Assessment. This policy context has led to the datafication of ECE in England (Bradbury and Roberts-Holmes 2017c), where practices, values and subjectivities shift towards a focus on the production and analysis of data, most often related to assessments. At the same time, the

statutory curriculum and assessment have been criticised as the further evidence of the formalisation or 'schoolification' of ECE (Alexander 2009; Moss 2013; OECD 2006).

In this paper I describe the process of datafication as it relates to ECE in England, both in school settings and nurseries, and then consider how the increasing role of digital data in ECE in England interacts with the shift towards formal learning for very young children, creating a mutually reinforcing need for more data and more activities to produce those data. I use research data from four projects in ECE settings conducted over the last decade, and a theoretical framework drawing on Foucault (1979) and Deleuze (1995), to consider how schools and nurseries are subject to the demands of data, and how this produces data-driven teacher subjectivities and a 'data double' (Simon 2005) of each child. I then explore how this relates to processes of 'schoolification', including more formal teaching, a focus on literacy[ii] and mathematics, and use of grouping by 'ability'. Overall, it is argued that these two processes of datafication and increased formalisation are mutually reinforcing, and underpinned by the same rationality that prioritises measurement over wider conceptions of learning. I begin with a discussion of datafication as a concept before setting out the theoretical perspectives that frame this work and the detail of the 'schoolification' critique.

Datafication in ECE

The ECE sector (or 'early years' as it is known in England) has, like many phases of education, been subject to a process of datafication in the last decade (Bradbury and Roberts-Holmes 2017c). This term is used to refer to a complex process where data has increased significance and this affects the practices, values and subjectivities in a setting:

> It is helpful to think about how data is produced from multiple sources and has multiple forms in classrooms, how it is transferred from one site to another and with whose permission, who has the power to alter it, and of course who controls how it is processed and delivered back to serve some purpose. [...] [Datafication] is not simply a change to

what is done and how, but also a change to *who people are*, or who they are expected to be (Bradbury and Roberts-Holmes 2017c, p. 6)

This work in early years draws on and adds to the growing body of work in other education sectors internationally which identifies 'the naturalisation of data as the most sensible medium for thinking about teaching and learning' (Lingard and Sellar 2013, p. 652), and the related impact on teachers and school cultures (Finn 2016; Hardy 2014; Pratt 2016; Sellar 2015; Selwyn *et al.* 2016). Throughout education systems, 'new modes of data-driven rationality' (Sellar 2015, p. 138) drive what we see as important and worthy of our time; data become fundamental in shaping behaviours and beliefs:

This wave of interest in the constitutive power of data, software and code is increasing as it becomes clear that data are, in a number of ways, central to the make-up of contemporary social formations of different types. (Beer 2015, p. 3)

The social formations of early childhood education are an exemplar of a sector in thrall to data, and to the production of what Millei and Gallagher call 'ad-hoc numbers' in reference to Australian ECE (2017), which influence practices and attitudes. In England, huge volumes are required to be collected, particularly in Reception, and the associated processes have an impact on practices, identities and values in early years (Bradbury 2013; Bradbury and Roberts-Holmes 2017c). First, there is a requirement that children be assessed at the end of Reception against 17 Early Learning Goals, using a three point scale of 'emerging', 'expected' and 'exceeding', based on teachers' observations and recording of each child's activities and work over the year. This produces a large volume of formal data, as children are assessed against these 17 goals every six weeks in order to demonstrate progress, and informal data in the form of photographs, notes and short assessments. Furthermore, the role of Reception year in providing the first set of statutory data in primary schools' assessment data profiles has brought more attention from school leaders to the early years; research

suggests the EYFS Profile is key in a school's 'Ofsted story', the narrative of progress produced for the purposes of school inspectors (Bradbury and Roberts-Holmes 2017a). This role as a 'baseline' for progress measures was formalised in 2015 when the government introduced a new assessment at the start of the Reception year called Baseline Assessment, which allocated each child a score which could then be compared against their attainment at age 11, in order to judge the school's effectiveness. There were three different providers of the assessment, two of which used a system of assessing one-to-one using a tablet (the other through observation). Baseline assessment was abandoned in 2016 due to problems with the comparability between different assessment providers, but there are plans to reintroduce it in 2020. Some of the research data discussed below is drawn from a project on the introduction of Baseline in 2015.

Finally, in addition to these developments, England will be one of three countries to take part in the OECD's new International Early Learning Study, known as the 'mini-PISA' (DfE 2017a; Moss *et al.* 2016a; Urban and Swadener 2016). This controversial development has further invigorated the debates about assessing young children and the reliability and validity of those data, and adds to the argument made here that children are 'datafied' at very young ages (Lupton and Williamson 2017).

Thus the Reception year is the main focus of this paper and this age group (four-five years) is the locus of many debates about increasingly formal education for young children internationally (Gunnarsdottir 2014; Moss *et al.* 2016b; Smith 2016). This year group was also the focus of a report from Ofsted, the school inspection service, which suggested that Reception classes were too often a 'missed opportunity' and should involve more formal structured learning. This report titled 'Bold Beginnings' focused on examples of 'successful' schools:

> These successful schools made sure that they gave reading, writing and mathematics in their Reception classes sufficient direct teaching time every day […] The headteachers made sure that their curriculum was fit for purpose, so that children were equipped to meet the challenges of Year 1 and beyond. (Ofsted 2017, p. 4)

Recommendations arising from this report include a greater focus on formal direct teaching and that children are taught 'how to sit correctly at a table' (p5). This report was heavily criticised by early years organisations on the grounds that could encourage 'developmentally inappropriate practice' (KEYU 2017) and a narrow focus on literacy and mathematics. The Bold Beginnings report has been seen as aligned to political statements about shifting the Reception part of the EYFS framework to focus more on Literacy and Maths in preparation for the rest of primary school, as indicated in recent plans to:

> improve the Early Years Foundation Stage Profile by: revising the Early Learning Goals to make them clearer and align them more closely with teaching in key stage 1; this will support us to meet our manifesto commitment to strengthen the teaching of literacy and numeracy in the early years. (DfE 2017b)

Thus Reception continues to be a key focus for those who question the formalisation of early years and the narrowing of the curriculum; I consider here how data drives and reinforces this shift. However, it should be noted that alongside this datafication of Reception, settings for younger children both in schools and private nurseries are also subject to the demands of data, as practitioners are required to catalogue children's progress against developmental norms from birth. I consider the ECE in the wider sense in this paper, but with a specific focus on the Reception year.

Theorising Datafication

In line with previous work on data, surveillance and education, I use concepts drawn from the work of Foucault, particularly *disciplinary power* (1977; 1980), and Deleuze, particularly his description of *societies of control* (1995), to conceptualise datafication. It has been argued

that contemporary digital forms of surveillance through data (or 'dataveillance') represent a shift from Foucauldian forms of discipline to Deleuze's more fluid forms of surveillance and control (Lyon 2014). This is a useful distinction between power as exercised within a particular place, and power as operating more flexibly spatially and at different times. For Foucault, the idea of the panopticon provides a metaphor for an all-seeing position which demands that we internalise expectations and can be relied upon to police ourselves, thus disciplinary power is exercised through 'conscious and permanent visibility' (Foucault 1977, p. 201). Foucault describes disciplinary power as operating within particular sites or enclosures, such as the school, prison or hospital; it 'imposes on those whom it subjects a principle of compulsory visibility' (1980). This analysis has been used in relation to how teachers are made visible and expected to 'self-govern' in response to demands (for example, in Ball 2003). The idea of disciplinary power as operating through data – governing what teachers do, how they judge each other and themselves – is an adaptation of Foucault's argument, which takes into account how computing technology has enabled 'a whole variety of new calculable spaces [to be] brought into existence' (Rose 1999, p. 213). As described by Ball:

> Measurement, comparison and examination, numbers of many sorts, are embedded in and serve the techniques to produce domination and responsibilization and construct 'calculating selves' and 'centres of calculation' (Ball 2013, p. 59)

Deleuze argues, in contrast, that control has taken over from discipline as there has been a 'progressive and dispersed installation of a new system of domination' (Deleuze 1995), as power operates beyond and between the institutions. Deleuze's argument is that instead we now experience 'ultrarapid forms of free floating control'; this is represented by a shift 'from targeted scrutiny of "populations" and individuals to mass monitoring'. Through this change, people become 'dividuals' rather than individuals:

> We no longer find ourselves dealing with the mass/individual pair. Individuals have become *"dividuals,"* and masses, samples, data, markets, or *"banks."* (Deleuze 1995 emphasis in original)

This idea is helpful in thinking through how data can reproduce the child as a 'data double', stripped of all complexity, and how this *dividual* can be subject to visibility rather than the person:

> the 'dividual' is fundamental here, in societies of control the individual is doubled as code, as information, or as simulation such that the reference of the panoptic gaze is no longer the body but its double, and indeed this is no longer a matter of looking but rather one of data analysis. (Simon 2005, p. 15)

Thus Deleuze's work allows for further scrutiny of the ways in which digital technology and data collection methods can operate even when there is no 'direct line of sight in the production of panoptic space' (Simon 2005, p. 15). The production of data through assessments conducted on online tablets (as in the case of Baseline and the planned IELS) is an example of this.

However, this does not mean that Foucault's theoretical tools become irrelevant; they can be complementary:

> While discipline stabilizes and objectifies bodies, control modulates them. One way to understand this difference is that control does not act on the body so much as the environment through which the body moves. (Simon 2005, p. 15)

In education we can see how freer flowing forms of surveillance through data collection, described by Bauman and Lyon as 'liquid surveillance' (2013), can be combined with more traditional forms of disciplinary power within classrooms. I would argue therefore that both perspectives are useful here in thinking about the operation of data in ECE.

The 'schoolification' critique

The argument that ECE is undergoing a process of 'schoolification' is based on evidence that settings for pre-school children are adopting practices traditionally associated with primary schools. Moss refers to an 'intensifying relationship' between ECE and compulsory schooling across Europe (Moss 2013), and notes that the OECD have acknowledged the imbalance of power between schools and ECE and the risk that settings 'adopt the content and methods of the primary school' with 'detrimental effects on children's learning' (OECD 2001, 129 cited in Moss 2008, p. 225). Indeed, the OECD's Starting Strong II report is often cited as the origin of the term itself (OECD 2006). This influence from schools, or 'academic shovedown' – a term used in relation to US kindergartens (Goldstein 2007) – is evident 'when free play and learning through play are no longer considered appropriate routes to knowledge' relationships (Gunnarsdottir 2014, p. 246). Rose and Rogers refer to the 'increasing pressure to prepare children for entry to formal schooling emphasising skills in literacy and numeracy' (2012, p. 44). As part of the drive to see early years as the start of 'lifelong learning', the sector is seen as preparation for schooling, and thus takes on the characteristics of more formal education settings. This conception of the aim of ECE as 'school readiness' is linked to human capital theory, and involves 'a particular construction of childhood, one where children are becoming rather than being' (Campbell-Barr and Nygård 2014, p. 355; see also Uprichard 2008).

For the purposes of this paper I regard this term 'schoolification' as referring to several elements of an overall process:

- greater prominence of formal teaching activities (such as children sitting at tables doing adult-directed tasks or sitting on a carpet listening to a teacher);

- a reduction in free play time;

- an increased focus on 'core' subjects of literacy and mathematics;

- and pedagogical practices associated with older age groups such as formal grouping by 'ability'.

These practices are concomitant with a reduction in the value placed on spontaneous play, creativity, and the building of relationships (Gunnarsdottir 2014). I argue here that the process of datafication is interrelated with all of these elements of increased formalisation; data are an enabling technology for schoolification.

The research studies

The research data here are drawn from four projects focused on early years education, conducted in 2008-9, 2013-4, 2015 and 2017. All four projects focused on classroom practices and assessment in ECE. The first project explored how the statutory assessment system, known as the Early Years Foundation Stage Profile, operated in Reception classrooms (age 4-5). Data collection consisted of ethnographic non-participant observation in two Reception classrooms in London over the course of one year, and in depth repeated interviews with teachers at the schools. The second project was an exploratory project focused on assessment policy in early years settings including schools, children centres and nurseries. It involved interviews with teachers, nursery staff and managers. The third project focused on the introduction of a new assessment system to Reception, Baseline Assessment, in 2015. Methods included a nationwide survey of teachers focused on the new assessment, and in-depth interviews with Reception teachers and senior leaders at five case study schools across England. The final project, on the use of grouping by 'ability', conducted in 2017, used similar methods: a nationwide survey and interviews at four case study schools. In addition, four focus groups were conducted with teachers on the subject of grouping. Data drawn from the second, third and fourth projects were collected with a co-researcher, Guy Roberts-Holmes.

All the studies were conducted in line with ethical guidelines of the British Education Research Association and the host university. All names of individuals and schools are pseudonyms.

Interview data and comments from the surveys from these four projects are used in this article to demonstrate the complexity of datafication processes in ECE in England during the last decade. The data presented here are not intended to be used as evidence of a shift over time, but they do represent a broad range of settings over a substantial period and thus indicate how established the discourses of datafication have become in ECE in England.

Findings: Datafication in ECE

School-based settings

Across the four research projects there were clear demonstrations of datafication, as defined as a shift in the practices, values and subjectivities in a setting (Bradbury and Roberts-Holmes 2017c). Beginning with the earliest data, from when teachers used the previous system of assessing children against 117 points on the EYFS Profile, the dominance of numbers in Reception is clear:

> It's really hard because they're asking for a number. [...] You're quantifying something that's not quantifiable. Some of it is quantifiable but for the majority of it, it's not. (Reception Teacher, EYFSP Project)

> There's 117 profile points, you know, and you're supposed to have evidence, three pieces of evidence, for each. There is no way that you can do that. (Reception Teacher, EYFSP Project)

These teachers identified two problems: the difficulty of translating complex information about a child into simple yes/no decisions in order to produce 'a number', and the volume of data required to justify these decisions. These are examples of the practical implications of

what Dahlberg and Moss describe as:

> … a rationality that cannot imagine any other way to justify and evaluate preschools except in terms of their ability to produce pre-specified outcomes and through the application of measurement techniques that are assumed to be objective and universally valid (Dahlberg and Moss 2005, p. 5)

Datafication is based on the principle that objective, valid data can be collected in an educational environment, and that this is a reliable method of assessing 'quality'. This reasoning was clear to one Reception teacher in the EYFSP project:

> It's just government statistics really … you have to quantify something, I mean the way that it works at the moment is, if you're funding stuff and you're giving all these schools money, you need to know, the government need to know that they're getting their money back from it; that they are, the people who you're giving money to are doing their work, so you need a figure, you need a percentage. (Reception Teacher, EYFSP Project)

These comments suggest that Reception classrooms were brought, through the EYFS Profile, into the 'ever-expanding systems of measuring, costing, monitoring and ranking' which 'converts them into manageable and auditable entities' (Shore and Wright 2015, p. 25). Similarly a teacher commented in the more recent Grouping project that assessments in Reception were 'linked to a curriculum that you can measure, therefore you can measure your teachers and link it to performance related pay' (Teacher, FG3, Grouping Project). This shift to an 'auditable entity' has been intensified with the revised version of the EYFS Profile, now 'slimmed down' to 17 statements (Bradbury 2014), and the introduction of Baseline Assessment, as early years results have become an important part of the whole school analysis of data and the school's narrative of progress. One teacher commented:

> You have to track children all the time and I have to add everyone's data at the end of each term to the school tracker. Have they performed appropriately and if not why not and what interventions are going to have go in? Nobody's allowed to fall behind. The

tracking begins from Nursery in the Prime Areas and right through to year 6. If you are exceeding at the end of Reception you have to show that you are exceeding at the end of KS1 and if not then we are not doing our job'. (Deputy Head teacher, Easthorne Primary School, EY Policy Project).

This tracking of children – often using commercial software such as TargetTracker (EESforSchools, nd) or OTrack (OTrack, nd) – begins in early years and continues throughout primary school. However, the early years have an important role in that the data they input form the first judgements on a child, from which progress will be assessed. The Reception classroom becomes one of the 'calculable spaces', subject to the 'principle of compulsory visibility' (Foucault 1980).

Importantly, the data are seen as evidence of 'doing our job'; these teachers' professionalism is tied up in producing the right data. This 'data-driven' teacher subjectivity (Bradbury and Roberts-Holmes 2017c) is formed through pressure on results, training on appropriate 'tracking' and through policies and inspection arrangements which define success as adequate proportions of 'progress' from children.

> We start tracking from nursery … so that's all entered onto the OTrack. […] So we would also use that to see if there's any particular gaps. So if we're looking through and we think, 'Oh actually we don't have very many observations' or ' very few things about this particular area' then we would be able to go 'Okay well that's what we're going to be doing in the next half term is make sure that we're doing…" (Nursery teacher, Moore Primary School, Grouping project)

> The collection and analysing of data is just too overwhelming. It makes you constantly think of how to *improve* it and what to do with this group and how to plug this hole and that one. I fill in trackers frequently and *I feel a personal pressure* to make them progress. (Reception Teacher, Easthorne Primary School, EY Policy Project).

The use of statutory assessment (both the EYFS Profile and Baseline) in ECE in schools demands that data become an important part of teachers' lives and their sense of worth. It

feeds back in their decisions about pedagogy and curriculum, and monitoring the data collected becomes another task, producing data on the data. This is particularly the case where the information accumulated is observation-based and non-numerical, a point even more relevant to ECE settings for younger children in nurseries, as I discuss below.

These data-driven subjectivities are informed by processes of monitoring which elevate the status of data as representations of teacher quality; 'pupil progress meetings' with senior management and 'hit visits' from the local authority focus on children's progress individually and as part of key groups such as 'pupil premium' children (those for whom the school receives additional funding[iii]):

> The other thing we started doing because of the fear of Ofsted, because we're due one soon and we're worried about going back into required improvement, is we've started doing [pupil progress meetings]. We do three pupil progress meetings a year, then we do three midpoint ones in between each of them, where we go back and we reassess any child that wasn't at the right point and any child who is on the pupil premium list. We reassessed them so their data has to go up in between. Then when you come to the pupil progress meeting, it has to have gone up again. The idea almost being that you can double their rate of progress by meeting more often. (Teacher, Focus Group 2, Grouping Project)

> [We] have a hit visit to check on how well the school is doing. Obviously there's agendas to those visits. So we have to look at our groups, we have to look at our PP [pupil premium], our ethnic groups. We have to hit the targets so you're constantly looking at those because you know, I know as EYFS leader, I know my Key Stage 1 leader is the same, we have to feed back to our heads about how well those groups are doing ready for the EYFSP. I have to look at predicted levels of development. (Teacher, Focus Group 4, Grouping Project)

Here we see how data from early years form a key part of the school's presentation to the outside world – to the inspection service Ofsted and to the local authority who monitor standards in the area. As the first quote suggests, these data do not necessarily have to relate to a child's learning, but there is a constant need to show progress between meetings.

Similarly, the second quote shows the pressure to 'hit the targets' and feed back to the headteacher means you are 'constantly looking'. The data have a disciplinary function; the early years teacher as professional is subject to 'permanent visibility' (Foucault 1977, p. 201) through the production of data for statutory assessments.

Settings for younger children

While private and voluntary nursery settings are not subject to a statutory assessment, practitioners are required to track children's progress against the set stages of the government document 'Development Matters'. This tracking involves regularly updating a child's profile, usually in digital form, on a spreadsheet or via tracking software such as Parentzone (Parentzone, nd). This allows for comparison over time and between children, and forms part of the performance management process for nursery staff.

In order to justify the decisions made on these profiles, where children are designated as 'commencing', 'emerging' or 'secure' for statements organised into age bands, practitioners are required to collect evidence of what children can and cannot do. This takes the form of photographs and observations, which are often recorded on a tablet and stored on a child's digital profile. This evidence is linked to colour-coded designations so that the information can be easily cross referenced, and the information is available to parents. Profiles include comments on emotional, social and physical development, and writing and reading skills for older children. As a parent I have received these detailed profiles from my children's nursery; one memorable example was when one of my daughters was designated at 11 months as 'secure' in 'having a can do attitude' (age band 15-20 months); the evidence for this was that she took a bottle of milk from her key worker and held it herself. Although these profiles amass large volumes of detailed data about the child, the need to include these designations means they simultaneously produce a reductive 'data double', an extracted and distilled version of the child, measured against standard criteria and labelled as 'ahead' or

'behind'. Thus datafication is reductive, oversimplifying the complexity of children, reducing them to a 'data double' (Simon 2005) or 'data doppelganger' (Williamson 2014).

At age two, a summary assessment is produced which designates the stages of 'Development Matters' which a child has achieved, and similar summing up reports are passed on to children's first teachers as they make the transition to school at age four-five. Thus the child is already 'datafied' when they arrive at school, designated through data in relation to standardised norms, and this continues as they are measured using Baseline assessment and the EYFS Profile in Reception.

As I have discussed elsewhere (Roberts-Holmes and Bradbury 2016), younger children are similarly judged in order to measure 'progress', and to make predictions. At one state-run ECE centre, a senior leader explained:

> We record how the children enter when they are two, so we have a baseline and then throughout the year we do three assessments with the children at set points and then compare them with each other to check that they are on track are making progress. You have to show that you have made 'value added' by the time they reach end of Reception. The LA [local authority] are using that information to predict how 2 year olds are going to do at the end of FS, KS1, and KS2 [age 5, 7 and 11]. (Senior Leader, Children's Centre, EYFS Policy project)

Thus the child is already tracked, labelled and predictable, from age two onwards. Datafication occurs across ECE settings, both in schools and in the range of pre-school provision found in the ECE market in England. I now turn to how these processes of datafication relate to the schoolification critique.

The relationship between producing data and 'schoolification'

As discussed, the critique that ECE is becoming 'schoolified' is evidenced in a range of changes, which can be summarised as: formalisation of teaching activities; reduction in free play; increased focus on literacy and mathematics; and pedagogical practices used with older

children. I begin by considering the first two of these in relation to increased use of statutory assessment.

Data and pedagogy: reducing free play and relationship-building

One of the clear findings from the third project on Baseline Assessment was that the pressure to collect and record data affected how teachers organised their classrooms. In the case of teachers using the observation-based assessment, the need to see children demonstrating particular skills (such as using number names, or linking sounds to letters) meant that they engaged in more formal activities:

> Rather than go with the children's interests - of what they were interested in – I have geared what I have been setting up in the class to try help me gather information for the purpose of this assessment. (Teacher 3, Cedar Primary School, Baseline project).

> [We] thought that actually we haven't really looked at that [some areas] so we had better do something about that, so we might put out a particular activity to almost cover those points. (Teacher 1, Beech Primary School, Baseline project)

> We assessed usually one activity by activity. So we set up an activity that we knew would fulfil the criteria for certain statements and then watched the children access it and then we just went down [the list of names] and said, yes they can do it. (Teacher 2, Elm Primary School, Baseline project)

> This year it is very much a case of find our way through it I suppose, working out how to change our curriculum to meet the needs of what we need to do for Baseline. […] We are having to do activities to find that information, so that has taken away from being able to get into the areas of provision and work with the children (Teacher 1, Alder Primary School, Baseline project)

These changes to activities are changes in the curriculum in Reception, which in these cases became driven by the need to collect data against the 47 statements on the Baseline Assessment. They also mark a greater formalisation, as children are required to engage with

the task so that the data set is complete. Some of these set up activities might be part of free play, where children circulate and choose what they engage with, but many will require some formal intervention from the teacher. Thus the requirements of data require and demand greater formalisation. This practice was noted in the recent Ofsted report on Reception, which noted 'Many teachers devised tasks simply to tick off elements of the early learning goals so that they could provide evidence of children's achievement' (Ofsted 2017, p. 4).

Similarly, for those teachers using the tablet-based assessments, these necessitated a change to normal practice and a reduced focus on building relationships:

> The reception teacher in our school found it impossible to administer the baseline test and teach a class of new reception children. A supply teacher had to be drafted in so that the tests could be carried out. The result was that our reception teacher was not able to work with her new class in setting expectations for behaviour, rules, routines or getting to know the children. The test caused a lot of disruption to learning and had an negative impact on relationship building. (W, Baseline project)

> Although I agree with baseline in principle, the NFER package prevented us from building relationships with children at a crucial stage. (W, Baseline project)

> It has to be done as early as possible at the crucial time when you should be developing relationships with them not ignoring the majority and looking at a screen 1:1 with 1 child (W, Baseline project)

As suggested in these quotes, the need to produce data was regarded as detrimental to the process of building relationships with children to make them feel secure. This reflects a policy failure to engage with 'the notion of care as a public good' (Urban 2015, p. 297), and a preference for measurement over social and emotional development, seen as symptomatic of 'schoolification'. The tension between data collection and building relationships was a repeated theme in teachers' responses:

> [Baseline Assessment] took me away from getting to actually know the class. We didn't gain anything from it. Some children looked at me and said "I can't read" when asked to read parts of the assessment. It was heartbreaking to see their reaction to it and I spent a lot of time reassuring children. (W, Baseline project)

> You had to set it up so you could actually assess these things which makes it very difficult to make, to start forming a relationship with the children, which is so important at this time of year. (Teacher 2, Cedar Primary School, Baseline Project)

> As a teacher I would rather spend time supporting children settle in properly, talk to them, get to know them as individuals, use my experience to identify needs and interest, not just fill in more forms. (W, Baseline project)

This shift can be conceptualised as a process of *dividuation*, following Deleuze (1995), where children are '*dividuals* rather than individuals; they become data to be mined, aggregated, analysed and acted upon' (Bradbury and Roberts-Holmes 2017c, p. 64). Relevant here is Thompson and Cook's argument, in relation to school teachers, that 'one of the logics of *dividuation* is the end of care for individuals'; instead there is 'a new logic in which care is not registered' (2014, p. 138). This is important in ECE where caring is a fundamental principle in many professionals' practice. Thus datafication produces not only a shift in pedagogy but also in values and priorities, towards those more aligned with the rest of the primary school.

The dominance of Literacy and Maths

The current EYFS curriculum is made up of three prime areas: communication and language, physical development, and personal, social and emotional development (PSED); and four specific areas: literacy, mathematics, understanding the world, and expressive arts and design (DfE 2014a). However, one of the criticisms associated with 'schoolification' is a shift towards focusing on literacy and mathematics, rather than a 'whole child' approach (Moss 2016), as ECE is reconceptualised as preparation for school. I would argue this is further

motivated and enabled by the need to focus on subjects that are easily measured and therefore more productive of data.

The primacy of literacy and mathematics was highlighted in the requirement that providers of Baseline Assessment focus on these two subjects:

> The clear majority of the content domain must […] demonstrate a clear progression towards the key stage 1 national curriculum in English and mathematics. (DfE 2014b, p. 1)

This request was related to the dominance of these two subjects in the later tests with which the Baseline results were to be compared (though the inclusion of the PSED element limited this connection). However it also represents a wider shift away from the broad curriculum of the EYFS in Reception towards a narrow focus on literacy and maths. Teachers commented, in both the Baseline and Grouping projects:

> [Tablet-based test] doesn't take into account anything other than literacy and maths. What happened to "the unique child"? (W, Baseline project)

> [Baseline test] is based purely on literacy and maths, and whilst there were some PSHE[iv] comments, it in no way encompassed the whole child. (W, Baseline project)

> We were told at the beginning of the induction of the Foundation Stage that in the EYFS the whole child is important and every area of the EYFS has the same importance. It no longer has - we group children for "Learning Groups" by the "important" areas (as seen by Primary schools - Number and Phonics!) (W, Grouping project)

> The early years curriculum is narrowing and schools are becoming only interested in literacy and maths. (W, Grouping project)

Furthermore, there was evidence of this shift in relation to younger children in nursery classes in schools, and similar concerns were raised in relation to three-year-olds:

> I am now pushing information into three-year-olds rather than developing meaningful relationships. Even in the nursery I now feel that pressure. If a child doesn't recognize a number or a letter I go "aggghhh' and hold my breath. I have to remind myself the child is three and not yet ready for it. (Teacher, Easthorne Primary School, EY Policy project)

We see here how the pressures of data demand that children are engage with literacy and maths before they are 'ready for it'. I would argue that in early years settings for younger children the practices of collecting data are also linked to pedagogical and curricular shifts which represent schoolification, particularly the tendency to focus on skills in preparation for literacy and maths, and increased use of teacher-lead activities designed to process information for assessments.

This shift demonstrates how datafication and schoolification both reproduce the other – literacy and maths are more easily translated into numbers, while their increased prominence in assessments encourages teachers to spend more time on these 'core' subjects. This produces a narrowing of the curriculum, as noted in the rest of primary education (Wyse and Torrance 2009; Alexander 2009; Wyse and Ferrari 2015).

Data and grouping practices

Finally, one particular practice can be seen as evidence of 'schoolification' – the use of set 'ability' groups in Reception – as this grouping practice increases in prevalence with children's ages (Baines *et al.* 2003; Hallam and Parsons 2013). Grouping practices are controversial (Francis *et al.* 2017) but are increasingly prevalent in younger ages groups (Bradbury and Roberts-Holmes 2017b; Campbell 2014). In the research project on grouping, direct links were made (often unprompted) between data analysis and grouping decisions:

> [The] realities of resource constraints (e.g. Lack of support staff etc), constant fixation on data results and so on, mean that grouping becomes necessary just so that basic teaching can happen. (W, Grouping project)

> [Grouping] has pros and cons but in a data driven world it seems to be becoming the norm. This sadly takes away from child led play time as we are forced into writing and reading constantly rather than appreciating the real heart of EYFS. (W, Grouping project)

The 'data driven' context requires grouping, which is seen as a solution to the problems of producing the right data (see also Bradbury, 2018). Moreover data facilitate the allocation of children to groups by providing evidence of different 'abilities'; for example, in several schools phonics assessments every six weeks were used to determine groups. These differences are solidified and made credible through data, even when there are doubts about the reliability of the information collected. For instance, in the case of Baseline some teachers commented it was used to group children, though there were doubts:

> It helps us group the children in differentiated maths and phonics groups. (W, Baseline project)

> Also there is no time given to these poor little children to settle in before they are assessed and in our school they are put into ability groups based on these results! (W, Baseline project)

Thus data and grouping work together, mutually reinforcing the dual ideas of fixed 'ability' and reliable measurement. In particular grouping was seen as necessary for literacy and maths, reflecting the greater prominence discussed above.

> I feel comfortable grouping for phonics, literacy and maths in my year group (reception) because it enables us to teach the right level which I believe helps the children's progress. (W, Grouping project)

> I think grouping for some EYFS areas of learning, specifically Literacy and Maths can be beneficial as it enables staff to plan and deliver focused adult inputs which are approriate to specific learning and development needs. (W, Grouping project)

The increase in data in Reception facilitates the adoption of grouping practices, and the result is seen to be an improvement in children's results. We see how the discourses of 'ability' and data work together, contributing to increased formalisation.

Discussion

Throughout the paper, I have used research data from four projects to argue that the process of datafication in early childhood education facilitates and accelerates the increasing formalisation of learning with young children, while simultaneously the greater use of formal assessments and set subjects produces yet more data. Datafication and schoolification are two sides of one coin, and dominate notions of 'good practice' and 'quality' in official discourse in England (though they are resisted by teachers and early years professionals).

The close links between the dual processes of datafication and schoolification described here can be understood through a consideration of the underlying discourse which dominates ECE. This is a technical, instrumental discourse of education associated with 'regulatory modernity' where political questions are removed 'to reduce everything to a technical practice of problem-solving and performance' (Moss 2016, p. 12). As in other education sectors, what matters is what can be measured; and in early years if there is nothing that can be measured, practice must change so that scales, statements and norms can be applied. In all of this, we risk 'losing sight of the child' (Campbell-Barr and Nygård 2014); there is little known or understood about how data processes relate to children's rights (Lupton and Williamson 2017). As Clausen et al (2015) argue:

> The pressures of individual child-profiling and external inspection hinder English children's freedom and democratic participation, promoting individualism and 'technical

performance', and restricting the understanding of children's learning. (Clausen *et al.* 2015, p. 366)

These concerns have been raised again in relation to recently announced plans to include English children in the OECD's International Early Learning Study (IELS), known as the 'mini-PISA', in recognition that it mirrors the OECD's PISA assessment at age 15. This development suggests a further shift towards formalisation and the production of data over children's play-based learning (Moss *et al.* 2016a). IELS will bring early years into the 'global measurement industry' (Biesta 2017). It will assess 'social and emotional skills as well as their cognitive abilities' in four 'early learning domains': executive function, i.e. early self-regulation and attention; emergent literacy, language and verbal skills; numeracy and mathematics; and empathy and trust (DfE 2017a, p. 2). Thus the data collected on children will be detailed, personal and will allow for predictions to be made. As with Baseline, the information gathered will form a datafied version of the child, a 'databased self', 'more easily accessible, observable, manageable and predictable than we are' (Simon 2005, p. 16), visible far beyond the classroom in a fashion symptomatic of Deleuze's societies of control (1995).

Furthermore, given that PISA has been seen as the cause of 'a dramatically increased reliance on quantitative measures' with older children (Meyer and Zahedi 2014; also Ozga and Segerholm 2015), it seems likely that the publication of data on five-year-olds as part of IELS will similarly encourage national systems to see young children as measurable subjects – miniature 'centres of calculation' (Ball 2013; Williamson 2014) – to be brought into the regime of accountability. Technology plays an important part in this, as the use of touch-screen tablets with audio instructions supposedly resolves the problems of assessing children who cannot yet read or write; current plans for IELS suggest it will use a tablet, like the latest iteration of Baseline Assessment (DfE 2017a). But there are additional ideological tensions involved in bringing ECE into this system, beyond those identified in the continued debates

about testing as neoliberal forms of accountability in schools. Importantly, the dominance of data in ECE brings with it a reduction in the value placed on care, and on building relationships between child and adult which allow the child to learn. ECE data are not just more data, they are data produced at a human cost.

Conclusion

I have examined here how data are an enabling technology for schoolification in ECE, and a catalyst for this formalisation. Both shifts are driven by a rationality based on measurement and accountability that dominates current notions of worth and value in education. In light of the research evidence presented here and the wider context of the 'mini-PISA', I would argue that broader discussions of data in education need to be cognisant of the volume of data collected on children *before* they begin formal schooling and the extent to which children are unknowingly 'quantified selves' (Lupton 2016) at young ages. Children are already datafied at age four, as huge volumes of information have already been collected on them, forming a 'data double' (Simon 2005) which demarcates them as fitting the norm or deviating from it. Thus I would argue that the wider concerns about data in schools – the loss of complexity, issues of reliability, the impact on pedagogy – must take into account what has already happened in early childhood education.

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[i] Confusingly, the term 'nursery' is used for private pre-school settings attended by children from birth-four, and also for the group of children attending schools before it is compulsory (aged 3-4). Some but not all schools have Nursery classes as well as Reception (age 4-5), and these form the 'early years' part of primary schools.

[ii] The subject of English, encompassing reading, writing and speaking and listening skills, is known as Literacy in primary schools in England.

[iii] Additional Pupil Premium funding is allocated to schools for each child who has been in receipt of free school meals (due to their family receiving certain state benefits) at any point in the last six years (£1,320 per child in 2017-18), or who is or has been in local authority care (£1,900 per child).

[iv] Personal, social and health education, which is a subject taught in primary schools.