DATA USE PRACTICES IN ENGLISH SECONDARY SCHOOLS

ELISHA OSIO OMOSO

PhD STUDENT

FACULTY OF EDUCATION

EDGE HILL UNIVERSITY

JULY 2019

A Thesis submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in education of Edge Hill University, England.

July 2019

ABSTRACT

English schools work under complex New Public Management (NPM) environment, in which teachers are required to collect and use volumes of data for many reasons especially for accountability. Data is thus likely to control the 'life' of English schools with arguments for and against its use. This qualitative case study explored in-depth, how teachers interpret and use data within five English secondary schools.

Data was collected via interviews, school documents and questionnaires. Qualitative data was coded into themes in 'NVivo' program in line with the research questions and the conceptual framework of the study. Questionnaire data was analysed descriptively in SPSS program and triangulated with qualitative data for confirmability. For internal and external validity, tables of specific case and cross-case analyses were constructed.

The results show four new findings. That is, (1) pastoral data is not a stand-alone data (2) schools do not partner with each other around data use (3) state schools are more constrained in data use than the independent school and (4) data collection and access are hierarchical. Other findings are that English schools collect large amounts of data with most pupil-related data being quantitative to allow ranking and comparison of students' academic and non-academic performance. Teachers also seem to be shifting focus from teaching to data collection and that data collection serves as a form of surveillance where teachers use data to set targets for pupils, monitor and report academic progress to school leaders and parents. Also, there is superficiality in data collection, interpretation and use. For example, teachers use data to determine which pupils should have certain resources as interventions, but the study did not find compelling evidence that teachers use data to improve their teaching methods or to evaluate what they do. Finally, data use in the schools spread through hierarchies from the government to school leaders, middle leaders and class teachers then all the way up again with teachers responding positively and negatively to data use. In terms of support, schools mostly support access and internal collaboration around data. Performativity, as discussed for example by Stephen Ball, has been used to interpret these findings.

Key words: *Data, data interpretation, data use, data support, performativity*

ACKNOWLEDGEMENTS

Studying for a Ph.D. necessitates lengthy study and extreme intellectual effort. It is a tall mountain that takes tremendous perseverance to climb. The completion of this thesis is the product of dedication of many years of hard work. Even so, it would not have been possible without the support of many individuals and institutions. It is my pleasure to hereby express my gratitude to them all.

I want to express deep appreciation to my Director of Studies Prof. Tim Cain who provided me with constant encouragement, guidance and support, without which this research could neither have been started nor accomplished. I also owe deep gratitude to other members of my supervisory team, Prof. John Diamond and Dr. Phil Rigby, whose patience, constructive suggestions, critical questions and discussions assisted me in developing a deeper understanding of the subject of study. They all made available their unrelenting support in many ways.

My colleagues at the Faculty of Education also contributed vastly to my personal and professional development at Edge Hill University. Their conversations and views, both formal and informal boosted me during this journey of perpetual challenges. To this end the head of research at the faculty, Prof. Vini Lander deserves special mention for her support and inspiration, particularly at the start of the programme. I also thank Julie Kirby for her willingness to provide administrative support whenever it was required. Many thanks for the arrangements they made to make Ormskirk a home for me in England. I am also very thankful to Edge Hill University who provided funding for my studies under the Graduate Teaching Assistant (GTA) Scheme within the Faculty of Education.

My sincere gratitude goes to the head teachers and teachers at various secondary schools in England that were involved in the study for their valuable support and devotion during the data collection exercise. I also acknowledge the scholars of Rongo University in Kenya, for encouraging me to pursue this PhD in the United Kingdom. Prof. Samuel Gudu, Prof. Stanley Shitote and Prof. Hezborn Kodero deserve special mention for their input and encouragement in this regard.

Finally, I appreciate my friends at home for emotional support and valuable contributions which assisted me in various ways. In this regard, I am indebted to Dr. Emmauel Midheme, Dr. Micheal Oloko all my family members-far too many to mention by names for their support, encouragement, prayers and advice during my PhD journey. I cherish their prayers, love and support in many ways.

ABBREVIATIONS AND ACRONYMS

BERA	British Educational Research Association
CTs	Class Teachers
CVA	Context Value Added
DBS	Disclosure and Barring Services
DEs	Data Experts
DfE	Department for Education
DMs	Data Managers
EYFS	Early Years Foundation Stage
GCSE	General Certificate of Secondary Education
ISI	Independent Schools Inspectorate
LTs	League Tables
MLs	Middle Leaders
NCLB	No Child Left Behind
NEET	Not in Education Employment or Training
OECD	Organisation for Economic Cooperation and Development
OfSted	Office of Standards in Education
PANDA	Performance And Assessment
PAT	Pupil Achievement Tracker
PISA	Program for International Student Assessment
RAISE Online	Reporting and Analysis for Improvement through Self Evaluation
SATs	Standards Assessment Tests
SLs	School Leaders (i.e. head teachers and their deputies)
TIMSS	Trends in International Mathematics and Science Studies
USA	United States of America
VA	Value Added

LIST OF TABLES AND FIGURES

Tables

Figures

CONTENTS

CHAPTER 1: INTRODUCTION AND BACKGROUND OF THE STUDY

This chapter presents the study background and rationale based on literature. It discusses the merits and demerits of data-use in schools both in the global and in the English education context leading to statement of the research problem and question.

1. 0 INTRODUCTION AND RATIONALE

Accountability and data use are at the centre of contemporary school reform efforts worldwide. This may be attributed to the growth of the New Public Management (NPM) in state institutions from 1970s onwards (Osborne, 2007). NPM applies private sectors' management approaches in the management of public institutions (see section 2.1.1.1). It explains the growth of data use, organisational change and reform. The last two decades, for example, have seen intense pressure on schools and teachers to account for the resources invested and the education provided, mainly in the form of data. This NPM environment is characterised by public accountability (e.g., inspections) and performative policies such as targets, which try to regulate, judge and compare schools and teachers using data (Ball, 2003; 2015; Perryman, 2006).

Consequently, data use in schools has become a global phenomenon. There are numerous examples of data use studies touching on this phenomenon around the world. These include, data use in England (Downey & Kelly, 2013; Wrigley & Wormwell, 2016); in the USA (Marsh et al., 2016; Wayman et al., 2017); in The Netherlands (Schildkamp & Kuiper, 2010); in Norway (Mausethagen et al., 2018; Werler & Faerevaag, 2017). Similar studies have also been done in New Zealand (Lai et al., 2009); in Canada (Dunn et al., 2013); in Belgium (Vanhoof et al., 2013); in Ghana (Azigwe et al., 2016); and in South Africa (Archer et al., 2013). Therefore, data use in schools has received attention worldwide partly due to, accountability demands, and partly due to recent research evidence linking data-use to increased students' academic achievement (see for example, Campbell &Levin, 2009; Carlson et al., 2011; Lai, et al., 2009). Policy makers and researchers thus increasingly emphasise the need for teachers to base their decisions on data.

Although data use is promoted widely, studies suggest that data-use is still limited in many schools. Besides, it is contested, and teachers struggle with its implementation (Ball, 2003; Ingram et al., 2004; Schildkamp & Kuiper, 2010; Stringfield et al., 2008). This study thus seeks to explore how some

English secondary school teachers and school leaders interpret and use data. The term school leaders (SLs) as used in this study refers to headteachers, their deputies and data managers (DMs) whereas the term teachers refer to middle leaders (MLs) and class teacher (CTs) unless specified.

'Data' can mean different things to different people in different settings. Scholars studying data use in education also define data differently. Some use narrow definitions while others use broad ones. For instance, Davenport and Prusak (1998), and more recently Werler & Faerevaag (2017) use narrow definitions of data to mean only the quantifiable assessment data from standardised tests. This view is reinforced by some policymakers and researchers who focus only on standardised test results as the primary source of data about schools and disregard other forms of data, such as those on the quality of instruction.

On the other hand, some studies broadly define data to mean all qualitative and quantitative data collected that represent some aspect of schools on which to base decisions (Coburn & Turner 2012; Schildkamp et al., 2012; Schildkamp & Kuiper, 2010). Coburn and Turner (2012), for example, view data use not only in terms of how people engage with standardised tests scores but also how people attend to measures of social and organisational conditions, including information they gather through experience. This means that schools have access to multiple data sources, not just quantitative. The data sources include: input (e.g., student demographics), process (e.g., data on the quality of instruction), output (e.g., test scores) and context data such as teacher surveys (Ikemoto & Marsh, 2007; Schildkamp, et al., 2012). It is this broader definition of data that this study adopts. The broader definition is chosen because data interpretation and use processes can be complex, and sometimes practitioners need to use multiple sources of qualitative and quantitative evidence to reach justifiable conclusions and decisions. Data use in this study refers to the purposeful utilisation of information generated from data to inform student and school improvement actions, for example, using school inspection reports to enact student safety measures in schools.

From the literature, policymakers and researchers consider data use as a compelling force for improving schools and student achievement. Earl & Katz (2006), for instance, argue that data use for school improvement is no longer a choice; it is 'a must'. Research evidence also suggests that data can be a powerful tool for strengthening school-wide improvement (Campbell & Levin, 2009; Carlson et al., 2011; McNaughton et al., 2009).

Several studies highlight the benefits of using data in schools. For example, Honig and Coburn (2008) argue that data can depoliticise decisions thus enabling practitioners to focus on teaching and learning. However, recent studies (Ball, 2015; Perryman et al., 2011; Robert-Holmes & Bradbury, 2016) show that data can politicise practices in schools (e.g., when data is used to control and judge teachers). Nevertheless, armed with data, teachers might be able to identify problems that may be affecting teaching and learning, interrogate learner-targets, and monitor progress (Earl & Katz, 2006; Schildkamp et al., 2014; Robert-Holmes & Bradbury, 2016). Teachers can also modify teaching using data, for example, identifying which topics need re-teaching (Coburn & Turner, 2008; Wayman & Jimerson, 2014; Young, 2006). Data can also be used to meet accountability demands, to defend decisions, and to identify areas for professional development (Coburn & Talbert, 2006; Diamond & Spillane, 2004). Additionally, data can give the benefit of helping teachers to identify priority areas to channel school resources and to support planning and policy development. Furthermore, data can support conversations and reflections with stakeholders of a school, for instance, on teaching and learning (Breiter & Light, 2006; Coburn & Talbert, 2006). Students and staff can also be motivated by favourable data outcomes (Diamond & Spillane, 2004). Despite these benefits, data use in schools seems complex, contested and context-dependent. This is so for several reasons.

First, like other organisations, schools struggle to survive in their ever-changing economic, social, political and global environment. Communities, students and parents served by schools are also becoming more diverse and mobile. In such a rapidly changing environment, there is little opportunity to adapt by trial and error. Teachers have to monitor changes in lessons they teach, in the character development of learners and general academic progress using data and to respond accordingly. Thus, studies recommend that teachers routinely collect, analyse, interpret and use data to respond to changes, target school improvement plans, decisions, and actions (Goren, 2012; Schildkamp & Kuiper, 2010).

Second, the lives of many students are greatly affected by teacher decisions. Earl and Katz (2006) warn that when policymakers and teachers either ignore data or rely upon inadequate data, they run the risk of making poor decisions. Without data, teachers' decisions are built on individual perceptions, opinions and limited observations. Valuable time, energy and resources might then be lost implementing measures that 'mismatch' students' needs (Honig & Coburn, 2008). Teachers, for example, need to understand their students' needs and use data from the school to service those needs. The fact that data collected can be statistically analysed with valid and reliable instruments

means that decisions derived from the data may be valuable and utilised to increase impact on issues identified.

Last, although teachers cannot 'escape' data in the current NPM environments, data use, is for them challenging and contested. Many teachers, for example, appear underprepared to use data due to data illiteracy, inadequate support and inadequate time to use data (Schildkamp & Kuiper, 2010). It seems that assembling good data, conducting analysis, interpretation and taking data-based actions can be complex, and goes beyond the training of most teachers. Moreover, teachers are not expected to be data experts given the teaching demands on their time.

Another challenge is that some teachers find themselves in the 'data dilemma' due to negative attitudes generated by accountability demands (Ball & Olmedo, 2013; Ingram et al., 2004; Werler & Faerevaag, 2017). Consequently, many teachers mistrust and 'fear' data; particularly when data is used to impose the terrors of performativity (Ball, 2003), or to control, remunerate, punish and add workload rather than to support pedagogy (Robert-Holmes & Bradbury, 2016).

With the above challenges, it becomes easier to understand why data use still is complex and contested in many schools (Ball, 2003; Ingram et al., 2004; Schildkamp & Kuiper, 2010). Several studies, therefore, emphasise the need to understand how data is interpreted, used, and supported in the different accountability contexts (Coburn & Turner, 2012; Goren, 2012; Levin & Datnow, 2012). This study focuses on the English context. This is because in England, data shapes school improvement conversations (Robert-Holmes & Bradburry, 2016), is politically charged (Ball, 2003; Perryman et al., 2011), and shapes what people think about schools, teachers and pupils (Ball, 2013).

Moreover, the available evidence suggest that the English schools are data-rich (Schildkamp et al., 2014). The schools' sector may be collecting volumes of complex data sets probably more than any other jurisdiction in the world (Earl & Fullan, 2003). Teachers can use the data to inform their practices. But data use in English schools also appears complex and contested with arguments for, and against its use (Ball, 2003; Bradbury, 2014; Robert-Holmes & Bradbury, 2016). For example, data use in the English schools is seen in some quarters as a tool for school improvement (Schildkamp et al., 2014), and as a tool for controlling teachers in other quarters (Ball, 2003: 2015; Perryman, 2006).

Yet, within that data use complexity, little is known about how English secondary school teachers interpret and use data. This study tries to bridge that gap. To achieve this, it is necessary to first give a brief overview of the study context to enable us to understand the environment under which the English schools work. This is because data use does not occur in a vacuum. It occurs in a context affected by policies, institutions and people. The following section therefore focuses on the types of secondary schools in England and some data use practices they may engage in.

1.1 THE STUDY CONTEXT AND PROBLEM

1.1.2. The schooling landscape in England

Neoliberal forces have created school-markets in England characterised by a fragmented education landscape of high-stakes accountability (Courtney, 2014; DfE, 2010). The fragmentation culminates into different varieties of secondary schools. The stated reason for having different varieties of schools in England is to provide parents with greater choice and to force improvement from underperforming schools (Davids, 1993). The different varieties of secondary schools incidentally offer parental choice based on data. The main varieties of schools in England are highlighted in the next paragraph. The schools selected for this study have a little more detail provided as specific contextual information in the results chapter.

There are two broad categories of schools in England: state schools and independent schools also known as private schools. The state schools are state-funded whereas independent schools are funded by fees they charge parents (Long, 2018). Most state schools in England follow the National Curriculum whereas independent schools do not have to although they are expected to have a comprehensive curriculum appropriate to the ages of the children being taught (Long, 2018). State schools and independent schools are inspected but by different agencies as discussed in the section on inspections.

State schools in England include local authority schools, community schools, academies and free schools. Local authority and community schools are those that fall under the jurisdiction of local authorities (DfE, 2010). They are regulated by their respective local authorities which control their budgets, coordinate admissions, employ their staff and own the schools' estate.

There are also academies introduced by the Labour government in the year 2000 (West & Bailey, 2013). Academies are regulated by the central government. They may or may not follow the National Curriculum and may set their own term dates. England has two types of academies: converter academies and new schools. Converter academies are underperforming schools (based on student outcome data) which are rebranded into academies to attract new students and parents. In contrast, new schools are high-performing schools which choose to become academies. There are also Multi-Academy Trusts which are groups of independent academies run by private companies but state-funded under legally binding contracts (West & Bailey, 2013). Academies are autonomous from local authority control and are intended to promote innovation as well as raise student achievement and school standards through 'good' General Certificate of Secondary Education (GCSE) data.

England also has free schools which are state-funded but started by individuals, universities, charities, teachers, parents or faith groups who feel the need to have a school in a particular area (DfE, 2010). Free schools may be regulated by central government, parents or a community and have more control over how they do things than academies and local authority schools. For example, they set their own pay, conditions for staff and term dates.

In addition to the above categorisation, English secondary schools can further be classified into small, medium or large-sized schools based on student population. Small-sized schools have below 500 students; medium-sized have 500 to 1499 students; and big schools have above 1500 students (DfE, 2010). Large-sized schools might generate more data from their diverse student population as compared to small-sized schools.

The fragmentation of the system is meant to encourage competition and choice. Data is central in this fragmentation as it allows comparisons to be made leading to competition and choice. Therefore, all the above types of schools are potentially 'data-rich' (Earl & Fullan, 2003; Schildkamp et al., 2014). For example, they might focus on generating and using data to monitor, measure and compare performance (i.e., performativity). According to Lyotard (1984) and more recently Ball (2017), performativity emphasises performance outcomes from individuals or institutions. Ball (2003) argues that for individuals, performativity is about what they do rather than what they are. In this regard, the continued infiltration of performativity into learning institutions is well documented. Ball (2016), for example, underlines the subtleness of performative reforms in learning institutions suggesting that we do not engage with them as grand strategies. Rather, we engage in them as

mundane incremental changes in everyday activities that are embedded in new vocabularies of practice and new forms of accountability. Also, we engage in them as new roles with new titles, in the data that we collect and use, in our relationships, in annual reviews, in evaluation practices, and in the output indicators we produce. Some of these are already evident in English schools with the government and schools increasingly emphasising on pupils' and teachers' performance (Ball, 2003: 2017; Cain & Harris, 2013; Courtney, 2014; Perryman, 2006; Perryman et al., 2011; Troman et al., 2007). A performative context of this nature can influence the kind of data schools collect and use as explained below.

1.1.3 Performative data use practices in English schools

Different policy levels promote a culture of 'datafication' in English schools. 'Datafication' according to Robert-Holmes and Bradbury (2016), is the massive collection of a wide variety of data in schools. Currently, policies on the data collected in English schools may be influenced by three policy levels: international, national and school levels. The levels may influence each other. At the international level, for example, the data used to compare student performance from different countries such as Program for International Student Assessment (PISA), and Trends in International Mathematics and Science Studies (TIMSS) enable comparison of national education systems. In England, this might have influenced the comparison of schools' and students' performance in the league tables and a focus on certain subjects perceived as important (see the next chapter in the section using data for 'evaluating performance and personnel decisions'). Data on Maths, for instance, is emphasised at school levels in the same manner it is emphasised by PISA (Perryman et al., 2011).

Datafication is also perpetuated by the increased focus on students' progress and attainment which is emphasised by Ofsted and schools (Perryman, 2006). This is believed to have changed the behaviour of schools and teachers in terms of accountability. For instance, it has activated competition, judgment, control and surveillance of schools to track and improve student achievement (Ball, 2003; Courtney, 2014; Perryman et al., 2011). Such behaviour changes can cause unintended data use consequences such as focus on measurable outcomes and fabrications of data to show schools in the best possible light especially when school and student performance is tied to rewards and sanctions (Ball, 2003; Courtney, 2014).

Consequently, English schools may generate sophisticated data sets to show accountability and compliance. Teachers may engage in continuous tracking of students' progress to check gains or losses in 'performance' (Perryman et al., 2011; Schildkamp et al., 2014). This urge to improve through standardised testing and tracking of pupils' attainment and progress has been reported in the English early years' education (Bradbury, 2014; Robert-Holmes & Bradbury, 2016; Wrigley & Wormwell, 2016). According to Courtney (2014) and Ball (2015), the relentless tracking of pupil performance adds pressure on teachers to collect more and more data as evidence of their work and for showing their improvement trajectory. Ball and Olmedo (2013) note that unending urge to improve 'performance' through progress tracking is the engine of hyper-accountability and performativity. Such hyper-accountability environment might explain the existence of many data sets in English schools (Bradbury, 2014; Schildkamp et al., 2014).

High-stakes performance and accountability policies at the national level also contribute to the comparison of schools in league tables (Courtney, 2014). Possibly in response, some secondary schools in England began using more of progress and attainment data generated from external sources such as Family Fisher Trust (FFT), Pupil Achievement Tracker (PAT)and the web-based Reporting and Analysis for Improvement through Self-Evaluation (RAISE-online) to track students' progress. Although schools are ranked based on pupil attainment data, Downey and Kelly (2013) reported that English teachers strongly preferred that the data be used to track pupil progress and not to rank schools. Possibly, the teachers know that ranking of schools ignores the unique contexts where the data for comparisons is generated. Courtney (2014) attributed the phenomenon partly to the Ofsted inspection framework which judges schools and teachers based on pupil progress. Possibly, without tracking pupils' progress, teachers may lack a standardised way to measure the progress as part of accountability (Perryman et al., 2011). Therefore, English teachers may prioritise the areas that are judged over those that are not explicitly judged by Ofsted. This may lead to 'panoptic performativity' where teachers do things simply to please and escape surveillance from inspectors (Perryman, 2006). I will revisit 'performativity and its criticism' in the literature review chapter.

1.1.3 Inspections

Inspection regimes also increase data use in English schools (Courtney, 2014; Perryman, 2006). State schools in England are inspected by the Office of Standards in Education (Ofsted) while the

independent schools are inspected by the Independent Schools Inspectorate (ISI) (www.isi.net). Unlike Ofsted, ISI is not an arm of the government but a body whose inspection framework is heavily influenced by the government (www.isi.net). This is because ISI is monitored by the Department for Education (DfE) and reports annually to the secretary of state against all the important accountability controls. Independent schools are inspected every three years although the DfE may order inspections whenever it has concerns about a given school. Both Ofsted's and ISI's inspections focus on schools' compliance with quality and welfare of students (www.isi.net). They inspect school documentation and conduct interviews with staff and students to ascertain the quality of provision and compliance by schools under their mandate. In the context of performativity, ISI uses descriptors such as 'excellent', 'good', 'sound' or 'unsatisfactory' to judge school quality (www.isi.net).

Thus, it is reasonable to argue that school inspection framework influences the kind of data the English schools emphasise. As Courtney (2014) points out, Ofsted manages and regulates schools via surveillance and regular inspection visits to modify teachers' behaviour towards record keeping and performance culture. For example, teachers may collect and use lesson observation data if Ofsted inspection emphasises it. School leaders are also under obligation to ensure that their schools comply with inspectors' data use requirements (Robert, 2005).

At the time of writing, a new Ofsted inspection framework was being planned. The available framework, however, judges schools on four items: attainment and progress; quality of teaching; behaviour and safety; and leadership and management (Courtney, 2014). Inspection reports are published on Ofsted's portal, thus, generating more data at school levels. A few observations can be made about the judgement criteria employed. First, the judgment policy on attainment and progress might generate progress, attainment and assessment data by schools. Progress monitoring may also lead to Value Added (VA) and Context Value Added (CVA) data produced by external sources such as the Family Fisher Trust (FFT). VA measures progress by comparing individual student's outcome deviations from prior attainments, while CVA data is computed to account for a school's contextual challenges in producing certain results (Courtney, 2014). Second, the judgment policy on the quality of teaching may produce lesson observations, lesson plans and class management data (Courtney, 2014; Schildkamp et al., 2014). Third, the judgment policy on behaviour and safety might lead to data on pupil behaviour and safety (e.g., data on students-related accidents and teachers' response to accidents). Last, the judgment policy on leadership and management might lead to data on self-evaluation, student demographics, teacher performance, staff attendance, school policy plans,

exclusion rates, self-evaluation data and pupil surveys meant to gauge feelings and opinions of pupils in school (Schildkamp et al., 2014).

After inspection, Ofsted rates schools as outstanding, good, requires improvement, or inadequate (Courtney, 2014), which again, reduces a complex phenomenon into a simplistic rating. Although not explicit, the rating is largely influenced by the national and school-level data such as the General Certificate of Secondary Education (GCSE) and student assessment data (Downey & Kelly, 2013). The frequency of inspection depends on the rating. A school rated as 'outstanding' may have reduced inspections in subsequent years compared to one with an 'inadequate' rating (Courtney, 2014). This suggests that most inspection visits try to confirm whether the practices in a school aligns with the data it generates in terms of student achievement.

1.1.4 Data use studies in English schools

Studies on data use in English schools already exist in this era of high-stakes public accountability (also known as NPM). Such studies focus on all levels of education, for example, in early years schooling (Bradbury, 2014; Robert-Holmes & Bradbury, 2016; Wrigley & Wormwell, 2016); in primary schools (e.g., Troman et al., 2007); and in secondary schools (e.g., Downey & Kelly, 2013; Perryman et al., 2011; Schildkamp et al., 2014). Other related studies focus on policy influences on data use in schools (Ball, 2003; Ball & Olmedo, 2013; Courtney, 2014; West et al., 2011). The studies, however, differ in their aims, research questions and methods. For instance, the studies conducted in English secondary schools such as Downey and Kelly's (2013) is largely a survey investigating teacher attitudes for the use of pupil progress and attainment data in the top-ranking schools in the League Tables. On the other hand, Schildkamp et al. (2014) is a qualitative study investigating the data available, the purposes and the enablers and barriers to data use in four 'best case' secondary schools in Ofsted ranking. Another qualitative study (Perryman et al., 2011) investigated how four English secondary schools respond to enact policies in the English and Maths departments where data outcomes in these two subjects are reported in the annual performance tables. Overall, these studies investigated teachers' attitudes to pupil progress and achievement data, the data available, the purposes for data use in schools and, the pressure some English teachers undergo due to policy focus on Maths and English subjects.

A further review of the literature shows that although English schools are 'data-rich (Earl & Fullan, 2003), and that accountability policies (e.g., inspections) orient schools to use more data (Ball, 2017), the available studies lack detail about how data is interpreted and used within English schools. This study tries to bridge that gap. It explores in-depth, how data is interpreted and used within some English secondary schools. In this era of NPM characterised by data-based accountability and sanctions in English schools (West et al., 2011), it is necessary to gain an in-depth understanding of how data is interpreted and used within English schools.

1.2. PROBLEM STATEMENT

NPM reforms in education require that teachers use data to improve schools and student achievement (Ball, 2003:2015; Robert-Holmes & Bradbury, 2016). However, data use in schools is surrounded by challenges, controversies, complexities and contestations particularly when data is used to control, terrorise, judge and compare schools and teachers in relation to accountability (Ball, 2003; Ball & Olmedo, 2013; Bradbury, 2014; West et al., 2011). Numerous studies show that many teachers struggle with data use in schools (Ingram, et al., 2004; Schildkamp et al., 2014; Stringfield et al., 2008). They were found basing decisions on intuition, experience, limited observations and authority rather than data (Ingram, et al., 2004; Schildkamp & Kuiper, 2010). Consequently, resources might be wasted on teacher decisions that mismatch student needs (Honig & Coburn, 2008). Little (2007) also observes that what teachers do with data remains opaque and without understanding how teachers interpret and use data we will remain in the dark about data use practices in schools. Studies thus advocate the need to understand how teachers interpret and use data in different accountability contexts (Goren, 2012; Schildkamp & Kuiper, 2010).

Data use in English schools is complex and contested. It is complex in the sense that England has a fragmented education landscape where volumes of sophisticated data sets are collected probably more than any other jurisdiction in the world with perceived arguments for, and against data use (Ball, 2003; 2015; Bradbury, 2014; Robert-Holmes & Bradbury, 2016). Data use in England is also contested because teachers and policymakers might not only use the data to improve schools and student achievement but also misuse and abuse it leading to unintended consequences such as increased workload on teachers. Explanations about misuse and abuse of data are discussed in the literature review chapter (section 2.5.2). Amidst the data use complexity and contestations, the

available studies lack detail about how data is interpreted and used within English schools. This study attempts to bridge that gap.

1.3. RESEARCH AIM AND QUESTIONS

The main aim of this study is to make an in-depth exploration of data use practices by teachers and school leaders in English secondary schools. To achieve this aim, the main research question is formulated as:

How do teachers and school leaders interpret and use data in English secondary schools?

To help answer the main research question, the study will seek answers to the specific research questions:

1. What data is collected by the secondary school English teachers and who accesses it?
2. How do teachers and school leaders interpret data?
3. How is data used by teachers and school leaders?
4. How do school leaders support the use of data in the schools?

1.4. SIGNIFICANCE OF THE STUDY

The study's findings are likely to inform both research and practice in at least three ways. First, the findings may offer insights to researchers about how teachers interpret and use data within high-stakes accountability contexts such as England. Researchers may also use the conceptual framework from the study, to inform future research on the issue. Second, the findings may serve as lessons to educational researchers and practitioners to critically reflect on their roles towards helping schools and teachers make better use of data. By understanding how teachers interpret and use data, researchers might be able to institute relevant data use interventions to support teachers. Last, some findings from the study may serve as lessons for practitioners to emulate in their practices for student and school improvement.

CHAPTER 2: LITERATURE REVIEW

This chapter presents a review of the available literature around the specific research questions. Thus, it describes the actors (external and internal), and school system levels influencing data and data use. The chapter also reviews data interpretation, data use and argument against data use at the global stage and in England including neoliberal performativity as a framework for discussing the study findings. The chapter ends by discussing data use support in schools and presents the study's conceptual framework which arises from the literature.

2.1. ACTORS AND SCHOOL SYSTEM LEVELS INFLUENCING DATA USE

2.1.1. External actors

Data use is a system issue implicating schools, local and national education offices in a complex way. As I already hinted in the previous chapter, external actors (i.e. policy makers, inspectors, researchers and parents) influence the data types collected, data access, and how data is interpreted and used by teachers (Schildkamp et al., 2012; Perryman, 2006; Werler & Faerevaag, 2017). Each external actor, however, has different degree of influence on data use practices. Policymakers and inspectors, for example, have more influence on data use practices in schools than researchers and parents. Studies (Courtney, 2014; Wrigley & Wormwell, 2016; Werler & Faerevaag, 2017), for instance, show that policies of accountability influence the kind of data schools collect. Although policies can help professionalise and support teachers' work, it can also hinder it. For example, policies which emphasise on public accountability and sanctions (West et al., 2011) can steer teachers' focus away from child-centred pedagogy to practice to performances (Ball, 2017; Robert-Holmes & Bradbury, 2016). Also, it limits network accountability that involves collaboration with others (West et al., 2011) and in a culture of performativity, hinders reflective approaches to educational practice (Cain & Harris, 2013).

Having described inspections in the previous chapter as an influencing factor to data use practices in schools, it is necessary to highlight the changes in the English education policy which may influence teachers' data use practices. This might enable an understanding of why the current English teachers might use data in different ways than previously. I will therefore, review the policies (from 1976 to date) because 1976 onwards marked the beginning of NPM and performative practices in the English

education system. My review will focus on the reforms which emphasised performative datafication practices.

2.1.1.1 Education policy reforms in England

The use of data in public institutions started with the growth and spread of NPM (see Diefenbach, 2009; Dunleavy et al., 2005; Hood, 2012; Osborne, 2007; Volacu, 2018). NPM thus, is the starting point for public accountability and performative practices in public sector institutions. It spread in the 1970s and 80s in the western nations such as England, asserting superiority of private sector management techniques over those of public administration with the belief that such techniques would bring effectiveness and efficiency in public service (Osborne, 2007). The logic of NPM is to make public services such as education, health, security and justice systems more business-like and market-oriented (Dunleavy et al., 2005). Performance, targets, competition, cost-saving contracts, efficiency, audit-oriented and entrepreneurial leadership in public institutions are the key elements of NPM (Osborne, 2007; Volacu, 2018). Other elements are disaggregation (e.g., use of league table to rank and compare), competition to permit user choice and incentivisation such as performance pay, all of which are based on data outcomes (Dunleavy et al., 2005). Hood (2012) calls it, 'public management by numbers as a performance-enhancing drug' (p. s85). Clearly, the application of NPM techniques led to certain kinds of performances and data collection that were seen as a necessary way of shaping and directing public management in many countries including England.

Slowly, NPM transformed English schools into a target-based system. This was achieved through public sector policy reforms conducted by successive governments from 1976 to date (Ball, 2017; Tomlinson, 2001). I categorise these successive policy reforms into five broad themes: relative autonomy, parentocracy, performativity, global competitiveness, and meritocracy.

2.1.1.1.1 Relative Autonomy (1976- 1979)

Before 1976 was a period of relative autonomy in the English schools. In this period, teachers were responsible to themselves through peer-reviews and reflections. As indicated by Gleeson and Gunter (2001), schools and teachers gathered evidence of performance informally and had a commitment to professional ethics. However, withdrawal of teacher autonomy began after the Prime Minister, James Callaghan 1976 speech at Ruskin College (Ball, 2017). Callaghan referred to the school curriculum as

a ‘secret garden’ where the goals of education from early childhood to university was to prepare students for the society and work (Ball, 2017). The speech marked the turning point in English education in terms of priorities of focus such as core-curriculum, basic knowledge and national standards. The speech also opened teaching to scrutiny by external agents including politicians and parents. Callaghan’s speech fore-shadowed Thatcher’s reforms from 1979 which were primarily framed from a neoliberal-performative stance (Ball, 2017; Chitty, 2014).

2.1.1.1.2 ‘Parentocracy’ (1979- 1997)

During this period, the English school system became increasingly neoliberal (Ball, 2017). This was a response to a perceived falling of standards in education by the conservative government under Margret Thatcher. Like businesses, schools were made to compete in this period through league tables and inspections with the intent to raise standards and enable parents see the standards of each school and so, make choices over where to take children (Davids, 1993; Wilkins, 2011). Davids (1993) calls this parent-dominated education as ‘parentocracy’ (i.e., the rule by parents). Whether parents were best placed to make decisions about policy and practice is unclear. Nevertheless, parentocracy seemed like a reaction to the relative autonomy of schools, experienced previously. Activation of high-stakes competition among schools enabled realisation of ‘parentocracy’. As Perryman et al. (2011) highlights, national policies that emphasise ranking and comparison in the league tables took center stage to enable parental choice. Attainment and progress as a judgement tool, for example, was activated and influenced teachers’ focus on competitive progress and achievement data aimed at ranking in the league tables to enable parental choice.

Parentocracy, however, has been criticised as a disguised class inequality. Ball et al. (1994) argue that parentocracy is a ‘myth’ because mostly the middle-class have the economic power and capital to choose ‘good’ schools (including far away ones) to send their children to. Furthermore, the middle-class is perceived to have cultural capital (e.g., contacts to access the best schools) as compared to the working class. Bartlett (1993) also criticised ‘parentocracy’ arguing that league tables give the ‘good’ schools only, the power to be selective because they do not have to take every student. Bartlett (1993) concluded that league tables encourage schools to engage in ‘cream-skimming’ (i.e., picking the best students) and ‘silt-shifting’ behaviours whereby schools avoid admitting potentially weak students, many of whom are from the working-class families. This may be due to the perception that children from the working class may be difficult to teach and contribute little to school performance.

Essentially, Ball et al. (1994) and Bartlett (1993) concur that 'parentocracy' seem to encourage social class inequalities.

Evidently, the period of parentocracy diminished teacher independence. Institutionalising this lack of independence further, was the enactment of the English Education Act of 1988. The Act moved teachers' accountability and responsibility from themselves to external agencies like Ofsted and QCA (Qualification and Curriculum Authority) (Tomlinson, 2001). Ofsted, and publication of inspection reports, however, did not exist until 1992 (Courtney, 2014). These external agencies mostly monitored student performance and tested the quality of teaching. The 1988 Act also introduced a national curriculum which took away schools' autonomy in curriculum and assessments and entrenched mandatory appraisal over teachers' work. Through the Act, tests such as SATs and GCSE were introduced to measure how effectively schools implement curriculum thus bringing standardisation and the curriculum under government control.

Ofsted inspections and publication of student achievement reports also brought schools and teachers under government control. 'Good pupil achievement' in the league tables, for example, was perceived as a strategy for earning freedom from inspectors' scrutiny (Perryman, 2006; Perryman et al., 2011). Consequently, most English secondary schools tried as much as possible to produce good pupil achievement data to look good and keep inspectors away as the contrary triggers more inspections (Courtney, 2014). Moreover, good data attracts well-performing students and earn schools' good local reputations (Ball, 2017; Davids, 1993). In the era of 'parentocracy', schools had to compete for funds and students via the formula funding programme (Ball, 2017; Chitty, 2014) where every student attracted the same funding. Under this programme, high-performing schools attracted more students, got more funding, employed more teachers, bought more teaching and learning resources, and survived more than underperforming schools (Davids, 1993).

2.1.1.1.3 Performativity (1997-2010)

1997 to 2010 was a period of performativity in English education. This period witnessed a continuation of the Conservative government's policies of NPM and marketisation of education through accountability, but this time, under the Labour government mainly led by Tony Blair. For instance, the Labour government not only reinforced competition and choice, but also added stringent accountability practices under the discourse of standards. The White Paper, 'Excellence in

Schools' enacted by the Labour government in 1997 made this possible. The paper brought a significant shift in accountability demands from schools which focused on standards and performance benchmarks (Chitty, 2014). Also, it emphasised outcomes over content thus putting pressure on teachers to perform (Tomlinson, 2001). Consequently, standards, targets, performance monitoring and leadership ideals borrowed from the NPM and the private sector continued to infiltrate the English education. Systems of accountability that demand increased production of data in schools as evidence of performance were emphasised (Ball, 2003: 2017; Wilkins, 2011). Teacher promotion and school funding were also tied to performance indicators, and school governors made to approve targets for teachers at the school level. Furthermore, private sector providers were encouraged to compete with the public education providers who were perceived as either failing or unwilling to improve (Ball, 2017).

Clearly, the policy reforms undertaken by the Conservatives and the Labour governments between 1979 to 2010 had one commonality. That is, both emphasised public accountability in schools via systems of numeration and classification of schools, teachers and students in relation to performance. The reforms also emphasised marketisation through dismantling of the social welfare and public-sector monopoly over state schools by introducing systems of competition (e.g., League tables), and private schools. This idea of competition continued to dominate the English Education policy framing in the next period, although with an added emphasis on global economic competitiveness.

2.1.1.1.4 Global competitiveness (2010-2015)

This period had the conservative-liberal democrat coalition government led by David Cameron. While NPM continued, the education policies in this era had their framing within the global economic competitiveness or markets; the 'us versus them' mantra. The speech by Cameron on 9th September 2011 at Norwich is a testament to this (Ball, 2017). In the speech, Cameron compared the English education with 'Asian Tigers' like China which had showed huge progress in science and Maths in the PISA scores. He also emphasised the need for the English schools to respond to global economic competitiveness. Basically, the speech focused on reforming the curriculum content and structure to make it 'globally competitive'. For instance, Maths was emphasised as it is in the PISA tests.

However, the goal to reach global competitiveness had some barriers. For example, the 'London riots of 2011' added the dimension of 'broken society' rhetoric as a policy problem. This led to tightening

of student behaviour and teacher-discipline in class (Ball, 2017). Another barrier was the perception of poor parenting which may have led to an increased focus on student attendance data in schools (Ball, 2017). Also, inequality (e.g., inability of pupils from poor backgrounds to compete fairly in the system) was found to be a barrier. Consequently, the pupil premium policy was introduced to address inequalities (Chitty, 2014). Pupil premium is an extra funding for pupils from disadvantaged backgrounds. Also re-introduced was the use of Free School Meals (FSM) to measure performance and partly to address inequalities (Ball, 2017). Despite the attempts to reduce inequality in the system, the coalition's 'austerity' measures also encouraged cost-cutting in schools (Ball, 2017). After the Brexit vote in 2016, most of the coalition's education reform policies were kept by their successor, the conservative government, which in addition, emphasised meritocracy.

2.1.1.1.5 Meritocracy (2016 to date)

The conservative Prime Minister, Theresa May, re-emphasised meritocracy while retaining global competitiveness and NPM agenda in education. May, in her speech after assuming government, stressed a need to overcome social welfare 'to replace privilege with merit' to make the country work for everyone (see, Ball, 2017, p. 22). May's speech attempted to emphasise social justice to help the very brightest among the poor through grammar schools. Grammar schools admit on merit based on scores in an examination called '11-plus' which students take at age eleven.

In conclusion, from the year 1976 to date, external actors have continued to influence the work of English teachers. The external actors, for example, have been able to transform the work of the English schools and teachers from that of autonomy to principles consistent with NPM ideals (Hood, 2012) and 'productive economy' (Gleeson & Gunter, 2001). Consequently, a culture of performativity has been incrementally entrenched into English teachers' work-life (Ball, 2015; Perryman, 2006) such that teachers have been made more accountable through formal audits of students' learning outcomes measured through data. Whether these changes over the past 40 years have impact upon the standards of the English education is still unclear. The history of educational reforms, whilst unique to England, is also similar to other countries around the world where public accountability (NPM) has taken root as highlighted in section 1.0. Apart from the involvement of external actors, internal actors also influence data use in schools.

2.1.2 Internal actors

First, it is vital to highlight that external and internal actors influence each other in determining what data teachers collect and use. More robust in this regard is a review of 46 articles about data use at the school and at the district levels by Honing and Vankateswaran (2012) which showed that education offices and schools influence each other's data use processes in the USA. The study showed, for example, that the education office used pupil achievement data that come from schools either directly or indirectly via state organs or from other sources to influence improvement measures in schools. Moreover, while trying to understand how teachers interact with data at their workplace, studies (Anderson et al., 2010; Coburn & Turner, 2012; Wayman et al., 2012) found that data is a multilevel phenomenon, where different school system levels (internal and external) interact to access and use data.

Second, the main influence of data use practices within schools is the school leader. Essentially, school leaders mediate between external actors and schools. They are key to ensuring that policymakers' vision for data use becomes a reality at school and at classroom levels. According to Levin and Datnow (2012) policy requirements trickle down to schools through school leaders who act as site leaders. Similarly, school leaders may influence external actors via feedback, which may prompt policy reviews. They may also influence the choice of data collected, stored and used by teachers (Earl & Katz, 2006). For example, a school leader may analyse a combination of student achievement and lesson observation data, then discuss the findings with teachers, thus, influencing further collection and use of the data by teachers to improve teaching. Supovitz and Klein (2003) summarise the importance of school leaders, noting that, 'the fingerprints of strong school leadership are all over the data found in data-driven schools' (p.36). This does not necessarily mean that a data-driven school is a desirable thing to be. Having discussed the external and internal actors influencing data and data use practices in schools, I now shift focus to the data types that schools may collect because of their actions.

2.2. DATA TYPES

Numerous studies document that schools collect multiple data which teachers can use for decision-making (Ikemoto & Marsh, 2007; Schildkamp & Kuiper, 2010; Schildkamp et al., 2014). These data can be categorised in a variety of ways according to their nature, use and levels. By nature, data is either qualitative (e.g., text and audio) or quantitative (i.e., in numbers). Categorisation by use,

however, is based on the purpose of data in organisations such as schools as explained below. Categorisation by use therefore is given prominence in this study since schools are social organisations (Coburn & Turner, 2012). This categorisation will also be useful in guiding data coding to answer the question, data collected in schools.

First, there is input data, which touches on schools' finances, material resources or human resources (Ikemoto & Marsh, 2007). Input data reported in some English secondary schools were data on: student intake, special needs children, and data from primary schools (Schildkamp et al., 2014).

Second, is process data which deals with changeable conditions of schooling and instruction under the control of school's management and staff (Ikemoto & Marsh, 2007). Process data includes data on students' academic progress, behaviour and attendance. Others are data on instruction, lesson observations, content covered, organisation of assessment, and student discipline (Schildkamp & Kuiper, 2010). In some English schools, process data such data on lesson observations, external evaluations, self-evaluation evaluation, and teacher performance is common (Schildkamp et al., 2014).

Third, is outcome or output data, which gives performance indicators measured at the end of the schooling period (Ikemoto & Marsh, 2007). Output data mostly show results achieved from any schooling process. This may include data on student achievement, well-being, and admissions to a university. After school, for example, there is the Raising of Participation Age (RPA) legislation requiring that the English youth partake in post-16 education, employment and training (DfE, 2016). Consequently, schools may be collecting data about school leavers to figure out those Not in Education, Employment or Training (NEET) following the RPA discourse. Other examples of outcome data types included inspection reports, self-evaluation, teacher performance, school leavers and exit interviews data.

Last, there is context data which is generated from a schools' environment to stimulate school performance (Ikemoto & Marsh, 2007). Context data include, data on staff and student satisfaction (e.g., surveys), school culture, special programs and duty rosters.

Alternatively, because data and data use in schools is a multilevel phenomenon (Coburn & Turner, 2012), the above data may also be categorised into different levels. Schildkamp and Kuiper (2010)

highlight these levels as: school-level, staff-level and pupil-level data. School-level data is that which touches on the entire school such as inspection reports, while staff-level data is those about staff for instance staff attendance data. Pupil-level data is data touching on pupils such as pupil academic progress data. Clearly, English schools have some of the above-mentioned data types (see Schildkamp et al., 2014). The next discussion will centre on access to data in schools.

2.3 ACCESS TO DATA

Schools not only collect different types of data but also make data accessible for teachers to use. Schildkamp and Kuiper (2010) argue that schools should provide teachers with timely access to relevant data they need in their work. Different types of data can be useful to different categories of teachers depending on their duties and responsibilities. This is linked to the fact that data use in schools is a multi-level phenomenon (Coburn & Turner, 2012; Wayman et al., 2012) and differs at all levels of the school system (Schildkamp et al., 2012; Schildkamp & Kuiper, 2010). School leaders, for instance, may have access to more data than middle leaders because of their need to have an overview of the functioning of the whole school. Similarly, classroom teachers who teach pupils may be more interested in accessing pupil or classroom-level data as opposed to school-level data (Schildkamp & Kuiper, 2010). Access to the needed data by different school staff can be eased by a functioning data system and technology that can enable seamless access to data.

After access to data, it is vital that data is interpreted or assigned meaning before use. The next section explores the various ways in which data can be interpreted.

2.4 DATA INTERPRETATION

Data does not speak for itself. Rather, people engage actively to make meaning from data before using it. Interpretation thus gives value and meaning to data. However, sense-making from data also called data interpretation is multi-sectoral, therefore its interpretation is complex in many ways.

First, data does not give appropriate answers or quick fixes. It only offers opportunities to view a phenomenon through different lenses, challenge beliefs and pose more questions. Interpretation of data is, therefore, a cognitive, experiential and a social process involving thinking, formulating

possibilities, developing convincing arguments based on experiences, finding logical flaws, and setting up a defensible notion of what the data may represent (Earl & Katz, 2006).

Second, data interpretation is a complex time-consuming process. This is because it needs critical and reflective thought focusing on what to believe or do as an individual or as a group. Such complexity can make data interpretation frustrating and confusing, especially when people attach a different meaning to the same data set before them (Spillane & Miele, 2007). Interestingly, Earl and Katz (2006) and more recently, Mausethagen et al. (2018) indicate that even with a consensus, the interpretation of some data may still be contested because scrutinising data and looking for patterns and trends can lead to multiple interpretations. This implies that data interpretation can be contradictory, thus producing divergent views of what is going on. It can also be problematic when people resort to simple interpretations to dismiss new information and to evade what do not match their past beliefs just to paint a simpler familiar meaning.

Last, data interpretation is complex because it is shaped by individuals' beliefs, knowledge and motivation (Coburn & Turner, 2011). The nature and patterns of social interactions people engage in influences this. Moreover, schools collect different types of data such that the approach of interpretation may vary from one data set to the next. Qualitative data which are in text, for instance, are prone to multiple interpretations and thus may invite social-constructivist interpretations conducted through team meetings.

Despite the above-mentioned complexity associated with data interpretations, a large body of research suggests that people interpret data in different ways such as through: prior knowledge and experiences; norms; experts; and school routines (Anderson et al., 2010; Coburn & Turner, 2011; Marsh, 2012; Spillane & Miele, 2007). The approaches may be used alone or in combination with others. Below is a discussion on each approach, based on literature.

2.4.1. Use of prior knowledge and experiences

People often construct meaning in relation to their prior experience and what they already know (Spillane & Miele, 2007). Thus, the state of being familiar or unfamiliar with something may influence a person's interpretation. Teaching experience and training, for instance, may influence how data is encoded, organised and interpreted by teachers. Jimerson (2014) confirmed this when exploring the

development of mental models for data use among educators in a small school district located in Texas. Using interviews and survey data, the study found that teachers and school leaders approached interpretation from a range of mental models of data use which seemed largely influenced by their formal training, social interactions with colleagues, modelling by the leaders, and personal experiences. This means that teachers may assign meaning to data by filtering its stimuli through the lens of their prior knowledge and experiences (Spillane & Miele, 2007). This suggests that data interpretation can be problematic when teachers lack prior knowledge and experience of the relevant subject matter.

Furthermore, cognitive psychologists concur that an event, an object or a behaviour may be interpreted by the brain through assimilation or accommodation (Tuckman & Monetti, 2011). Assimilation and accommodation to a large extent, depends on one's pre-existing knowledge and experiences (Ross, 1987).

Assimilation occurs when the brain interprets new unfamiliar information, by relating it to prior knowledge for instance, from previous training (Spillane & Miele, 2007). Such interpretation occurs whenever the deeper alternative schemas also known as ideas have not yet been developed. Consequently, assimilation is about incorporating new information into existing schemas, without changing these schemas. Often, through assimilation individuals make interpretations by fitting new information into their pre-existing belief frameworks such as focusing on what data and data patterns to notice, and how to make sense of it (Mausethagen et al., 2018). This sometimes may lead to a flaw psychologist call 'confirmation bias' (Nickerson, 1998). Confirmation bias occurs when individuals focus on searching for data aspects (e.g., test scores) which supports or confirms their pre-existing beliefs and discount other aspect of data that may challenge those beliefs. Beliefs may thus shape what teachers look out for and notice when interpreting data. Hill (2001), for example, found that teachers working to adopt new materials aimed at supporting new Mathematics policy interpreted the reform concepts differently from policymakers' intentions. The teachers mistakenly interpreted a 'new' Math teaching approach as similar, to what they already know. In the mind of the teachers, a mere use of the existing traditional curriculum was enough to meet the proposed policy requirements, and therefore, nothing new was needed to call for deeper interpretations. This finding demonstrates the danger of confirmation bias. That is, people can misinterpret or bias issues; when they superficially link new information to their prior knowledge or beliefs. Also, teachers who perceive standardised test data as lacking validity or usefulness, may interpret the data with bias,

thus, not noticing student learning and teacher effectiveness opportunities that the data may offer. In such circumstances, teachers may defend their beliefs by questioning the validity of the test, the method used and perhaps the degree to which a test measures the valued outcomes simply to elude what data reveals. Studies in The Netherlands (Schildkamp & Kuiper, 2010), the USA (Ingram et al., 2004), and New Zealand (Timperley & Parr, 2009) also found teachers using past knowledge and experiences to interpret data. For example, Schildkamp and Kuiper reported that Dutch teachers in their study argued that 'years of experience was enough' to interpret data. Teachers who mainly value this way of interpreting data might not anticipate the unexpected interpretations that data may offer. This suggests that data interpretation by assimilation has assumptions and judgments which are sometimes rooted and shaped by one's pre-existing beliefs although, accommodation sometimes may occur.

Accommodation involves changing mental frameworks and restructuring existing knowledge by incorporating new ideas (Tuckman & Monetti, 2011). It changes our prior beliefs, for example, about a person. Rather than simply using what we already know, accommodation allows new information to emerge, for example, about a person or a practice. This way, accommodation can overcome assumptions, stereotypes and prejudiced-interpretations. Therefore, whilst assimilation does not change our mental framework of thinking during interpretation of data, accommodation does.

2.4.2. Use of norms and criteria

Norm-referenced interpretation is based on a normal distribution curve. This may be assigned by government agencies such as examination boards or by school leaders at the school levels. Norm-referencing is mainly used to interpret quantifiable test score data. It prioritises variability and is premised on the concepts of sorting, ranking and comparing (Fulcher & Svalberg, 2013; Lok et al., 2016). A 'norm-referenced' interpretation, specifically in academic performance such as data obtained from test scores, a normal distribution curve is expected. In norm-referencing, 'a pre-determined percentage of students must obtain a certain grade; if the entire class is outstanding, the same number of 'Ds' would be awarded and conversely, if the entire class is inadequate, there would still be the same number of 'As'' (Lok et al., 2016, p. 450).

In some cases, criteria-referencing is used to interpret data. Unlike in norm-referencing where interpretation is made relative to others, criteria-referencing is an interpretation of individual pupil

performance based on pre-defined standards that must be attained (Fulcher & Svalberg, 2013). For example, if the standard is 61-69% is 'Bs' and 70% is an 'A', and all students obtain 70%, they all get grade 'A'.

At the national levels, norms and criteria are assigned by government agencies such as examination boards while at the school levels; they may be assigned by school leaders. But with interpretations based on norms or criteria, attention to data patterns can sometimes be partial and filtered especially when individuals do not attend to key pieces of information and major patterns in data. While investigating the tension between norm-referenced and criterion-referenced assessments in the context of curriculum planning and assessment in higher education, for example, Lok et al. (2016) argued that using norm-referencing or criteria-referencing interpretations alone (e.g., in tests), can lead to grade inflation or deflation. This suggests that norm-referencing and criteria-referencing produce interpretations that have little alignment between learning and assessment. When interpreting data obtained from tests, a hybrid of both might be helpful (Lok et al., 2016).

2.4.3. Use of routine meetings

Data can also be interpreted within school routine meetings (Anderson et al., 2010; Mausethagen et al., 2018). This involves making sense of data in a repetitive and recognisable pattern of interdependent actions involving multiple actors within a school. The routines may include attending a school, departmental or grade meeting where data is discussed, debated and meanings are drawn for action. Therefore, teachers who engage in a culture of collaborative inquiry can overcome cognitive biases leading to a deeper interpretation of data and professional learning beyond their prior beliefs (Katz & Dack, 2014; Van Gasse et al., 2016).

Data use routines can be designed as a school requirement such that, departments are tasked to analyse, interpret and report student test scores after each assessment (Coburn and Turner, 2011). Routines contrast with Downey and Kelly (2013) who reported that English teachers preferred that 'a senior colleague' in the department interpret data. However, this might seem reasonable particularly when teachers are not data literate or need time to focus on teaching.

Although data interpretation may be influenced by individual's prior knowledge and experiences, in routine meetings, data interpretation can be subject to scrutiny, debate, rigour and negotiations.

Hence, such interpretations may be compelling and robust. Horn and Little (2010) while studying how teachers interact to interpret data, for example, found that teachers working collectively to examine data on students' work had changes in their data reasoning and sense-making, and were more focused.

2.4.4. Use of internal data managers

Schools may also hire or appoint an internal expert to support data interpretation (Anderson et al., 2010; Datnow, Park & Wohlstetter, 2007). An internal data manager can be a teacher or statistician, trained, then appointed by a school leader to support data analysis and interpretation. A data manager may see more from data than a novice teacher. Further, they may not be distracted by the superficial interpretation surrounded by teachers' beliefs. Consequently, they can be more objective and impartial in a data interpretation process. Schildkamp et al. (2014) found that some English schools having designated data managers who were appointed by headteachers to help schools in data matters. Wayman (2005) also found some schools engaging internal data experts to summarise and interpret student achievement data. One challenge, however, is that teachers who are appointed as internal data managers, may lack time and ability to support data interpretation.

2.4.5. Use of external data experts

Schools may engage external data experts such as researchers, IT companies, or consultants with specialities relevant to their needs (Anderson et al., 2010; Ikemoto & Marsh, 2007). These external experts might be professionally trained statisticians who help schools and teachers in the collection, analyses, and interpretation of data. For example, Ikemoto and Marsh (2007) report that some high schools receive technical support from an external data management organisation. This organisation sent a representative to meet with teams in schools to examine data. The experts helped in crafting inquiry questions, collecting, analysing, facilitating conversations around data interpretation and deciding data-informed actions. The study reported the benefit of increased data use awareness on the part of participating teachers but not improved classroom practices. External experts can bring expertise and non-partisan data interpretations. However, they can also overlook contextual information needed to gain deeper interpretations of a schools' data.

2.4.6 Use of triangulation and longitudinal analysis

Triangulation is the act of corroborating different sets of data to develop meaning. That is, one set of evidence or data informs another for a 'bigger picture.' Triangulation is based on the understanding that data is prone to margins of error and therefore, one single piece of data cannot guarantee accurate meaning unless corroborated with other sets of data. Alternatively, different knowledge sources (e.g., norms and prior experiences) inform each other (Ikemoto & Marsh, 2007). Recent research evidence shows that teachers triangulate sources of evidence in team meetings to interpret data (Bertrand & Marsh, 2015; Jimerson, 2014). A longitudinal qualitative study in three secondary schools in Norway (Mausethagen et al., 2018) found that teachers working in a data meeting drew upon a range of knowledge sources to interpret data. Teachers in the study interpreted data using prior experiences (45%); relationships with parents and students (28%) such as using specific students' motivation and home situation to draw meaning from data; and using research and researchers (6%), mainly to legitimise existing practice. The study also showed that teachers sometimes corroborated these knowledge sources to show improved test results. This finding suggests that teachers' interpretation of data through triangulation might be influenced more by the interest to improve students' performance in tests. Although triangulation may provide in-depth interpretations, it can be time-consuming to conduct. Hence, most teachers may avoid triangulation especially in school-contexts with massive teacher workload. Apart from the use of triangulation, teachers may use longitudinal analysis to interpret data. Longitudinal analysis involves checking for cumulative trends in data (Gray, 2014). This means analysing data at different points in time to develop meaning.

2.5 USES OF DATA IN SCHOOLS

After data is interpreted and meanings attached, it becomes knowledge which may inform teachers' practices. The discussion below outlines how school data can be used based on literature. Data can be used for school and pupil improvement (e.g., improvement teaching). Also, it can be used negatively (e.g., abuse) which I have explained in the 'unintended data use' section.

2.5.1. Data use

2.5.1.1. Improve teaching

Data can be used to revise teaching practices. It can also be used to target teaching to improve pupils' learning (Wayman & Jimerson, 2014). A few studies also link data use to improved teaching and student achievement (Breiter & Light, 2006; Carlson et al., 2011; Wayman et al., 2017; Wohlstetter et al., 2008). For example, Breiter and Light (2006) found some teachers using data to revise teaching practices.

A few studies have also linked data use to improved pupil achievement. For example, Carlson et al. (2011) describe how some teachers in New Zealand used data in a five-year longitudinal study to increase student achievement in math and reading skills. Reading skills registered the highest improvement in pupil achievement. More recently, Wayman et al. (2017) in a two-year longitudinal study of effects of teachers' use of a computer data system on student achievement in the USA, reported mixed results. The study found a significant relationship between system use and elementary reading, but no significant relationships for elementary Mathematics. The studies (Carlson, et al., 2011; Wayman et al., 2017) suggest that data use may enhance pupil achievement more readily in languages than Mathematics. The results from the two studies may be influenced by complex factors including student motivation, teacher, parent and accountability factors which interact in complex ways. A lack of high-stakes external accountability pressure in New Zealand (Carlson et al., 2011), for example, might have enhanced the uptake of data use to improve pupil achievement.

However, it is also important to highlight that improving teaching through data is complex in many ways. Determining which data to use and how to use it to improve teaching is never a straight-forward thing for many teachers (Wieman, 2014). After a review of diverse sets of literature that address these complexities, Wieman (2014) found three distinct approaches that teachers use to aid data-informed teaching: the diagnostic, the methods, and the teacher approach.

Within the diagnostic approach, teachers gather data to find students who need targeted teaching (e.g., in certain topics). The diagnostic approach is used within Cognitive Guided Instruction (CGI) whereby teachers use data to decide students' prior knowledge then organise teaching accordingly (Carpenter et al., 1999). For example, some teachers may analyse past performance in a test to target and improve teaching (Schildkamp et al., 2014; Werler & Faerevaag, 2017). Within the 'methods'

approach, teachers collect data to decide the aspects of teaching that add to student learning. This approach focuses on improving the teaching methods and activities that a teacher uses (Wieman, 2014). Finally, the teacher approach is where teachers collect data to help develop beliefs and knowledge that support effective teaching. This may include aligning content to the way people learn such as the use of multimedia learning principles to facilitate learning.

All the above-mentioned three approaches aid teaching, and a balanced mixture of approaches would likely be most successful because teaching is complex. Besides data, teaching is influenced by many factors (e.g., contact hours, teacher, student, parent and school factors) which interact in complex ways. Teacher factors such as data literacy, for instance, can affect teachers' data use to improve teaching. A study of data-based decision-making for instructional improvement in Dutch primary schools (Gelderblom et al., 2016) show how lack of training limits teachers' data use to improve teaching. The study shows that although most teachers used data to improve teaching, they neither used all the available data optimally nor conducted all the relevant data analyses. Most teachers thus are ill-prepared to use data to aid teaching. In USA, Wayman and Jimerson (2014), also analysed qualitative data from 110 teachers and concluded that they lacked five broad data-related competencies needed for data-informed teaching: (1) asking the right questions (2) integrating data use with curriculum, instruction and assessment (3) analysing and interpreting data (4) computer skills and, (5) collaborating around data. Also, a lack of time and poor data systems can also hinder data-informed teaching (Wayman et al., 2012) either because teachers lack the time to review data or because the data systems make the needed data inaccessible (Schildkamp & Kuiper, 2010).

While data use can help revise teaching practices, it can also undermine teacher autonomy, restrict teachers' practices and reinforce unfair structures on pupil learning especially in high-stakes accountability contexts (Bradbury, 2014; Werler & Faerevaag, 2017; Wrigley & Wormwell, 2016). This, however, is not to mean data should never be used to improve teaching. Rather, how data is presented to teachers is a crucial determinant of how it will be used by teachers to improve teaching. Teachers, for instance, might need to see the value for using data (e.g., in terms of improved pupil achievement) for them to embrace the practice.

2.5.1.2. Supporting conversations

Teachers can use data such as student academic assessment scores to provoke improvement conversations with stakeholders such as students, parents and colleagues (Breiter & Light, 2006).

The conversations may occur in staff, departmental or during parents' meetings where data is used to explain childrens' academic progress. Data-based conversations may reduce bias, thus, enhancing the involvement of stakeholders in setting and working towards student learning targets. Several studies (Bradbury, 2014; Schildkamp et al., 2014; Wrigley & Wormwell, 2016) show that English teachers use student, lesson observation, performance, and inspection data to support improvement conversations with stakeholders including Ofsted and parents. Similar findings were reported in the Netherlands (Schildkamp & Kuiper, 2010) and in Norway (Werler & Faerevaag, 2017).

2.5.1.3. Professional development

Teacher professional development can improve classroom instruction, and data can inform professional development choices (Breiter & Light, 2006; Schildkamp et al., 2012). School leaders, for example, may use student achievement data to decide which teacher needs to attend a professional development training on a given topic or subject area. Unfortunately, recent studies show that data use teacher professional development programs often have a short-lived impact on teacher practices (Ebbeler et al., 2016; Farrell & Marsh, 2016; Poortman & Schildkamp, 2016; Van Gasse et al., 2016). That is, the teachers in these studies applied their newly acquired data use knowledge from the training for a short period and then slowly reverted to their old practices. A study by Farrell & Marsh (2016) to support teachers' in using data, for instance, found that after the support, teachers were able to group their students based on data but did little to promote changes in instructional delivery. This suggests that whilst teachers' awareness about data increased, their practices did not change. Although cognitive biases might be working to preserve the status-quo and impede teachers' practices (Katz & Dack, 2014), the findings suggest that how professional learning is provided to teachers might need serious reconsideration if at all teachers' practices are to be improved from such training. This is a gap that future data use professional learning programs might perhaps need to pay attention to.

In England, teachers whose subjects perform poorly sometimes received professional development or advice (Schildkamp et al., 2014). The study found that lesson observation, student achievement and internal evaluation data were used to initiate targeted improvement conversations with teachers, for example, discussions around what areas individual teachers need to add effort to improve their teaching.

2.5.1.4. Monitoring and identifying areas of need

Data may be used to identify priority areas to channel resources, and to monitor student progress and the constantly changing school environment (Schildkamp & Kuiper, 2010; Young, 2006). By analysing assessment data, for example, teachers can identify which learners need extra coaching and what learning gaps have been narrowed. Data may also be used to monitor students' needs, learning and discipline (Omoso, 2013). Monitoring is closely associated with the keeping of records, reporting and decision-making functions. For teachers, monitoring progress and pupil learning may be in the form of regular assessment tests, observations, questioning, reviewing pupils' assignments and giving feedback. A multi-national data use study across Europe (Schildkamp et al., 2014), for example, found that some teachers in England, Germany, Poland, Lithuania and the Netherlands, used student assessment data to identify students' difficulties and to monitor students' academic progress. Also, important to note is that studies in Europe (Downey & Kelly, 2013; Schildkamp et al., 2014; Schildkamp & Kuiper, 2010; Werler & Faerevaag, 2017), and Kenya (Omoso, 2013) show that data use by teachers to improve pupil learning rarely go beyond identifying and monitoring of pupil progress.

2.5.1.5. Planning and Policy development

Schools can use data to plan and develop policies (Breiter & Light, 2006; Schldkamp & Kuiper, 2010). Student intake data may inform annual school action planning (e.g., the number of textbooks and learning resources to stock). Conversely, student attendance data can inform the development of new school rules and regulations. Also, student achievement data can inform the development of policies on classroom instruction or even lesson planning. According to Schildkamp et al. (2014), English teachers used internal and external evaluation data to set targets, plan and develop school improvement policies.

2.5.1.6. Meeting accountability demands

Accountability demands can prompt teachers to prepare, keep and use some data sets (Earl & Katz, 2006). Accountability in schools is characterised by the need to continually report about data on pupils, teachers and the school to school leaders, local authorities or state agencies. Such accountability-related demands often emphasise provision of evidence (in form of data) to prove the school's, the teacher's or the pupil's work. Massell (2001), for instance, found that in district

meetings, administrators held headteachers accountable for using data. They asked headteachers to explain how they planned to address declining test scores forcing them to keep and use students test score data. However, accountability not only orient schools to collect and use certain data, it sometimes invites unintended uses of data. For example, Coburn and Turner (2012) reviewed studies touching on how practitioners interact with data at their workplace settings and concluded that accountability pressures cause schools to use data in undesirable ways (see section 2.5.2).

2.5.1.7. Justifying actions

Data can provide a justification for decisions taken (Diamond & Spillane, 2004). Said differently, teachers may use data to persuade, support arguments and even defend actions. Diamond and Spillane (2004) found that armed with relevant data, school leaders were able to justify and convince teachers and parents why some school improvement decisions and policies were necessary.

2.5.1.8. Motivating students and teachers

Data can be used to motivate teachers' and students' performance (Diamond & Spillane, 2004; Kerr et al., 2006; Omoso, 2013). There are two types of motivation: intrinsic (self-driven) and extrinsic (externally instigated e.g., issuing prizes). Data showing a positive deviation in student achievement can be used by school leaders to motivate high achieving students or staff, for example, through school-sponsored trips (Omoso, 2013). The goal is to promote hard work and competition in teachers and students, to improve school performance (i.e., extrinsic motivation). Some English schools were also found to extrinsically use student achievement data to celebrate school performance online (Schildkamp et al., 2014), in attempt to encourage prospective students and parents.

However, Ryan and Deci (2000) found that extrinsic motivation reduces intrinsic motivation. That is, the more one buys into extrinsic motivation, the less they will have intrinsic motivation. Teachers and students aiming for extrinsic motivation such as rewards, for instance, may give up, become demotivated, and demoralised; especially when they do not get the reward. A performance orientation with a focus on grades and achievement can also prompt pupils and teachers to compare themselves with others (Pope, 2010) or even give up when faced with difficulty (Pintrich, 2003). A qualitative study (Perryman et al., 2011), however, report mixed motivational effects of data use. The

study found that teachers were happy and motivated when their data outcomes (e.g., in test scores) was favourable compared to other departments, but demotivated when unfavourable.

2.5.1.9. Evaluating performance and personnel decisions

Data may be used to judge school, student and teacher performance (Kerr et al., 2006; Schildkamp et al., 2014). English schools are judged against pupils' examination results at 16 years of age, but there are three overlapping measures: the GCSEs, the English Baccalaureate (EBacc) and Progress 8.
The GCSE is a performance data from an examination that students take at KS4 (age 16 years). In 2016, the GCSE grading system changed from alphabets A—F to a 9-point scale to better differentiate between the highest performing and underperforming students (DfE, 2016). In the new grading, 9 is the highest (previously A*) and grade 4 being the minimum borderline pass a student needs to attain in any subject (previously C). Like the previous grading system, the new system contributes to school's performance data in the league tables. It shows the proportion of pupils achieving grade 4 borderline and above making it a headline measure of school performance. Whilst GCSE data may provide information for parents to choose between schools, school leaders may use it to evaluate teacher's performance, and teachers may use it to evaluate student's performance. The EBacc introduced in 2012, however, measures the percentage of students who attain the borderline grades 4-9 in five subjects: Math, English, Science, foreign language, Geography or History (www.englishbac), whereas Progress 8 measures a student's progress between KS2 (primary) and KS4 across 8 subjects. The later compares schools with similar intakes data and indicates whether students have performed to expectations based on value-added measure of KS2 English and Maths as a reference point (DfE, 2016).

Although the grade 4 borderline may provide a focus to schools including monitoring students' progress, doing revisions and testing to increase the number of students attaining the borderline pass (cf. Perryman et al., 2011), the focus might also encourage 'educational triage' where, teachers sort and label students into: the 'pass anyway', the 'borderline' and the 'hopeless' cases (Gillborn & Youdell, 2001). Teachers are then likely to provide more support to the borderline students who can improve the school's ranking than to the 'pass anyway' and the 'hopeless' cases students who will 'pass anyway' and 'fail anyway' respectively.

Clearly, the above three measures make the English accountability system quite complex. Besides, there is also a measure known as attainment 8 which measures a student's mean score across eight subjects (three subjects more than the EBacc). The measure is intended to encourage schools to offer broad and balanced curriculum (DfE, 2016). In attainment 8 measure, Maths and English are double-weighted in the national examinations to reflect their importance in the national curriculum while the rest are not (DfE, 2016; Perryman et al., 2011). For example, a student who scores 7 points in GCSE Maths is awarded 14 points in Attainment 8. This means that schools with better data outcomes in Maths and English get better ranking in the league tables.

2.5.1.10. Self-directed learning

Teachers and students may use data for self-learning and reflections. They can ask questions such as, what succeeded or failed, and why (Breiter & Light, 2006; Young, 2006). Self-directed learning enables teachers and pupils to evaluate themselves critically through self-insights guided by the outcome from data. The assumption is that getting students and teachers to review their own data, gives them a better opportunity to reflect about their strengths and weaknesses, and hence, seek ways to improve through hard work. Self-reflections help teachers and students to check and regulate their own practices and perhaps start self-driven improvement initiatives. Students who score 10% on a test, for instance, can use the data to reflect what caused the outcome and how to improve.

In addition to using data for school and pupil improvement, data use, can also cause unintended consequences particularly in high-stakes accountability contexts. I will now discuss such unintended data use consequences based on literature.

2.5.2. Unintended data use consequences

In addition to using data for academic, structural and administrative school improvement, teachers may also use data in undesirable ways such as: strategic use, fabrications, abuse and misuse, as described below.

2.5.2.1. Strategic use

Teachers may use data strategically when they intentionally hide or select 'easy-to-use' data, and ignore data needing complex long-term improvement trajectories (Ehren & Swanborn, 2012;

Schildkamp & Kuiper, 2010). Strategic use of data in most cases is employed by individuals to gain undue advantage over a given standard of requirement. According to Ehren and Swanborn (2012), schools are more likely to use data strategically when the data is part of a high-stakes accountability. Strategic use of data is undesirable because it denies schools a data-based improvement opportunity, even when the chance to do so is possible. For example, Downey and Kelly (2013) report how some English secondary school headteachers strategically denied access and use of some data they perceived as capable of exposing some weaknesses in their leadership style.

2.5.2.2 Fabrications

Fabrication is about inflating or deflating data to present a picture of what people want to see or hear. Fabrications can also be about strategic manipulations of data when constructing objectives, appraisals, reviews and policy plans. In fabrications, teachers and schools do certain things not because they believe in them, but because it will be measured and compared, and it will make them look good. Consequently, they present descriptions of the school and of teachers purposefully for accountability, but, are in themselves, ineffective and lack truth or simply do not exist.

Some commentators have linked the fabrications of data to neoliberal policies of performance and competition (Ball, 2017; Perryman, 2006). Such policies are anchored in the production of more and more numerical data to show performance, and to justify the value for money invested in schools. This practice sometimes results into fabrications of data through gaming the system to satisfy some performance requirements (Bradbury, 2014). Ball (2003) warns that obsession with data use and performance outputs can produce opacity rather than transparency as organisations and individuals take greater care in their construction and maintenance. Some teachers, for instance, may look for loopholes to deceive evaluators as opposed to developing their practice.

Essentially, fabrications' aim is to show organisations and people in the best light possible and therefore, are not designed to inform but to confuse. Ball, (2003) calls it 'tactical improvement as the improvement game' (p. 224) and Bradbury (2014) calls it 'gaming the system'. As Ball (2003) puts it, fabrications produce opacity and game playing tactics, rather than transparency as teachers take greater care in the construction and maintenance of fabrications. Fabrications thus can conceal as much as they can reveal. Organisations can do whatever is necessary to excel or survive including excluding things which do not fit into what is intended to be conveyed merely to portray 'best

practice' and 'improving' intention (Ball, 2003, p. 220). Viewed this way, fabrications seem to be a strategy for eluding direct surveillance from authorities (Perryman, 2006). However, authorities themselves sometimes engage in data fabrications. Bradbury (2014), for instance, found that the Early Years Foundation Stage (EYFS) data were moderated by some local authorities when they were too high, and adjusted upwards when they were low to present a certain 'picture' to the public.

2.5.2.3. Abuse

Teachers can also abuse data (Booher-Jennings, 2005; Diamond & Spillane, 2004) when they use it for the wrong purpose or in morally harmful ways. Abuse of data occurs in different ways, for example, when teachers group and teach students having a higher chance of passing a test (also called 'bubble-kids') merely to improve a school's performance (Booher-Jennings, 2005). Alternatively, underperforming students may be put on grade referrals or excluded instead of instituting measures to help them improve. For instance, it has been reported that English secondary schools off-roll thousands of underperforming students in the run-up to GCSEs as they come under pressure to boost league table rankings (The Times, 28 August 2018). An earlier study (Ireson et al., 2005) reported similar result. Abuse of data may also cause 'narrowing' of the curriculum such that, teachers emphasise on teaching certain parts of the curriculum that are likely to be tested in national examination while ignoring those which are not likely to be tested. Courtney (2014) and Perryman et al. (2011), for example, observe that the pressure on English schools to improve in English and Math, potentially led to teachers giving more time for the teaching of Math and English at the expense of other subjects. A similar finding was reported in Norway by Werler and Faerevaag (2017). Teachers in the study openly used test data to 'teach to the test'. For instance, rather than teaching the whole curriculum, the teachers not only repeatedly practised tasks from tests with pupils but also regulated pupils' identities based on tests results. Interestingly, teachers in the study relied on national tests data to teach to the test despite perceiving it as reductive and decontextualised. It seems the Norwegian teachers abused the national test data partly because they were judged on it and partly because their promotion was pegged on it (Werler & Faerevaag, 2017). The teachers thus struggled to support pupil learning based on the test results to overcome accountability hurdles.

2.5.2.4. Misuse

Misuse of data is the use of data in unsuitable ways. It happens in different forms in schools. First, it may happen when teachers misinterpret data and focus on improving aspects of the school which do not need improvement (Schildkamp & Kuiper, 2010). Second, it can happen when teachers ignore what data is revealing and instead continue to use intuition, limited observation and authority to base decisions rather than what data reveals (Ingram et al., 2004). This may lead to instituting measures that 'mismatch' student needs (Honig & Coburn, 2008). Third, misuse of data happens when a given data is used for what it was not intended. Data used to assess students, for example, might end up being used to compare teachers' effectiveness to the extent that teachers' job positions, careers and salaries are determined using student test scores (Ball, 2003; Ball & Olmedo, 2013). Data can also be misused when used to control and sanction schools to follow certain ideological policies of the government of the day (Courtney, 2014; Perryman et al., 2011). Such misuse of data is undesirable and can deny schools and teachers an opportunity to improve based on data.

Having discussed how teachers can use data, it must be remembered that data and data use in schools is contested and politically charged. This is particularly true in high-stakes accountability contexts such as England where this study was conducted. Consequently, arguments have been advanced against data use in the English schools which have been highlighted in the next paragraphs. They include increased teacher workload, undermining of professional ethics and negative impact on teachers' well-being.

2.5.3 Arguments against data use

To further understand the study context, arguments against data use in English schools including the performative practices that go with it have been reviewed. They include increased workload and negative effects on teachers' professional ethics and well-being.

First, data use has considerably increased the workload of teachers. English teachers currently engage in time-consuming 'datafication' procedures and practices right across secondary (Schildkamp et al., 2014; Perryman et al., 2011), primary (Troman et al., 2007), and early years schooling (Robert-Holmes & Bradbury, 2016). 'Datafication' is attributed to the English government policies created through Ofsted inspections (DfE, 2016; Lynch et al., 2016). Many data audit

inspection procedures add workload and make teaching difficult (Bradbury, 2014; Wrigley & Wormwell, 2016). This happens when teachers spend more time producing the data needed by the authorities and less time on the quality of teaching and learning. For example, the judgment policy in early years requires that teachers filter and distil progress data into numerical data covering an entire year for each child over multiple curriculum areas and behaviour (Bradbury, 2014; Robert-Holmes & Bradbury, 2016; Wrigley & Wormwell, 2016). The judgments are also based on lengthy teacher observations of children in classrooms throughout the school year in the form of written notes, observations, photographs and samples of children's work collated into a folder for each child thus increasing teachers' workload.

The workload from 'datafication' of the English schools may deny some teachers rest and a work-life balance beyond the school gates (Perryman et al., 2011; Wrigley & Wormwell, 2016). According to Lynch et al. (2016) some teachers leave the profession because of data use workload. This might explain an earlier finding that teachers view the collection of volumes of data in their work as a waste of time but a 'necessary evil' to satisfy accountability (Bradbury, 2014). According to teachers in Bradbury's (2014) study, there was little link between the collection of volumes of data and pupil learning.

Second, data use can heighten emotions and impact negatively on teachers' well-being (Ball, 2003; Ball & Olmedo, 2013; Bradbury, 2014). This is because data use in a high-stakes accountability context, compares teachers and pupils with each other thus producing a system of winners and losers. The practice may cause anxiety, stress, depression, frustrations, uncertainty and fear not only in losers but also in winners who must keep their winning status. Teachers with favourable data may rejoice while those with unfavourable data can get demoralised, frustrated, stressed, depressed, less trusted and devalued (Ball & Olmedo, 2013; Perryman et al., 2011). Data use is also linked to regular appraisals, reviews, and performance-related pay (Ball, 2003) which may motivate or demotivate teachers' emotionally depending on outcome and the actions taken by authorities.

Data use underpinned by accountability and inspections can also bring unnecessary state control, judgment and surveillance which can demoralise and frustrate teachers (Ball, 2003; Courtney, 2014). In high-stakes accountability context, for example, teachers worry whether their voice counts and whether what they do is enough or the right thing and when they will be inspected (Ball, 2003; Bradbury, 2014). This changes the relationship between the state and schools as teachers struggle

for visibility via recording of practices and comparisons (Courtney, 2014). In England, control is exercised via visibility of inspectors who inspect and judge schools. Schools judged 'Outstanding' in the most recent inspections are exempt from routine inspections. Those judged 'good' get one-day short inspection about every four years provided their examination results remain good whereas those with 'requires improvement' judgement receive inspections at least every 30 months (GOV.UK/ofsted). According to Courtney (2014) inspection judgements may not reflect reality but rather frustrates and demoralise teachers especially whenever the inspection framework changes. This leaves teachers struggling to adjust to 'moving goalposts and orders to comply with the changing inspection criteria at all times' (Courtney, 2014, p. 10).

Data use studies in Norway, a low-stake accountability context, also reported negative emotions after national tests data were made compulsory for schools (Werler & Faerevaag, 2017). The study found that Norwegian teachers exhibited emotional insecurity and stress before and after the tests results. Teachers in the study expressed greater worries about what the expected public opinion about them would be when the national test results conflict their internal test reports to parents. Ball (2003) explains the source of such worries arguing that teachers who do not meet targets (e.g., in student test scores) may get punished, dismissed and sanctioned, or branded irresponsible (Ball & Olmedo, 2013; Roberts, 2005).

Students may undergo similar emotional impacts (Bradbury, 2016; DfE, 2016; Wrigley & Wormwell, 2016). Data can heighten emotions, if used to compare or punish, for example, 'to expose teachers' attempts as inadequate' (Courtney, 2014, p. 10), rather than to support learning. Another example is using data to subject students to accountability judgments, measurable outputs and targets which heighten emotions especially for losers. This heighten emotions because 'performativity has no room for caring but excellence' (Ball, 2003, p. 224). Therefore, comparison of students, for example, in Standard Assessment Tests (SATs) can worry students about the consequences of poor performance in tests.

The consequences on students who fail or pass tests varies from compulsory remedial classes to grade referrals, although grade referrals are not applicable in England. In contrast, 'high-performing' students may be punished by having their performance bar raised (Booher- Jennings, 2005). Such actions have been blamed for causing psychological distress in young school-going English children. A longitudinal study of young school-going people in England from 2004 to 2014, for example,

showed that the mental well-being of students had worsened compared to those who schooled before the year 2004 (DfE, 2016). The study also found that the young people had a lower 'locus of control'. This suggests that they had less control over their identities and events affecting them. Robert-Holmes and Bradbury (2016) and Wrigley and Wormwell (2016) added their voices to this matter warning that the relentless focus on 'performance' agenda in the English schools may undermine the foundations for pupils' personal development and learning. Schools may also undergo actions that can be viewed as punishments which heighten emotions (Ball, 2003; Bradbury, 2016; Wrigley & Wormwell, 2016). For instance, parents can have children transferred from underperforming schools to schools perceived as performing (Courtney, 2014; Davids, 1993).

Finally, overemphasis on data can undermine teachers' professional ethics (Robert-Holmes & Bradbury, 2016). Data use has led to a disregard of professional ethics and values simply because ethics do not translate to immediate measurable impact. Research show that the teaching profession formed on the logic of competition and targets impose negative ethical implications in the profession especially, when teachers struggle to impress government, parents, and students (Ball, 2003; Werler & Faerevaag, 2017). Hence, ethics are lost, and results prioritised over processes, number over experiences, procedures over ideas and productivity over creativity (Ball & Olmedo, 2013). Moreover, overemphasis on data and performance outputs has two main consequences already discussed above: performance and fabrications (Perryman, 2006).

Overemphasis on data can undermine teachers' professional judgment and the nature of teaching (Bradbury, 2014). This is true, particularly when authorities look to regulate the profession including inside the classrooms. This causes confusion, stress and fear which undermines teacher autonomy, restricts their practice and reinforces unfair structures in pupil learning (Ball, 2003; Werler & Faerevaag, 2017). Subsequently, teachers begin to adopt test-based pedagogies (Ball, 2003). This means pervasive use of data, especially test results to evaluate performance which, if not handled with caution, might not only determine what teachers do in class but also limit the kind of knowledge they provide to pupils. But perhaps more interesting is the question of how teachers respond to performative regimes.

According to Kilderry (2015) teachers respond to performative regimes by resisting or cynically complying with the requirement. Resistance is when teachers do not comply with accountability mechanisms. They resist by either thinking or acting differently or by simply refusing standardised

technical practices outlined in policies (Fenech et al., 2010). Another strategy used by teachers is strategic or cynical compliance. Here, teachers do certain things they do not believe in merely to satisfy others (Ball, 2003; Courtney, 2014). Perryman (2006) calls it 'panoptic performativity; that is, 'performing the 'normal' to escape inspectors' scrutiny' (p. 150). For example, teachers may engage in pervasive tracking of pupil progress because authorities need it, but they (teachers) may not believe in it as key to pupil learning. By complying, teachers' practices become mechanised rather than professional. This problem is widely documented in the literature. For instance, Ball (1994) argues that compliance, 'constitute a more subtle yet totalising form of control of teachers than is available in the top-down prescriptive steering' (p. 54). This is because 'performativity works from the outside in, via controls, regulations and pressures, and from inside out, colonising lives and producing new subjectivities' (Ranson, 2003, p. 469). This can affect teaching and curriculum practice (e.g., through fabrications). Perryman (2006) found that in 'performative' demands, lessons are taught in certain ways and school documents revised to reflect the expected discourse demanded by authorities. Performativity may thus, steer pedagogy from a distance as teacher's pedagogical interpretation of the curriculum becomes constrained (Robert-Holmes & Bradbury, 2016). Information relevant to test requirements is pushed to pupils, rather than meaningful learning. For example, Robert-Holmes and Bradbury (2016) found that datafication and testing in the English early years' education narrowed the early years' pedagogy to focus on tests.

In conclusion, arguments for and against data use in English schools are well documented. Also, pervasive use of data in English schools has been perceived as driven by the concept of 'performativity' in education. This concept is associated with high-stakes accountability and is also documented in other countries including the USA and Sweden (Johannes & Janelle, 2014); Slovenia (Trunk et al., 2018); Australia (Connell, 2013; Kilderry, 2015); and England (Ball, 1998; 2003; 2012; 2017; Perryman, 2006; Wilkins, 2011). In England, the concept of performativity in education is discussed by Stephen Ball. It is this concept of performativity that I intend to use as a framework for discussing the study findings. The concept of performativity and its criticisms therefore, deserve a brief mention in this literature review section before I embark on what literature says about how data may be supported in schools. In the ensuing discussion the focus will mainly be on performativity in the English education context because performativity takes different forms in different contexts (Harvey, 2007). A definition of the concept, an illustration of its manifestation in teachers' practices, criticisms associated with it and a conclusion will be the main stages of this discussion.

2.5.4 Performativity in English schools

The market-based schools in England alongside high-stakes accountability policies are widely conceptualised as a culture of performativity (Ball, 1998: 2003: 2012; 2017; Cain & Harris, 2013; Perryman, 2006; Wilkins, 2011). Performativity is an aspect of neoliberalism which centers on the logic of 'performance'. Lyotard (1984) defines performativity as 'obsession with efficiency and effectiveness measured via 'input-output ratio' (p.88) while Ball (2017) describes it as a culture or a system of 'terror' (p. 57). The term 'terror' as used by Ball means a regime where targets, tests, comparisons, judgements and publications of performance as a means of accountability pervade teachers' work. Ball's (2017) and Lyotard's (1984) definitions suggest that performativity is performance deliberately designed to generate emotions, respect and fear.

Going by the above definitions, it is reasonable to argue that performative systems constitutes two traits- that of management and performance. The former orients people to follow certain so-called 'best practices' (whether they work or not notwithstanding) while the later adds to individual pressure to perform (Ball, 2017; Ball & Olmedo, 2013, Perryman et al., 2011). For example, performative systems provide governments with an indirect management of education via systems of benchmarks and outcome indicators which manifest in the discourse of improving quality and standards, most of which, are data-driven. In addition, performativity assumes that if teaching is good, then students' achievement data should also be good and vice versa. However, management policies enacted to improve performance via competition such as league tables, accountability and sanctions (West et al., 2011), have the potential to de-professionalise teaching (e.g., hindering teacher creativity) through what Foucault calls, 'imposing a particular form of behaviour' (p. 205) on teachers. That is, performativity can have profound implications on the meaning and experiences teachers bring to their work; their identities; their dedication to teaching; and how they view their careers. This is because performativity 'does us'; it speaks and acts through our language, purposes, decisions and social relations (Ball, 2012). Ball (2012) warns that performativity 'invite and incite us to make ourselves more effective, to work on ourselves, to improve ourselves and to feel guilty or inadequate if we do not' (p. 31). That is, performativity works most powerfully when it is 'inside our heads and our souls' (Ball, 2012, p. 31). Performativity, therefore, can be a central analytical tool for understanding how English teachers interpret and use data.

Performativity manifests in many ways in the English schools some of which are already discussed in the previous sections. They include inspections (an aspect of panoptic performativity), widespread publication of test scores and comparing schools in league tables and progress monitoring practices all of which are systems of 'performance' and accountability (Ball, 2017). In schools, performative practices entail construction of targets, tests, grades, performance management, inspections, performance pay, teacher appraisals, and sorting people based on measurable quality (Troman et al., 2007). Performativity may also manifest through construction of test-based league tables and computerised databases through which teachers and students are monitored, recorded, and published in the public interest' (Ball, 1998; Perryman 2006). Performativity in English schools also manifests through unintended data use consequences such as educational triage, fabrications and abuse of data (discussed in the previous sections). Therefore, performativity is more likely to make data use pervasive in the English schools than previously since performative regimes increase the focus on data because schools must prove that they are effective. This is already evident in the English early years' schooling (Bradbury, 2014; Robert-Holmes & Bradbury, 2016), through primary school (Troman et al., 2007; Wrigley & Wormwell, 2016) to high school (Schildkamp et al., 2014; Downey & Kelly, 2013; Perryman et al., 2011).

However, performativity in English schools has been widely criticised. Some of the criticisms will be highlighted. Comparisons will be made against arguments provided by Stephen Ball, Jane Perryman and others. The criticisms are vital for this study because they will enable us to understand the pros and cons of data usage in English schools.

2.5.5 Criticism of performativity

Performativity has been criticised for its negative effects on teachers and students (some already discussed above). To understand the effects of performativity in the English education, I will largely rely on what Stephen Ball and Jane Perryman say concerning performative systems. For instance, Ball (1998: 2003: 2012; 2017) and Perryman (2006) concur that problems emerge when performative systems make teachers accountable in certain ways. Such problems may include: (1) individualisation and damaged relations (2) targets narrowing focus what can be measured (3) orientation to outcomes and (4), it undermines creativity.

First, performativity isolates through individualisation. It destroys common solidarities and professional identities and replaces it with a new community of cooperate culture and competition (Ball, 2017). Although a cooperate culture may encourage team work, the managerial stance of performativity encourages differentiation and internal competition between teams. Such high-stakes competition may push people to a survival 'culture of self-interest' (Ball, 2017, p. 54). Consequently, partnering to learn best practices from other schools or colleagues may receive little attention when schools and teachers shift their focus to meeting external expectations. For instance, teachers with performance and inspection demands may aim to attain benchmarks and performance qualifiers such as outstanding, rather than building a community of team work and support for each other. Pupils may experience similar effects.

As a result, performativity can damage relations (Ball, 1998; 2017) because it creates a mode of power relations in which people are judged on measurable productivity rather than their personal worth (Ball, 2016). Miller and Rose (2008) adds that performativity is a technology of dividing practices that work to find, valorise and reward successful productive subjects, and target for exile those who fail to rebrand to the image of the markets (Gillies, 2011). This way, performativity damages relations when it becomes the determinant of social relations (Apple, 2017; Ball, 2003). For example, relations may suffer when teachers and pupils are made more accountable inside schools. Excessive accountability creates less belonging and unhelpful ethos between staff as there is less tendency to share resources (Perryman, 2006; Ball, 2012). As Ball (2003) argues, productivity is everything in performative systems, and 'performance has no room for caring' (p.224). Hence, languages of judgements such as 'outstanding', orients beliefs about one's productivity and defines relations (Ball, 2017). These language games of performative judgements may encourage inequality (Ball, et al., 1994), for example, giving more support to borderline students than others in EBacc discussed in the section, 'data use'. The danger here is judgements may not capture the mind and soul of everyone. Moreover, 'performance pressure can be so high that the 'value of a person is eradicated' (Ball, 2003, p. 224).

Second, performativity often turns education into a game of targets thus narrowing focus on what can be measured (e.g., in GCSEs). Although a focus in measurable tests can be positive in some ways, the target-based culture can create an instrumentalist view of students and education. As Ball (1998; 2003) rightly puts it, performative measurements do not always value the things that may be

considered valuable in their own terms. This is because in performativity, numbers triumph over experiences, pedagogy, learning contexts and learner situations. Ball (2012) sums it up, saying:

> The first-order effect of performativity is to re-orient pedagogical and scholarly activities towards those which are likely to have a positive impact on the measurable performance outcomes and are a deflection of attention away from socio-emotional and moral development that have no immediate measurable performance value. (p. 30)

Teachers may focus on measurements that have little or no benefit for student learning and pedagogy (Robert-Holmes & Bradbury, 2016). This can be problematic in many ways. For instance, targets may lead to unhealthy focus on data (Ball, 2003: 2015) by narrowing teachers' focus to academic success, league table positions and what is tested, rather than on what is best for pupils for instance learning and social relations. Performativity can thus be self-reinforcing 'using comparisons and judgements in place of interventions and direction' (Ball, 2012, p. 31). The possible effect here, is teachers who are unable to look beyond the metrics for the 'bigger picture' (Ball, 2017). Another problem is targets may harm education as teachers become more interested in doing whatever it takes including fabrications to get better data outcomes. This already plays out in England with the focus on grade 4 borderline students (see section 2.5.1.9)**.** Consequently, teachers may focus on analysing data to check whether targets are being met.

Third, performativity orients teachers to outcomes such as test scores to the exclusion of everything else (Ball, 1998: 2017). That is, a focus on the product rather than process. Ball (2003) equates this with the belief that if it is not being tested, it is not being taught. Other studies also show that performativity orients teachers to outcomes rather than the needs of different students in class (Robert-Holmes & Bradbury, 2016; Perryman, 2006). This may be due to competition to improve pupil outcomes in test scores, but not necessarily to support the process of learning (Whitty, 2008), hence, teaching to the test. One problem with using data to teach to the test is that it can produce students who are less interested in learning (Lee et al., 2012). Another problem is that data imposes precision on phenomena which are not precise and thus, should be interpreted with caution but are not (Ball, 2003). This suggests that tests may be unreliable depending on the timing and the kind of data used. For example, a test result might not be similar when the same students take the same test after some days or months. Also, giving different tests to different students in different days can

produce different results which may reflect an outcome for that day only. Therefore, a school dropping a few places in the league tables might not necessarily mean it has deteriorated.

Last, performative demands via excessive external interferences can undermine teachers' creativity. Driven by targets and levels, the system may not allow for individual freedom to be creative. A strict focus on narrow goal attainment, for example, can impede experimentation and risk-taking. According to Ball (2016), risk-taking becomes dangerous in performative systems because it is unclear whether it would improve the output, for example, in the GCSEs. This means schools working with a 'too important to fail' mentality by evading failure through all means. Ball (2003) warns that this may make the core of school becoming a dull, mundane routine of testing, producing the opposite of risk-taking, which means, a reductionist orientation of knowledge. Consequently, the question of where this would leave students who need differentiated programs may arise especially when they are not likely to improve school performance. This question touches on the core effects of performativity on risk-taking in that it may limit teachers' options to change thus making them unreflective of their data use practices.

However, the effects of performativity are not always negative for teachers. They do not simply function as 'terrors of performativity' (Ball, 2013, p. 216). Sometimes, performativity has positive effects. Ball (2003) and Perryman (2006) observe that apart from stress, performativity labels such as 'outstanding', may carry a feeling of being 'excellent' or achieving. This offers satisfaction to those achieving as Ball (2012) reminds us, 'performativity is not in any simple sense a technology of oppression; it is also one of satisfaction and rewards, at least for some' (p. 31). A study of early childhood teaching in Australia also found that performativity policies assisted teachers to articulate and explain their role (Kilderry, 2015). The study reported positive effects when teachers' work was acknowledged, valued and supported by performative measures. Another example of positive effect of performativity was evident in England where a new generation of teachers showed post-performative traits (Wilkins, 2011). Teachers in this study were neither 'compliant' nor 'resistant' to performative measures (Ibid, p. 389). Instead, they balanced accountability demands with their autonomy in their teaching practices. This suggests that some teachers can adapt and think of other ways to operate within performative regimes, rather than merely responding to performative requirements. Besides data use and its effects, teachers need support mechanisms to use data. My next discussion is about the conditions that may enhance data use practices in schools.

2.6. SCHOOL CONDITIONS ENHANCING DATA USE

A large body of research argues that schools need supportive conditions for data use to flourish (Anderson et al., 2010; Coburn & Turner, 2011; Schildkamp & Kuiper, 2010). While studying conditions influencing data use in schools, Anderson et al., (2010) found that school leadership plays a central role in setting up data use purposes, expectations, opportunities, training, access to expertise, and follow-up actions. School leaders are vital in championing and giving support for teachers to respond to and use data. Young (2006), Marsh and Farrell (2015) and more recently Hoogland et al. (2016) concur that school leaders model, plan and support teachers' data interpretation and use processes. The studies suggest that data may be used or ignored by teachers depending on the measures enacted by school leadership. In the ensuing discussion, some school leadership actions that may promote data use in schools are reviewed based on the available literature.

2.6.1. Devolved leadership

A shared or devolved leadership style may enhance data use growth and success in schools. This applies when roles and responsibilities are clearly outlined (Kerr et al., 2006; Young 2006). Through devolved leadership, individuals may take greater responsibility for what they do. According to Schmidt and Datnow (2005), school leaders should distribute decision-making authority over several groups and levels such as heads of departments or data teams to act on, use, and own data. Sharing leadership responsibilities can enhance innovation and change among teachers and should occur by design rather than by default. The practice allows others to lead through broad-based involvement in decision-making while the school leadership actively set strategic directions for the school. Case studies on school transformation in England confirmed that distributed leadership was a central part of data use success and highlighted, its association with higher performance gains in student achievement (Harris, 2008). In all the cases studied, school leaders deliberately shared leadership responsibilities to support innovation and change. Devolved leadership, however, it is not about more numbers of leaders but rather quality leadership within different levels of schools.

2.6.2. Teacher collaboration

Teacher collaboration is another ingredient to data use. Teachers working in isolation can hinder data use in schools (Datnow et al., 2013; Lee et al., 2012; Van Gasse et al., 2017). Schildkamp and

Kuiper (2010) and Wayman and Jimerson (2014) identify teacher collaboration around data use as a valuable opportunity for teachers to learn how to use data. A range of leadership actions can shape teachers' collaborative work on data. School leaders, for instance, can make data use a collective responsibility, establish norms for teacher collaboration, and implement data use discussion protocols for teachers working in groups. Leaders should initiate teacher collaboration activities around data planning, analysis and interpretation (Wohlstetter et al., 2008; Young, 2006). Schilkamp et al. (214) found that data use was common in English schools and among Lithuanian and Polish teachers and that teachers collaborated sometimes at the request of school leaders. School leaders who provide teachers with data use collaboration opportunities are likely to promote effective use of data in their schools. Some studies document the benefits of teacher collaboration around data use. A correlational study (Lee et al., 2012), for example, found that teacher collaboration had a positive relationship with instruction and pupil learning whereas a systematic review (Hoogland et al., 2016), identified teacher collaboration as a pre-requisite for data use in the classroom.

2.6.3. Having vision and goals for using data

Establishing clear and shared visions and goals for using data can enhance data use in schools (Ikemoto & Marsh, 2007; Kerr et al., 2006; Young, 2006). Honig and Coburn (2008) argue that school leaders with data use visions and goals focus on using data to support improvement processes, and not for blaming staff. Studies show that school leaders who effectively encourage data use are those who are knowledgeable and committed to data use by setting and conveying clear goals and teacher expectations around data use processes (Levin & Datnow 2012; Wayman et al., 2012). Also, school leaders with strong visions and goals for using data showed openness and collaboration that enhanced data use unlike those lacking the traits (Ikemoto & Marsh, 2007; Schildkamp & Kuiper, 2010). Schildkamp et al. (2014) argue that a lack of clear and shared data use vision and goals in school can hinder data use. This means data use vision and goals needs sharing across different levels of the school (Wayman et al., 2012). But many schools lack shared clear goals and visions for using data. Studies show that the visions and goals for using data in many schools are clear only to school leaders but become less clear to the rest of staff (Schildkamp et al.,2012; Wayman et al., 2012). But the goals for using data not only need to be clear and shared, they also need to be measurable and specific at school, classroom and pupil levels (Honing & Coburn, 2008). For example, school leaders can encourage staff to constructively challenge each other through the provision of specific evidence for claims they make during a data inquiry process.

2.6.4. Structuring time to use data

Structuring time for staff to analyse, synthesise and interpret data may enhance data use in schools (Coburn & Turner, 2011; Ikemoto & Marsh, 2007). Time to use data not only changes individual and collective beliefs, but also prompts an in-depth collective re-examination of the meaning of data through open discussions. Ikemoto and Marsh (2007) found that schools pursuing complex data use processes, gave valuable time for common planning in groups that enhance collective interpretation, resulting in data-informed actions. Giving teachers time for data inquiry might enable them to understand the implications of data for school-wide improvement.

2.6.5. Training staff

Schools are made of individuals some with data use knowledge and skills and others without. It takes certain knowledge and skills to collect, analyse, interpret and use data. School leaders can support data use or perhaps provide teachers with data use training (Kerr et al., 2006; Wohlstetter, et al., 2008). Providing teachers with data use training is essential for effective use of data (Levin & Datnow, 2012; Lee et al., 2012), and enables teachers to use data to inform teaching (Ebbeler et al., 2016). Codding et al. (2005), for instance, show that after training, teachers were able to successfully use data to frame instructional goals and objectives based on data. Means et al. (2009), however, warn that one single training session might not change teacher behaviour or actual use of data. Rather, providing Continuous Professional Development and technical assistance in teams is more likely to yield positive results. A survey by Downey and Kelly (2013) reported a higher frequency of data use training and skill for English school leaders than for class teachers and heads of departments. An exploratory study (Schildkamp et al., 2014), however, found that despite receiving some data use training from local authorities, English teachers were still unable to demonstrate improvement measures based on data.

Recent studies thus propose alternative school leader-led strategies to support long-lasting context-based data use teacher training within schools. For example, Mandinach and Gummer (2016) recommend that school leaders integrate school-based data use training and experiences as part of teachers' everyday practices in schools. One strategy to implement such school-based data use training is by implementing data teams which enable teachers to use data in teams to solve education-related problems in school.

Data use interventions studies have identified some benefits of data teams in schools. A mixed methods study measuring the effects of working in a data team in 10 Dutch secondary schools (Ebbeler et al., 2016), showed that teachers who worked in data teams did not prioritise data use for accountability but rather for instructional actions and school development. A similar study in nine Dutch schools with no control group showed that five out of the nine data teams that took part in such an intervention were able to increase student achievement (Poortman & Schildkamp, 2016). However, whether a data team intervention in high-stake data use contexts such as England would produce similar results is still unclear.

2.6.6. Assigning a data expert

The process of collecting, storing, analysing, interpreting and retrieving data, can be difficult and technical for many teachers. Ikemoto and Marsh (2007) found that teachers avoided using data especially in contexts where they lacked adequate data expertise and time to spare on data activities. School leaders may hire or appoint a statistician to help teachers collect, filter, analyse, interpret and present data (Datnow et al., 2007; Kerr et al., 2006). Schildkamp et al. (2014) found data managers in some English and Dutch schools. Whilst most data managers (DMs) in the English schools are members of staff, those in the Dutch schools are not. They only visit to support the data needs of the Dutch school leaders at the school board level. Having a teaching staff as a DM may bring the benefit of understanding the context under which data has been generated. However, it adds to teacher's workload and sometimes the teacher may not be well-trained to handle data matters as it would be with an external DM.

2.6.7. Pressure and support

School leaders can enhance data use through pressure and support. Teachers might not use data if data is not advocated, stimulated and encouraged by school leaders. Towards this end, Marsh et al. (2006) give evidence suggesting that teachers may disregard data they perceive as lacking quality or invalid, although, under pressure (e.g., through rewards and sanction), they may use such data. Marsh (2012) adds that fellow teachers and external actors may also exert pressure on teachers to use data.

Fullan (2001), however, cautions that pressure without support can lead to resistance and alienation, whereas support without pressure can drift and waste resources. Wohlstetter et al. (2008) concur

arguing that accountability combined with support incentives are key to promoting data use. Equilibrium between support and pressure should thus be established when supporting data use in schools. Support can be in the form of data coaches, facilitators, data collection instruments, technological tools (e.g. software) which help teachers to summarise and create reports from data into user-friendly modes (Ikemoto & Marsh, 2007). Some English teachers have data systems and software which enable access to timely data (Schildkamp et al., 2014).

2.6.8. Involving students and parents

Involving parents and students can enhance data use in schools (Levin & Datnow, 2012; Omoso, 2013). Levin and Datnow (2012) explain how school leaders', students' and parents' actions influence each other in co-constructing the success of data use at the school level. Their study summarises the benefits of sharing data at each level and shows that by sharing data, school leaders and parents were able to formulate school-wide student learning goals, gave supportive structures and a culture of data use and trust. Students were also able to discuss, examine their own data, develop ownership of their own learning through reflections, create actionable measures for improvement and to check whether they were meeting their learning targets. Their study suggests that using student assessment data was incomplete without bringing students onboard to understand their role over the results. Teachers in the study also reported that although assessment data was useful for improving instruction, it did not tell everything teachers needed to know to help students succeed unless the students were involved.

2.6.9. Establishing a partnership with external organisations

Schools may partner with external organisations such as universities, IT companies, state departments or other schools to support data use. Hitt and Tucker (2015) in their systematic review of key school leadership practices found that collaboration with external partners was an effective strategy for school leaders to enhance student achievement. Moreover, Stringfield et al. (2008) found that teachers appreciated cross-site collaborative data use opportunities. Teachers felt that off-site collaborations and cross-school retreats offered them valuable learning experiences and sharing of best practices. Stringfield et al. (2008) found some teachers collaborating with teachers in other schools to observe classroom instruction in high achieving and demographically similar schools and implemented some of them in their own classrooms with the hope to improve student performance.

Finally, school leaders may use one or a combination of the above actions to create conducive data use conditions in their schools. That is, different school leaders may support data use differently.

2.7 CONCEPTUAL FRAMEWORK OF THE STUDY

Based on the above literature review, a conceptual framework is generated to organise data for this study (Figure 2.1). The framework is based on variables hypothesised to influence data collected, data interpretation, data use, and data use support in schools (Ball, 2003; Ikemoto & Marsh, 2007; Levin & Datnow 2012; Schildkamp & Kuiper, 2010; Spillane & Miele, 2007). The Framework may not be exhaustive but is adequate to guide the study; particularly during data coding. Results from the study may be used to improve the framework. Although the core section of the framework portrays data use as a linear rational process, I acknowledge that data use involves several processes, conditions and contexts which interact in complex ways. The framework tries to consider that it is the interaction between data and people in certain contexts that result in decisions and data use. Data use, for example, involves an interpretative process in which data must be identified, collected, analysed and interpreted for meaning before action(s) are taken or ignored. The framework tries to capture that complexity by showing how the factors are interlinked and influence each other. Subsequently, the framework is presented and a brief explanation of how its various parts are interlinked is provided.

Figure 2. 1: Conceptual framework of the study

2.7.1 Operationalisation of the conceptual frame work

The conceptual framework suggests that external actors in Part A and internal actors in Part B may influence the data types collected, stored and used in schools (Part C). The framework also suggests that for data use to be successful, certain conducive conditions should exist in schools (Part D), which in turn influence how data is interpreted (Part E), and used by teachers and school leaders in Part F. After data has been used, it may be stored in its original form (part C), and some may be passed over for use by other teachers or school leaders in part B, or even shared with external actors as an accountability requirement in part A.

One key aspect of the conceptual framework is that it links the data collected in schools to school conditions, interpretation and use. The framework suggests that external actors (i.e. policy makers, inspectors, parents and researchers) in Part A, highly influence the data collected and how it is interpreted and used by internal actors such as teachers and school leaders in Part B, hence, their placement at the top of the framework. Further, the framework acknowledges the different school system levels (also called internal actors) who access and use school data in part B and tries to show that access and influence on data use practices in schools, depends on seniority within the school system levels (Schildkamp et al., 2012). School leaders, for example, have more access and influences on data use practices in schools than teachers. Further, although there exists no universally accepted distinction between teachers and school leaders, the framework separates the two in part B, because a study by Schildkamp and Kuiper (2010) showed that the two may use data differently, and therefore, is worth acknowledging in the framework.

CHAPTER 3: METHODOLOGY

This chapter presents the research approach used in the study. It addresses the philosophical foundations, the study strategy, the methods and the ethical procedures that underpin this study and how they tie in together. It also highlights the limitations of the study and concludes with challenges encountered during the study and what they meant.

3.1 METHODOLOGY

Methodology is about explaining and justifying approaches, methods and procedures used in a study (Clough & Nutbrown, 2006; Sikes, 2004). This is because different approaches and techniques answer different research questions and have different philosophical underpinnings. It is conceivable that the approach and methods taken by a researcher can impact the way data is generated in a study and ultimately the results. Methodology and methods are thus distinguished in the literature. Sikes (2004) posits that while methodology is about understanding what you are doing, methods are about doing. Sikes (2004) explains, 'methodology is about understanding and justifying the overall type of research whereas methods are about understanding and justifying the actual practical use of those methodologies' (p.16). Essentially that means methodology empowers the researcher to comprehend the research process itself.

In line with the above views, researchers identify three determining factors for choosing the research methodology: the research aim, nature of phenomena under investigation, and the research questions posed (Gray, 2014; Thomas, 2009). Thomas (2009) adds that the above factors and the methods used should be 'knit' together, demonstrated, and justified. Researchers, however, refer to research approach, strategy and methods almost synonymously. For consistency and clarity, a distinction has been made between the terms research approach, methods and strategies as used in this study, followed by an explanation on how the 'factors' influenced the methodology choices. To make that clarity, I use the distinction provided by Simons (2009), that the term '*approach*' means the research design; 'research strategy' means the educational and ethical process by which I gained and maintained access to collect data; whereas 'methods' are the techniques of research I used such as interviews.

3.2 STUDY APPROACH

3.2.1 Qualitative case study

The study followed a qualitative case study approach. According to Morse (1991) what distinguishes qualitative research from quantitative research is the research problem and the research question posed and not the research methods used. Morse (1991) argues that a research is qualitative when (1) the concept under investigation is either 'immature', lacks previous research or biased in findings; (2) when there is need to describe phenomena; and (3) when the nature of the phenomenon under investigation is not suited for quantitative measures. These criteria will be re-visited later to justify the use of qualitative case study in the section, 'why I used qualitative case study'.

Meanwhile, I use the term approach to imply that qualitative case study in this study had a larger goal and methodological intent which influenced my methods. Simons (2009) noted that 'when using case study approach, it is important to acknowledge the tradition you are drawing upon' (p.19) and to be aware that case study draws on many methods. Framing the study thus needed an examination of how case study has been defined by authors from different social science traditions and how my study fits into their constructs.

Presently, exact definitions of the case study are problematic because of the alternatives different authors provide. Pointedly, some researchers (Merriam, 1998; Simons, 2009; Stake, 1995) define case studies from a qualitative-constructivist stance, while Yin (1994) defines it from a quantitative-positivist stance.

According to Stake (1995) case study is, 'the study of phenomena via cases' (p.11), similar to Simons' (2009) definition that a case study is the study of the particular. Stake adds that a phenomenon is complex and tied to political, social, historical and personal contexts which shape meaning. A similar view is held by Merriam (1998) who perceives case study as an end-product involving thick-description of phenomena. Both Stake (1995), Merriam (1998) and Simons (2009) view case study as the study of an individual, a situation, or a phenomenon within its context. Creswell (2013) however provides a slightly controversial definition of case study in which he attempts to delineate the context of phenomena. He states, 'a case study is a qualitative approach in which the researcher explores a bounded system(s) using multiple sources of evidence and then

describes the case and cased-based themes' (p. 97). The term 'bounded system' as used by Creswell (2013) refers to what the researcher can 'fence in' during a study. This is problematic because it is hard to distinguish where a phenomenon ends, and its context begins in the social world. For example, data use in schools are influenced by both internal such as teacher characteristics and external school environments such as education policies. It is therefore difficult to bound data use to the internal context of schools alone as Creswell (2013) suggests. In summary, the definitions of a case study provided by Stake (1995), Simons (2009), Creswell (2013) and Merriam (1998) convey a qualitative stance, that is, the study of a phenomenon within its context using an inductive approach.

In contrast, Yin (1994) perceives case study as a potential for replication and generalisations like it is with experimental studies. In this sense, Yin's view of case study has a positivist leaning. He adds that 'case study inquiry copes with the technically distinctive situation with more variables of interest than data points, relies on multiple sources of evidence with data needing to converge in a triangulating fashion, and benefits from prior development of theoretical propositions to guide data collection and analysis' (Yin, 1994, p.13). This statement by Yin opens ground for debate. First, the term 'variable' as used by Yin may not be appropriate because in the real world as revealed by case study, many factors influence each other in complex ways. Moreover, in the social world contexts, it would be difficult to measure and attribute a variable to a specific cause. Yin's (1994) assumption that multiple sources of data should converge in a triangulating fashion is also flawed because in social science research where complex phenomena are involved and multiple realities exist, findings may or may not converge. Yin (1994), however, concurs with Creswell (2013) and Merriam (1998) that case study is not restricted to particular methods.

From the above definitions, two traits of case studies emerge: (1) case study is the study of phenomena within its context, and therefore, it is very different from experimental studies; and (2) case study is flexible in methods. This study used the qualitative case study approach. A more detailed justification for choosing this approach will be revisited later. Meanwhile, numerous authors contend that after a decision to use case study approach has been reached, cases (single or multiple) should be selected to help achieve the aim of a study (Creswell, 2007; Merriam, 1998; Yin, 2003). In this study, multiple cases (five schools) were chosen to explore in-depth, how English teachers interpret and use data in a variety of school contexts. The reason for choosing five schools is given in section 3.5.2.

3.2.2 Multiple cases

There are varied views as to whether a single case or a multiple case study is the best choice. The choice of selecting single or multiple cases depends on the study context and aim (Gustafsson, 2017; Eisenhardt & Graebner, 2007). As I specified in the study background, England has diverse types of secondary schools which made me believe that data and data use practices might be different in these schools. Hence, I chose different school sites (multiple cases) for the study. Creswell (2007) argues that 'in multiple cases, one issue is selected, then the researcher selects multiple cases to illustrate the issue' (p. 74). The study aimed to understand how teachers in the variety of school sites use data as unique cases. The variety of school contexts were thus considered more likely to offer a more thorough understanding of how English teachers use data than using single case study approach.

A selection of multiple cases was also preferred to permit specific-case and highlights of cross-case analysis (Yin, 2003). Five cases were selected to permit comparison of important similarities and differences between the cases. As Eisenhardt (1989) argues, 'between four to 10 cases usually work well' (p.15) for cross-case analysis and, above 10 cases provide volumes of data that can be difficult to analyse. The main aim of this study, however, is to gain an in-depth understanding of the 'particular'. Highlights of cross-case analyses will mainly be used to help discuss the study findings by drawing upon the essential impacts about the similarities and differences between cases (Baxter & Jack, 2008) and to show whether insights from the entire study are important or not (Yin, 2003).

Although single case studies enhance a deeper understanding of phenomena; are cheaper and consume less time to conduct (Baxter & Jack, 2008; Eisenhardt & Graebner, 2007), multiple case studies remained my choice because this study was driven by the desire for depth and variety. Besides, depending on a study goal and careful selection of cases, case study researchers can significantly minimise the cost and time for conducting multiple cases (Etikan et al., 2016). For instance, by selecting the nearest, most accessible and friendly schools, I was able to reduce the cost and time I spent in the field studying the cases.

3.2.3 Limitations of qualitative case study

Qualitative case study approach is said to lack generalisability, objectivity, rigour and confirmability (Morse et al., 2002; Punch, 2014; Yin, 2014). According to Morse et al. (2002) and Lincoln and Guba

(1985), these concerns are better addressed during qualitative research processes. For instance, through methodological coherence, theoretical sampling, instrument testing, investigator sensitivity to respondents' responses, probing for examples, keeping audit trails, saturation of data, and developing an active analytical stance. I have demonstrated these in the research processes of this study. Below I briefly discuss the concerns about generalisability, objectivity, rigour and confirmability.

3.2.3.1 Generalisability

It is said that generalisability of findings from qualitative case study to other contexts is limited because of the small number of cases and participants involved. Quantitative researchers, for instance, question how one or two cases can represent the whole. It is difficult to attain the whole picture as positivists suggest. However, the question of making generalisation from case study, is to me, a misunderstanding of the reason behind conducting case studies. Case study research is not aimed at making (law-like) generalisations as it occurs with experimental studies. Rather, case study is conducted to understand the 'particular' (Stake, 1995; Woodside, 2010). What is more, as Lincoln and Guba (2000) argues, 'the trouble with generalisation is that they do not apply to particulars' (p. 27). Moreover, generalisations oversimplify the worldview, contrary to the main purpose of a case study research, which is about an in-depth understanding of phenomena. Hence, 'case studies have high accuracy but low generalisability' (Woodside, 2010, p. 21).

This study did not aim to make generalisations but rather gain an in-depth understanding of the phenomena. I wanted to interpret and make sense about what was happening in each case school and to explore possible explanations for it. Therefore, the study was not a universal study on data use but a study of data use in some individual schools as a way of contributing to knowledge about data use in schools.

3.2.3.2 Objectivity, rigour and confirmability

Qualitative case study approach is perceived by positivist researchers as lacking objectivity, rigour and confirmability. From a positivist point of view, the qualitative approach relies largely on researcher's unsystematic perceptions and interpretations of peoples' experiences (Creswell, 2007; Miles & Hubberman, 1994). Thus, it is perceived that qualitative researchers have a lot of freedom

to select from their research data what is treated important or insignificant. Also, the trustworthiness of data may be compromised by the close personal relationship qualitative researchers establish with the researched (Bryman, 2012). It also argued that readers of qualitative case studies are sometimes provided with limited information about why one area was chosen for the study over the other (Braun & Clarke, 2013). My response to these concerns is that these perceptions are framed from a quantitative rather than a qualitative stance. Moreover, research data do not speak for themselves; researchers do, by forming meaning out of data. Therefore, all research (quantitative included) are, at some point subject to researchers' own interpretations (Flyvbjerg, 2006).

The rigour and confirmability of qualitative studies are built in the qualitative research processes (Morse et al., 2002). Qualitative case study such as mine follow rigorous, transparent and confirmable procedures (as demonstrated in my research approach, strategy and methods). The strategies and methods are straightforward, confirmable and recognise the critical responsibilities of the researcher and the researched. For instance, I maintained my role as a researcher, and as much as possible prevented my views from eclipsing those of my respondents. Also, the elaborate testing of my research instruments, use of multiple sources of evidence, audio recording and verbatim transcriptions translated into findings and a write-up, which are thorough in terms of the research rigour and confirmability.

As already hinted in my introduction to qualitative case study approach, my methodological choices were largely impacted upon by the study aim; the nature of phenomena; and the main research question posed. Below, I highlight the determining factors for choosing the research methodology to demonstrate and justify why I used qualitative case study approach to answer my research questions.

3.3 WHY I USED QUALITATIVE CASE STUDY

3.3.1 The research aim

Qualitative case study approach was chosen because the study aimed to explore the data use phenomenon in-depth to generate insights for describing (Morse, 1991), how 'particular' English secondary school teachers interpret and use data in their schools. As various authors argue, the primary aim of qualitative case studies is a thorough understanding of phenomena (Bassey, 1999;

Merriam, 1998; Stake, 1995; Yin, 2014). Also, qualitative case studies are perceived as appropriate for gaining a deeper understanding of issues in educational practice than when survey or experimental approaches are used (Bassey, 1999; Cain & Cursley, 2017; Merriam, 1988; Merriam & Tisdell, 2016). This is because while surveys and experimental approaches tend to study phenomena by removing them from their natural setting, case study emphasises the rich-world context in which phenomena occur (Stake, 2005; Simons, 2009). As Simons (2009) argues convincingly, case studies are about studying the lived experiences of individuals in their natural setting.

I wanted to understand and interpret 'how' teachers (in some schools) interpret and use data without changing or influencing what they do, and to explain the findings as I understood them. Interpreting and explaining the 'how' question about a complex phenomenon such as data use, is never straightforward and cannot be done in a vacuum. It must be done considering the broader context of the English Education, human experiences and scholarship (Trip, 1985). For instance, I used some relevant extant arguments from Stephen Ball about performativity in education to examine the meanings behind teachers' interpretation and use of data. This way the study was neither purely descriptive nor about theory-building from scratch. Critical to me was to make the case study useful to different people in different ways (Bassey, 1999). Whilst some research approaches, presume a general, disinterested reader, who will believe or disbelieve findings based on factors such as the weight of evidence, the study assumes that readers will bring their own knowledge to their reading, and interpret the cases in the light of their individual prior knowledge and context. Qualitative case study permits this.

Also, qualitative case study approach is flexible in methods (Denscombe, 2014). This permitted my use of interviews, surveys and documents to understand and explain plausibly and in different perspectives (Bendassolli, 2013), how English teachers use data, the lessons that can be learnt and hence, build case-based 'thick descriptions' about the phenomena (Lincolin & Guba, 1985).

Although an ethnographic study of a single school can also yield deeper understanding of a phenomenon, I neither pursued nor developed the approach due to its inability to allow the study a variety of school sites. Unlike case study approach, an ethnographic approach is restricted to a single site; uses direct observations which is time-consuming; is intrusive; and may disrupt the natural setting of data use in the schools contrary to my research aim (Creswell, 2007; Denscombe,

2014). Also, data use is not necessarily something that happens daily, or on a weekly basis. In an ethnographic study of a single case, I might have had to wait several weeks to observe data use. My approach, resting largely on interviews, was an efficient way to obtain the information I needed. I therefore used a qualitative case study to permit in-depth understanding of data use in the diverse sites; to allow for use of less intrusive, less time-consuming, and less disruptive methods to schools and teachers.

3.3.2 Nature of phenomena

I used qualitative case study because the data use phenomenon in English schools is complex (Morse, 1991). The phenomenon is impacted upon by many factors including school setting, processes and relationships within schools which makes it complex. The topic is also contested, politically charged and influenced by contexts external to the schools themselves (e.g., inspections). Data use is also influenced by teacher characteristics (e.g., data literacy and perceptions) all of which keep on changing. Faced with such a complex phenomenon, a qualitative case study became a better approach to use because it can do what other approaches such as experiments cannot. Bassey (1999) argues that 'one advantage for the case study is its uniqueness, its capacity for understanding complexity in particular contexts' (p. 36). A similar opinion is held by Woodside (2010). Additionally, within the complexities of social truth, 'case study can reveal inconsistencies between viewpoints held by participants' (Adelman et al. Cited in Bassey, 1999, p. 23), which to me, formed an interesting aspect of the study. The study aimed to understand the complex aspects of data use such as how data is used differently at different levels of the schools such as at school leader and at classroom levels. A case study approach supported my understanding of that complexity. For example, about how various teachers use data in the schools; the social processes and relationships involved; the explanations; and the convergent and divergent views thus gaining a more thorough understanding of the practice in the English schools.

Data use in English schools is also a contemporary phenomenon. It is an activity that teachers do and learn from; it is dynamic, and little is known about how English teachers interpret and use data and their feelings about the practice under the current contested data use culture. This is something which motivated the study, and by extension, my use of qualitative case study approach as motivated by different researchers (Creswell, 2007; Gray, 2014; Stake, 2005; Yin, 2014). Whilst Yin (2014) argues that 'case study is appropriate for investigating a contemporary phenomenon' (p.

16), Gray (2014) adds that case studies focus on collecting current information about phenomena. The approach was thus useful in investigating data use phenomena where research activities and findings remain 'immature' (Morse, 1991).

3.3.3 The research question

Research study is built around a research problem and research question and not around methods. In this regard, several researchers contend that qualitative case study is ideal when a 'how' research question is posed about a phenomenon (Creswell, 2013; Gray, 2014; Yin, 2009). I utilised case study for its suitability in seeking answers to my main research question: 'how data is interpreted and used by teachers in English schools?' According to Morse (1991) and more recently Denscombe (2014), the 'how' research questions are not suited for quantitative but rather qualitative measures. From my main research question, there are four sub-questions, three of which are 'how' questions as seen below:

1. What data is collected by the English secondary schools and who accesses it?
2. How do teachers and school leaders interpret data?
3. How is data used by teachers and school leaders?
4. How do school leaders support data use in the schools?

Qualitative case study approach was useful in answering all my 'how' research questions. It permits me to expose contextual data use variations such as how data use support may influence how teachers use data. Moreover, answering the 'how' research questions in unexplored research areas are typically effective when a qualitative case study approach is used (Eisenhardt & Graebner, 2007). Next, I will discuss the philosophical underpinnings of the study in light of the research problem and research questions.

3.4 ONTOLOGICAL AND EPISTEMOLOGICAL UNDERPINNINGS

The research problem enables researchers to understand the reality about what they are investigating, and by extension, how to acquire knowledge from it (Creswell, 2007; Gray, 2014; Guba, 1990). Therefore, when I conceived this study, I deliberately reflected on the research problem and the research questions and decided that I would adopt an interpretivist ontology and a

constructivist epistemology. Whilst Ontology is a researcher's belief about the nature of reality of the research problem, epistemology is how knowledge is formed from a given reality, which again, influences how a researcher relates with the researched (Creswell, 2007; Punch, 2014). When trying to form knowledge about a phenomenon, qualitative researchers are often attached to the researched whereas quantitative researchers detach themselves from the researched. The phenomena in the context of this study is data interpretation and use.

3.4.1 Ontology

The study followed an interpretivist ontology because the main concepts in the study are by nature, open to multiple interpretations (Creswell, 2007; Lincolin & Guba, 1994). The concepts, that is, data interpretation, data use, data support and teachers, are all social constructions which all can (especially 'data') be interpreted in different ways by different people, depending on their perceptions. A researcher working in a positivist frame could define data for a study but would have to ignore that other people would define data differently.

Moreover, data interpretation and use are complex and can be interpreted by different people in different ways. For instance, each teacher potentially has a different understanding of data and data use which might not be necessarily wrong. Such differing understanding may result into various methods for knowing and sets of meanings about data and data use leading to separate realities (Crotty, 1998). Also, if teachers were homogenous as a group, it would be possible to research a representative sample and to draw valid findings from the sample. But they are not: they vary in their roles, the subjects they teach, their competence and the value they place on data more generally. Furthermore, how data is used can vary across time and settings. Headteachers' views, for instance, may influence teachers such that a change of headteacher is likely to lead to a change in staff views. Faced with such a complex phenomenon, it was not conceivable to have a single reality in the study (Patton, 2002). Rather, there were multiple realities. Different teachers' understanding of data use was likely to have a lot of overlaps emerging 'out of how individuals think' (Lincolin & Guba, 1985, p. 80). In such a circumstance, an interpretivist ontology provided the most feasible framework to understand the complex overlaps about how teachers use data, their experiences and explanations behind their data use practices. This way, I expected multiple interpretations of reality to emerge and my target as a researcher working inside this interpretivist perspective was to perceive how teachers build their own world inside their social settings

(Lincolin & Guba, 1985). Consequently, I visited schools to gain a thorough understanding of teachers' experiences, the complex relationships and the dynamics behind how they interpret and use data. This informed my constructivist epistemological stance in the study.

3.4.2 Epistemology

Constructivism is a belief that knowledge is formed largely from social interpretations rather than awareness of an external reality (Stake, 1995). Constructivism therefore prefers to develop knowledge through meaningful interactions (Creswell, 2007; Crotty, 1998; Lincolin & Guba, 1989). It acknowledges that different people construct meaning in different ways even when they experience the same events (Crotty, 1998). Such constructions of meaning are better understood through social procedures. Crotty (ibid) identifies several traits of constructivism, two of which are useful to this study: (1) because meaning is developed by people as they understand and interpret their world, qualitative researchers tend to utilise semi-structured questions so that the research participants can share their perspectives, and (2), people connect with their reality and comprehend it in view of their historical and social perspectives. The meanings and findings drawn from qualitative research, are thus, context-specific. As Bendassolli (2013) argues, 'meanings are acquired in the context to which they belong' (p. 9). I therefore used constructivist epistemology to thoroughly examine and understand how teachers interpret and use data in their schools. Individual teachers were interviewed to gain insights about the meaning and the value they place on data and data use as well as their shared experiences. Generally, how teachers construct their reality about data use in relation to their experiences and work context is complex and exhibits a constructivist epistemology.

From ontology and epistemology, methods of data collection were generated. The complex nature of the research problem required gaining evidence into the socially constructed multiple realities using mainly qualitative methods such as interviews, documentary evidence and a short survey for teachers. Teachers' interview statements were used as indicators of their data use understanding, experiences, feelings and practices. Stake (1995) describes interviews as, 'the main road to multiple realities' (p. 64). Talking with people is a major means of understanding how they see their world. In this study, the interview statements offered a 'richer' understanding about how teachers interpret and use data in their schools. Quotes from teachers supported building a richer

understanding of teachers' data use practices, including how individual teachers narrated their data use experiences differently from others.

A short survey for teachers was also used. The survey increased the number of participants to establish the extent to which the perceptions of the interviewees are held by others. The survey provided information about the perceptions of interviewees' colleagues and therefore the contexts of the interviewees and permitted more robust comparison between schools and different category of respondents than would be done purely on the interview data. The survey, for instance, might reveal how school leaders use data uniquely in contrast to class teachers. Lincolin and Guba (1985) contend that in a comprehensively conducted research, the researcher cannot discard divergent constructions of reality while trying to pull together a level of understanding. Individual respondent's experiences and the setting in which they occurred in the emerging constructions were thus useful to me and were considered (Appleton & King, 2002). This meant considering every piece of data so that I did not miss out anything. Details about the methods I used are provided in the 'methods' section. Next, I describe the strategies used to conduct the study.

3.5 RESEARCH STRATEGY

3.5.1 Study location

The study was conducted in the North of England. The location was chosen for its familiarity to the researcher (Gray, 2014), and for hosting a variety of secondary schools including academies, independent and local authority schools that had good working relations with Edge Hill University. The study targeted these different varieties of secondary schools. Additionally, the North of England has a reliable public transport network including taxis, buses and trains which made it easy for me to commute faster between the university and the schools where I collected data. Braun and Clarke (2013) argue that a good study location should be accessible and friendly to the researcher. After identifying the study location, schools and respondents were selected for the study.

3.5.2 Selection of cases

Cases were chosen based on the nature and type of study (Etikan et al., 2016). Whilst sampling strategies in quantitative studies is mainly randomised to permit generalisations, qualitative studies tend to use theoretical sampling strategies for insights and a deeper understanding of the

topic of interest (Patton, 2002). The five case schools for this study (see Table 4.1 in the results chapter), were chosen theoretically because the study aimed for insights and not generalisations to other English schools. I used maximum variation and convenience sampling to select the case schools. First, a list of North of England schools was obtained from Edge Hill University. I then employed maximum variation sampling strategy (Miles & Hubberman, 1994) to group schools into various types such as academies, local authority schools, and independent schools. This ensured that a variety of schools were included in the study to generate site-based data use insights and shared data use patterns across the various school sites. Because the study did not aim for generalisations, a random sampling of schools was not necessary (Etikan et al., 2016).

After schools were grouped into various types, one school from each group was then conveniently chosen (Miles & Hubberman, 1994; Patton, 2002) as case schools for the study. Here, I chose schools based on access and availability (Etikan et al., 2016). Being in England for the first time and given the cultural hurdles that being a foreign researcher presents (Yasmin, 2003), I needed schools and respondents that were accessible, friendly and easy to reach quickly. Consequently, I chose schools that were near bus stops and willing to participate in the study. Convenience sampling strategy made this possible. Although convenience sampling is vulnerable to hidden biases (Creswell, 2013; Gray, 2014) and prone to the problem of outlier cases that assume homogeneity (Etikan et al., 2016), the strategy did not compromise my study aim to generate insights needed to understand data use in the individual school sites.

An important aspect of gaining a thorough understanding of a case study outcome is to understand its context. In the results section, I will therefore provide the contextual information of the five case schools that participated in the study. Each school will be described in terms of policies; institutional context such as school type, size, governance, mission, vision; data available on its public website; and Ofsted rating, all of which, may shape what data the schools collect and use. Such contextual issues needed understanding, failure to which, we gain a shallow understanding of why things happen the way they do in these schools. For example, a school judged 'requires improvement' by Ofsted might probably mean that a school collects more data to show they are improving, especially if it has had a history of poor Ofsted judgment. Similarly, a school judged 'good' may mean the school collects fewer improvement data. Again, unlike in small schools, a large school might need to collect more variety of data to cater for their broad-based curriculum and to

help them understand the needs of their diverse pupils. Table 4.1 in the results chapter summarises the traits of each case schools.

3.5.3 Respondents

3.5.3.1 Selecting interviewees

A total of 18 purposively selected respondents participated in the interviews in the entire study (Table 3.1). Unlike random sampling which emphasises equal chance to select respondents, purposive sampling deliberately selects respondents who are better positioned to provide the information needed to answer the research questions (Etikan et al., 2016). Teachers who had different roles in relation to data use in the English schools were chosen because they were deemed critical in getting answers to the research questions (Bryman, 2012; Dane, 1990). Moreover, data use in schools is a multi-level phenomenon (Honig & Coburn, 2011), and certain data is emphasised at certain levels of schools (Schildkamp & Kuiper, 2010). In this study henceforth, SLs constitute Headteachers, Assistant headteacher or Data Managers (DM); MLs constitute Head of years, Progress leaders, faculty leaders, heads of departments or pastoral leaders; and CTs constitutes classroom teachers and assistant teachers.

In each school, I aimed to interview one SL, two MLs (English or Mathematics and a Pastoral leader), and one CT. In schools 3 and 4, however, only three respondents participated because the fourth interviewees were unavailable. Details of those interviewed are provided in Table 3.1. Eighteen interviewees were deemed adequate for the study because qualitative studies focus on the data quality, not quantity (Nachmias, 1996). Moreover, the sample size in qualitative research depends on the scope of a study, the nature of the topic and the data collection methods used (Morse, 2000). In qualitative research, authors argue that 'saturation' or the point when additional data fails to generate new information determines the end of data collection, not the sample size (Morse 2000; Sandelwonski, 1995). To attain data saturation in the study, I deliberately selected respondents who could provide richer information to my research questions as opposed to using probability sampling techniques which are rich in breadth but limited in depth (Denscombe, 2014). It was quality data that can tell a rich story about the phenomenon that mattered to me, not excessive data that would hamper deep, complex engagement with the data collected (Onwuegbuzie & Leech, 2007).

3.5.3.2 Survey

Participation in the survey was open to willing respondents to enhance the study breadth (Kumar, 2011). The survey measured and compared data use practices across different respondents (Miles & Hubberman, 1994). This offered an opportunity for triangulating with the interviews for a thorough understanding of how teachers use data. A total of 57 respondents completed the survey in the entire study. Table 3.1 summarises the respondents per school.

Table 3.1: Respondents per school

School			**Returned questionnaires**
	Respondents interviewed	Total	
1	DM; Pastoral-ML; Academic-ML; CT	04	**10** [1SL + 4MLs+ 5CTs]
2	DM; Pastoral-ML; Academic-ML; CT	04	**13** [2SLs + 2MLs+ 9CTs]
3	DM; Progress-ML; Academic-ML	03	**06** [1SLs + 5MLs]
4	DM; Academic-ML; CT	03	**19** [1SL + 8MLs+ 10CTs]
5	DM; Pastoral-ML; Academic-ML; CT	04	**09** [3SLs + 2MLs+ 4CTs]
Grand totals		**18**	**57**

3.5.4 Ethics

Research is about using the most appropriate research methodology and researching morally (Gray, 2014) because all studies are vulnerable to ethical risks. This study had three broad risks: risks to the reputation of schools, risks to the professional practice of individuals, and, emotional risks to individuals.

The study carried potential risks to the reputation of the case schools. When reading the study report, for example, teachers in some schools might discover that they use data inappropriately compared to other schools. Additionally, it may be that from the study, some schools may discover staff-related problems that may pose risks to relationships among teachers. For instance, a SL may say what contradicts their MLs which could be interpreted as a sign of poor management. Thus, a school that perhaps had relied heavily on its reputation might end up with poor reputation when the study is published. This is in the backdrop that data use is politically charged, contested and shapes many school improvement conversations in England.

The study might also carry risks to the professional practice of individuals. It might be that teachers have just been using data without any reflections but when the research questions are posed, some

teachers may begin to reflect on their previous practices. For example, some might have felt that what they were previously asked to do on matters data were unhelpful but had not reflected about such before the study. The study thus, might have motivated some teachers to ask questions about data use practices in their schools.

The study outcome might also carry emotional risks to teachers. From the study outcome, for example, some respondents might compare themselves with their counterparts in the other case schools and discover that they were not as good as they previously thought and that what they regarded as important data use issues are not important to their counterparts in other schools. Some teachers might thus feel they have not been doing their job properly.

The researcher cannot eliminate all ethical risks but rather minimise them in a study (Gray, 2014). Guided by this principle, I took steps before, during and after data collection to minimise the ethical risks to respondents. To this end, I adhered to the British Educational Research Association (BERA) guidelines (BERA, 2011) when conducting the study as I explain in the paragraphs below.

Before the study, I applied for ethical clearance through the Faculty Research Ethics Committee (FREC) to the Edge Hill postgraduate ethics committee for scrutiny and approval. In the application, I outlined all the relevant ethical plans and procedures I was to follow during the study, which after scrutiny by the committee, was approved. Upon securing ethical clearance from the university, I proceeded to seek informed consent from schools and respondents. According to Crow et al. (2006), gaining informed consent can positively enhance the confidence of respondents in a study and by extension, attain more frank responses and participation rates. I drafted and sent informed consent letters (appendices G and H) to schools and respondents seeking permission to conduct the study. To avoid deception (Gray, 2014), the letter highlighted the study aim, methods and duration of interviews and questionnaires (i.e., 50 minutes and 4 minutes respectively). The letter also stated the category of teaching staff I intended to interview and that I would also require anonymised samples of data from the schools. The letter assured confidentiality to schools and respondents over their personal data and that their participation in the study was strictly voluntary. The letter added that respondents had to consent only after fully understanding the risks and implications of their involvement in the study processes and procedures (Sudman, 1998). The right of a respondent to withdraw before or during the study without any consequence was also emphasised. In addition to

the letter, I provided copies of my Disclosure and Barring Services (DBS) clearance certificate (Appendix I) as a reassurance that I was not a potential threat to teachers or students.

I continued to prioritise research ethics during data collection. For instance, I requested additional informed consent from respondents (Crow et al., 2006; Sudman, 1998), respected their privacy (Gray, 2014), and avoided any harm to them (Moreno, 1999). As Gray (2014) indicates, 'consent should not only be requested before data collection but also during data collection' (p. 78). In this regard, I reminded respondents that their participation was voluntary and that they had the right not to respond to any question they felt intrusive during the interview. Anonymity and confidentiality were re-assured to respondents after which I requested their permission to record the interview. These additional informed consent requests were also highlighted in the preamble statement of all the study instruments (see Appendices A to E). For anonymity purposes, no respondents were asked for details that may identify them in any way in the questionnaire or the interviews. To safeguard respondents' privacy (Gray, 2014), all interviews were conducted in private rooms chosen by respondents themselves. During the interviews, I posed non-judgmental questions and listened more to enable respondent respond freely about their own data use practices and experiences. However, whenever respondents mentioned something interesting bordering on the research questions, I politely probed for elaborations and examples.

During data collection, I also tried to minimise harm to respondents. According to Sudman (1998), harm is not just physical but includes acts that may burden research participants. Moreno (1999) and Sudman (1998) both advocate for ethically sound research which not only yields reliable and valid results but minimises the research workload and interference with respondents' programmes. Hence, I consulted and visited schools and respondents only when it was convenient for them. For instance, I halted data collection between April and July 2017 to allow teachers to prepare their students for the GCSE examinations. Also, owing to the workload on English teachers (DfE, 2016), the study instruments were designed to have minimal impact on respondents' time as elaborated in the 'instrument testing' section. To further reduce research burden on respondents, only the data managers were asked to provide the anonymised samples of data that their schools use. Since research burden may be reduced when some compensating gains are provided to respondents (Moreno, 1999), I wrote a summarised research report to participating schools. Because of the ways schools know each other, the report will not contain information that can be traced back to individual respondents or schools. Rather, codes and pseudonyms will be used.

There was also the need to protect the data after collection by restricting access to it in different ways. Firstly, schools and respondents were anonymised by giving them codes instead of using their real names in the data and in the transcripts. For example, I coded schools from numbers 1 to 5 and that of respondents as SL, MLs or CT. Samples of data were anonymised by deleting names of children and schools and then keeping them in a locked cupboard only accessed by me (Braun & Clarke, 2013). Secondly, I assigned passwords to all the electronic data files and computers where the data were stored (Braun & Clarke, 2013) and I analysed the data myself to protect it. After thesis writing, all the data will be destroyed. Only the de-identified aggregate analysis would appear in the thesis report to be shared with the academic community through publications and conferences, not the raw data. Where quotes from respondents are included in the report as evidence, I have substituted respondents' identity with pseudonyms (Creswell, 2007). To the research stakeholders, I intend to communicate my research findings with clarity and in a manner open to scrutiny by other researchers, policymakers and practitioners. Negotiating the above research needs was not simple but rather complex and came with challenges which I have discussed at the end of this chapter.

3.6 METHODS

3.6.1 Mixed methods

Although the study was qualitative, I used a mixed methods approach to answer some of my research questions (Table 3.2). According to Creswell and Plano-Clark (2011) and more recently, Denscombe (2014), a mixed method is an approach to investigation that combines both quantitative and qualitative data as a methodological answer. The approach enables researchers to produce findings that are more comprehensive and provides different aspects of the issue under investigation.

Although the mixed method approach is broadly acknowledged in social science studies, there have been arguments around the appropriateness of quantitative approach or qualitative approach. For instance, Gergen and Gergen (2000) contend that qualitative methods are more helpful in the social world than the quantitative ones as they enable data to surface freely from setting. In the recent years, however, even the most grounded advocates of qualitative studies, such as Erickson (2007) and Hammersely (1992), have upheld the incorporation of numerical data in qualitative studies and findings. My view in this study is consistent with the researchers who propose that a mixed method can answer broader and more comprehensive research questions than when a researcher is

restricted to a single approach (Creswell & Plano-Clark, 2011; Onwuegbuzie & Leech, 2007, Teddlie & Tashakkori, 2010). Qualitative data was thus used in this study together with some quantitative data to show some variation between people in the study.

Mixed methods helped me gain a 'complete picture' (Creswell & Plano-Clark, 2011; Plano-Clark, 2017) into how the English teachers interpret and use data. The method facilitated my explanation of the complex data use phenomenon in details and from different perspectives (Fryer et al., 2017), and offered a better understanding of my research problem by utilising the complementary strengths and differences provided by both the qualitative and quantitative techniques (Plano-Clark & Ivankova, 2016). I used a questionnaire for the quantitative part of the study and interviews and school documents for the qualitative part.

The use of mixed methods in a study is not without shortcomings. Whilst mixed methods tend to consume more time, resources and effort to organise and implement, it is the data produced in various ways that were invaluable to me. The study aimed for in-depth understanding from different perspectives and mixed methods were useful in achieving that because it enabled me to think 'outside the box' about my findings (Mason, 2006) leading to a thorough understanding of my research problem than either approach by itself could otherwise allow. The method added rigour and trustworthiness to the study by producing deeper insights and distinctive results from different perspectives hence a broader understanding of data use practices by teachers. As Mason (2006) suggests, 'mixing methods offer enormous potential for generating new ways for understanding the complexities and contexts of social experience' (p.10).

When using mixed methods to understand the complexities surrounding a social phenomenon, researchers always have a variety of mixed methods typologies to choose from (Creswell & Plano-Clark, 2011; Gray, 2014). Creswell and Plano-Clark (2011) identify five mixed methods typologies: mixed-exploratory; mixed-explanatory; mixed-multi-phased; mixed-embedded; and mixed-convergent. Researchers can align their mixed methods approach to one or more of the five typologies. 'Real life' research, however, is sometimes too complex to permit a clear-cut alignment of a study to a particular typology (Plano-Clark, 2017). This is one such complex study that cannot align with one typology. Rather, the study integrates elements of mixed-embedded and mixed-convergent typologies to investigate the research problem. Mixed-embedded and mixed-convergent differ in several ways. Whilst mixed-embedded prioritises one data set over the other;

merges data during analysis; and aligns to constructivist epistemology, a mixed-convergent typology gives equal weight to qualitative and quantitative data (explored further in the 'data analysis' section about how corroboration or lack of it in the data sets were treated). Mixed-convergent also merges data during interpretation; and aligns with pragmatist epistemology (Gray, 2014). This study, however, aligns with both the mixed-embedded and the mixed-convergent typologies.

The study aligns to mixed-embedded typology in that qualitative data in the study was considered as primary over quantitative data. Qualitative data was prioritised to permit in-depth answering of the main research question 'how' while quantitative data supported in identifying the variations between people, for example, in identifying who uses data more to improve teaching. The rationale for embedding quantitative data in this qualitative study was based on my understanding that one data set was not sufficient for a richer understanding of the complex data use practices in the English schools. According to Merriam and Tisdell (2016), 'embedding quantitative with qualitative methods in case study yields a richer understanding of the subject under study' (p. 48). The study was also mixed-embedded because it was grounded on constructivist and not pragmatist epistemology. In contrast, the most distinguishing aspect of the study that aligns it to mixed-convergent typology was that the study collected qualitative and quantitative data simultaneously. As Gray (2014) stipulates, 'data from mixed-convergent helps to deepen and validate the other' (p. 203). Corroborating qualitative and quantitative data was crucial for exploring the 'how' research questions from different perspectives (Creswell, 2014) and to be certain with the results. Therefore, rather than align the study to a particular mixed-method typology, I deliberately chose to integrate mixed-embedded and mixed-convergent typologies to gather the evidence for answering my research questions.

3.6.2 Data collection methods

Data collection methods largely depend on the research questions posed (Gray, 2014; Yin, 2014). The main research question 'how' was exploratory. This invited the use of primarily interviews, documents and some element of the quantitative survey to show variation among respondents. Details about the methods used are discussed below and a summary is provided in Table 3.2. Each research theme underwent triangulation to ascertain the results as demonstrated in the data analysis section.

3.6.2.1 Semi-structured Interviews

Semi-structured interviews were used to collect qualitative data. Interviews are powerful for eliciting rich data about processes, peoples' lived experiences and meanings underpinning people's lives and behaviour (Seidman, 2013; Gray, 2014). It also provides opportunities for probes and clarifications (Rowsley, 2012). The study aimed to generate an in-depth understanding of teachers' experiences, meanings and processes they attached to data use, something semi-structured interviews accomplished through probes for details, clarifications and examples from teachers. Although focus group discussions (FGDs) and observations would have added in-depth insights to the study, the methods were discounted on ethical grounds. FGDs for example, could not guarantee privacy and confidentiality for what participants said in groups, particularly on a politically sensitive data use topic. I anticipated that teachers would not talk freely in such FGDs. I therefore decided to restrict the study to private interviews with the relevant teachers (Gray, 2014). I also considered observing teachers work with data but realised the method would be too time-consuming and too intrusive for the schools to accept participation in the study.

3.6.2.2 Survey

I employed a short survey to augment the interviews. Details of how the survey was constructed is provided in the 'instrument testing' section. In summary, the survey had similar questions to those asked in the interviews to enhance search of convergence or divergence in the evidence (Creswell, 2007), and to show variations among respondents (Oppenheim, 1992). For example, showing which respondents received more data use support, hence a thorough understanding of the data use phenomenon in the English schools.

3.6.2.3 School documents

Punch (2005) argues that a lot of institutional data is written and kept in document form. Thus, I collected some of the schools' documents that depicted data use practices in the schools in line with the research questions. I pursued documentary evidence because of its richness in context-specific information (Jensen & Laurie, 2016) which supported the study aim. Documentary evidence collected together with interviews was useful in triangulating evidence (Punch, 2005). For instance, school documents contained evidence that was critical in revealing the data types and their uses

which were not immediately apparent because they carry stable information well beyond the time they were produced (Denscombe, 2014). This sheds light on respondents' past data use practices at certain times within the broader policy context.

Table 3.2: Data collection methods

Conceptual domain	Question	Method	Source	Data source	Data type	Sample size
Data types	1	Interviews	Developed for study	SL, MLs, CTs	Qualitative	18
		Documents	Schools	School documents		None
Data interpretation	2	Survey	Developed for study	All	Quantitative	N=57
		Interviews		SL, MLs, CTs	Qualitative	18
Data use	3	Survey		All	Quantitative	N=57
		Interviews		SL, MLs, CTs	Qualitative	18
		Documents	Schools	School documents		None
Data support	4	Survey	Developed for study	All	Quantitative	N=57
		Interviews		SL, MLs, CTs	Qualitative	18

3.6.3 Instrumentation

3.6.3.1 Questionnaire

A closed-ended questionnaire was developed to measure teachers' data use practices to augment data from the other methods. According to Oppenheim (1992), closed-ended questionnaires 'offer a set of pre-designed replies representing the strength of feeling or attitude' (p. 365). Tashakkori and Teddlie (2010), add that 'the research questions focus and extend the specific research activities that will be undertaken and, in developing these questions, the researcher must be aware of the contextual environment within which the study will occur' (p. 274). To this end, the questionnaire provided respondents with some structure to their answers as I elaborated under 'instrument testing' section. Also, teacher workload and strict school schedules in England necessitated the design of a short, simple and clear questionnaire capable of collecting data quickly

without overburdening or discouraging the teachers. The questionnaire had four short questions in total that required about four minutes to complete. The first section of the questionnaire categorises respondents into senior leaders (SLs), middle leaders (MLs), class teacher (CTs) and teaching assistants (TAs). This was to permit easier analysis and comparison of views across respondents.

Next, questions 1, 2 and 3 in the questionnaire were inventory responses constructed to rate respondents' data use practices in their schools. Gray (2014) argues that closed-ended questionnaires of inventory responses are easy to process and do not require extended writing on the part of respondents. Questions 1 to 3 in the questionnaire were all on a 3-point scale rating (0=Never, 1=Sometimes and 2=Often). The questions were about the data use support respondents received, the approaches respondents used to interpret data and, the common uses of data in the schools (see Appendix E). Moreover, 'inventories are good for obtaining a quick relatively crude, but useful set of measures, with reasonable reliability because of the use of area scores rather than the use of single or open questions' (Oppenheim, 1992, p. 249). In question 4, a Likert scale was used to measure contested teachers' attitudes and feelings about the consequences of using data such as 'data adds to my workload' (Oppenheim, 1992). Details about the questionnaire are found in the 'instrument testing' section and Appendix E. Although I used close-ended questionnaires with the aforementioned advantages, I was also aware that they are prone to bias in answer categories and sometimes can be crude and irritating to respondents. However, I tried to minimise these by testing the instruments before use and by collecting interviews data to triangulate the questionnaires.

3.6.3.2 Interview schedule

Interview schedules were used to conduct interviews with SLs, MLs and CTs. The schedules were developed and tested in line with the conceptual framework and the specific research questions (Creswell, 2007; Simons, 2009). The schedules contained questions and prompts (Braun & Clarke, 2013) that stimulated respondents to identify and describe the various types of data and how they are used. Details about the interview schedules appear in the 'instrument testing' section and in the appendices A to C.

3.6.3.3 Document checklist

A checklist of the possible data available in schools (Schildkamp et al., 2014) was prepared and used to guide the collection of anonymised data samples. The checklist (Appendix D) helped to identify and exhaust the data types the schools collect.

3.6.3.4 Trustworthiness

Trustworthiness adds rigour to research (Bassey, 1999; Lincolin & Guba, 1985). The trustworthiness of this study was achieved through an elaborate instrument testing (Oppenheim, 1992), multiple sources of evidence, digital recording of all interviews, triangulating methods and verbatim transcription of all interviews (Braun & Clarke, 2013). Below I discuss how I addressed the study's trustworthiness before, during and after data collection.

3.6.4.1 Before data collection

Oppenheim (1992) observes that 'many research frameworks and instruments falter because they are constructed in an office according to some theoretical plan which overlooks contextual realities' (p. 179). To avoid this 'trap' I tested the study's conceptual framework and instruments to correct errors and enhance their context trustworthiness before I employed them to collect data (Yin, 2013; Gray, 2014). Dillman (2007) advises that instrument testing should be conducted with people similar to those targeted in the study. I therefore tested the instruments and conceptual framework with the help of nine participants all from England. They included three research experts employed at the university and, six practising teachers who helped refine the technical and practical aspects of the instruments, respectively. For instance, while experts improved question ordering in the questionnaire, teachers added clarity to the questionnaire's instructions.

Because data use in schools is a multi-level phenomenon (Coburn & Turner, 2011), I involved teachers of different categories to test the instruments and the framework: two primary teachers (1SL and 1CT), and four secondary teachers (2MLs and 2CTs). The teachers came from different English schools which did not participate in the study. Different category of teachers were useful in the test because the SL provided broader hands-on experiences on data use practices and follow-up actions while MLs and CTs highlighted the aspects of data use that were overlooked or treated insignificantly by the headteacher.

3.6.4.1.1 Instrument testing

Prototyping approach was used to refine the study framework and instruments (Nieven, 1999). Paper-based prototypes of the instruments and the framework were used in six phases between August and December 2016 to conduct the test runs. Each phase followed a cyclic process: analysis, prototype design, formative evaluation, and reflection (Richey, Klein & Nelson, 2004) as shown in Figure 3.1.

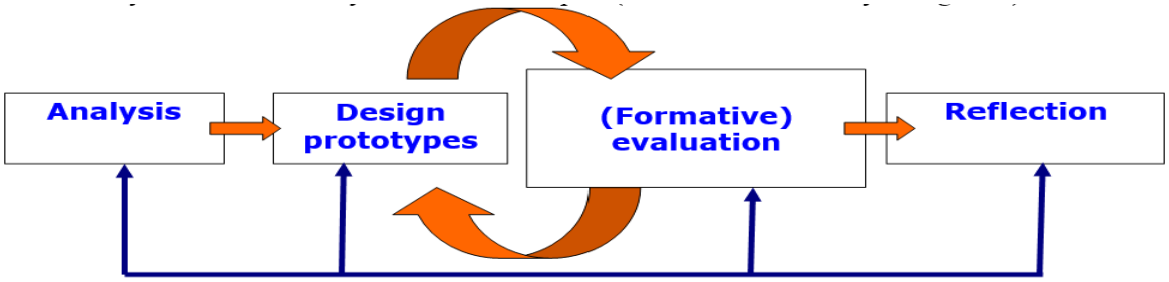


Figure 3. 1: Prototyping process

In each phase, the prototypes were sequentially evaluated by experts and teachers in face to face meetings. For objectivity, the research aims, and questions were first explained to participants. Thereafter, they were given the instruments to review on a question-by-question basis (Oppenheim, 1992). Later, participants were interviewed and their comments audio-recorded to guide further analysis, reading, reflection and prototype revisions (Dillman, 2007). This procedure was repeated in all the phases. The overall aim of prototyping was to ensure that the instruments were clear and generated useful data for answering the research questions. Below I explain the aim and outputs from each phase of my prototyping process.

Phase 1 was meant to refine the conceptual framework of the study to align with my research questions and the English context (Thomas, 2009). A SL and 2 CTs were given drafts of the framework to evaluate whether it captured how data is interpreted and used in their workplace. Although the teachers agreed that the framework captured all aspects of data use in their workplace, they indicated that it omitted 'governors' who also influence how data is used in the English schools. Experts then identified an illogical flow between the framework items. Consequently, 'governors' was added to the framework and the flow of items revised to proceed from external influencers e.g.,

Ofsted, to data types, data interpretation, data use, then support. The final version of the framework (Figure 2.1) then informed the drafting of the study instruments that were tested in phase 2.

Phase 2 started with six questions in the instruments which were later reduced to four after deletion of ambiguous and redundant items (Dillman, 2007). In the questionnaire, for example, experts observed that the initial question 3 which stated: 'What would you consider to be the most important uses of data in (your) school?' did not align with the research questions because it answered school's preferred use of data instead of teachers' own perceived use of data. It was rephrased in the final version. Also, two responses to the questionnaire: I need 'data use training' and 'I need skills and knowledge to use data,' were deemed redundant (De Vaus, 2002). The former was deleted. An expert also observed that question 1: 'How often did you get the following data use support?' could generate non-current responses. A time limit was thus included to make it read: 'How …data use support in the last 12 months?

Again, in the instruments, teachers confused the terms 'data-expert' with 'data managers' in the English schools. 'Data-expert' was revised to 'trained qualified statistician'. Further, teachers noted that question 1 in the interview schedule: 'Which data do you access and use in your job and how do you use it,' produced boundless responses (Gray, 2014). Question 1 was thus split into four sub-questions each having a theme on data type, access and use (see the interview schedules). The revised drafts were re-tested in phase 3.

Phase 3 aimed at refining of the response categories (Oppenheim, 1992). Teachers noted that data use support in England required rating because it varies in frequency among teachers and across schools. Consequently, the response category for question 3 was revised from the grid to inventory rating responses from 2= often, 1=sometimes to 0=never. Knowing who to ask what question was also raised (Gray, 2014). Teachers observed that question 1 in the interview schedule assumed that all teachers have the same data use information about their school, yet, teacher responsibilities differ including the data they use. Hence, data about the whole school were asked to SLs, not class teachers. Again, CTs were not asked 'data about staff' because they do not handle these data. This led to construction of targeted interview schedules for SLs, MLs and CTs. Also, sensitive phrases were revised from the instruments (Munn & Drever, 2004). Teachers argued that the response in the questionnaire: 'data can be withheld if perceived as unfavourable or damaging to 'my' school' was sensitive and could invite untruthful responses because it linked teachers' responses to their schools.

To delink them, the word '*my*' was deleted from the response. The revised prototype was tested again in phase 4.

Phase 4 focused on question ordering, instrument layout and clarity of instructions to enhance instrument reliability. Oppenheim (1992) warns that questionnaires should avoid double-barreled questions because they do not yield specific responses to specific research questions. Experts noted that the response 4i: 'the current data use policy neither motivates nor improves my job performance,' was double-barreled because rather than measuring one thing, it measured attitude on policy and its effects on teachers' motivation and performance. It was revised to read: 'the current…motivates me …to improve my own job performance'.

According to De Vaus (2002), questions that are factual, easy and key to a survey purpose should come first. Dillman (2007) adds that while the first question should be interesting to attract respondents' attention and interest in the survey, sensitive questions should appear at the end. According to participants, for example, the question on the unintended data use consequences was sensitive in England. It was thus placed last in the questionnaire. Oppenheim (1992) also posits that 'attitude statement should be skillfully ordered, not too long, not-too-obvious and not containing double negatives' (p.180). Therefore, question 4 responses were sequenced to have positive attitude statements alternating with the negative one to allow respondents to also disagree. For example, in the questionnaire, question 4 had a favourable response 4(a) alternating with unfavourable response 4(b). Oppenheim (1992) argues that alternating favourable with unfavourable responses in a survey improves its reliability because it enhances respondents' interest in the survey by making the responses less obvious. This prevents respondents from ticking similar responses throughout the entire survey items without giving it much thought.

Phase 5 tested whether the instruments yielded the data needed to answer the research questions. It tested question clarity, brevity, estimated session lengths and questionnaire layout. To achieve these goals, I used the revised instruments from phase 4 to conduct a mock data collection exercise from three school teachers. The sessions were timed to establish how long it took teachers to respond to the questions (Oppenheim, 1992). The trials revealed that interview sessions lasted between 35 to 50 minutes and questionnaires took about four minutes to complete. The teachers considered the session lengths appropriate considering teacher workload in England. Afterwards, they commented on the questionnaire layout because an attractive layout can enhance questionnaire response rate

(Gray, 2014). The teachers reported that the questionnaire layout was appropriate in two ways. First, the way to answer the questions was consistent e.g., ticking one box across the rows. Second, boxes were placed round sets of questions, lines used to guide respondent's eye from question to response and, all questions and sections numbered. Teachers did not struggle to complete the questionnaire and indicated that the instructions were clear (De Vaus, 2002).

In phase 6 the experts reviewed and appraised the revised instruments and agreed they were good enough to yield the data needed to answer the research questions. These then became the final version of the instruments that I used to collect data (See appendices A to E). Although research instruments can never achieve 100% trustworthiness (Oppenheim, 1992), the elaborate prototype testing and revisions, enhanced the trustworthiness of my research instruments.

3.6.4.2 During data collection

During data collection, trustworthiness was focused on interview sessions and not questionnaires which are difficult to revise once given out to respondents (Oppenheim, 1992). The trustworthiness of interview responses was enhanced via strategies provided by Arksey and Knight (1999) cited in Gray (2014, p. 388). My first strategy was to build rapport and trust with respondents by re-assuring them confidentiality and data protection, which in my opinion, encouraged them to talk freely. Next, I used interview schedules to guide the interviews, requested for illustrations and examples from respondents. I took notes during the interviews to help me formulate new questions, note respondents' body language and to locate important quotations for analysis (Patton, 2002). Also, I recorded all interviews to enhance trustworthiness of responses (Patton, 2002). The interview sessions lasted at least 35 minutes which according to Rowley (2012) is adequate to allow in-depth exploration of issues for trustworthiness. Moreover, interviews are more trustworthy because unlike surveys where the researcher has no face-to-face contact with respondents, face-to-face interviews permit a researcher to verify the accuracy of the data on the spot through probes (Denscombe, 2014).

To enhance the trustworthiness of data during data collection, I employed multiple methods and multiple respondents (see 'methods'). Additionally, during the interviews, I posed to respondents the same questions in the same manner, which according to Gray (2014), enhances the trustworthiness of data. Again, I avoided bias by being non-judgmental during interviews, repeating

questions when respondents asked and, probing in a non-directive manner (Gray, 2014). Where respondents did not want to respond or did not know the answer to a question, I accepted without irritation, and this, according to Gray (2014) enhances the trustworthiness of the data collected through interviews.

3.6.4.3 After data collection

For trustworthiness, all interview data were transcribed verbatim using a transcript annotation system described in the data transcription section. Although member checks (Yin, 1994) enhances trustworthiness, context challenges (described under the 'study challenges') did not allow me to realise it. The trustworthiness of the school documents, however, were scrutinised, especially the online ones to ensure that they were from accredited sources or websites, were current, complete and aligned to the research questions. This was to safeguard against collecting incorrect or biased documents (Kumar, 2011). Having explained how trustworthiness were addressed in the study, I now shift to the processes I used to collect data for the study.

3.6.5 Data collection

3.6.5.1 Questionnaires

I hand-delivered the questionnaires on my first visit to each school which also served as an opportunity to interact with some respondents thus 'putting a face' to the study (Oppenheim, 1992). Because of restricted access to teachers which I have described in the study challenges section, the questionnaires were administered to teachers through the data managers (DMs), who were not only gate-keepers of data in the schools but also members of the Senior Leadership Teams (SLT). The DMs reported having delivered the questionnaires via teachers' pigeonholes. Teachers then returned the completed questionnaires to drop-in boxes where the DMs collected and handed them over to me. A total of 57 teachers completed the questionnaires representing a 15% response rate of the total number of teachers in the five schools. The returned questionnaires and the percentage response rate per school were: school 1 (n=10; 19% response rate); school 2 (n=13; 22 %); school 3 (n=06; 6%); school 4 (n=19; 18%); and school 5 (n=09; 23%). Evidently, despite having made the questionnaire short, clear and interesting, the response rate remained low. Possible causes for this might have been more of school organisational challenges rather than questionnaire design and

administration. I have discussed these under 'study challenges' section and demonstrate how they impacted on the data collection process and how I tried to minimise them.

3.6.5.2 Interviews

18 respondents (5SLs, 9MLs and 4CTs) were interviewed in the entire study using interview schedules. At least three respondents were interviewed per school (see Table 3.1). Respondents were also probed for tangible examples and descriptions (Braun & Clarke, 2013) about their present and previous accounts as part of the evidence about some of the data use practices they mentioned. The structure and the question flow in the interview are provided in the interview schedules (Appendices A to C). The interview sessions lasted between 35 to 50 minutes and all were digitally recorded to add depth to the questionnaires.

3.6.5.3 Checklist

After interviewees responded to question 1, a checklist of possible data found in English schools was given to them. They were asked to check if there was data in it which their school collects and might want to further say something about. I utilised the checklist to help teachers 'exhaust' all the data collected in their schools (Braun & Clarke, 2013; Kumar, 2011).

3.6.5.4 Collection of documents

The DM of each school were requested to provide anonymised samples (hardcopy or soft-copy) of each data they collect as 'documentary evidence' (Punch, 2005) to corroborate with the interviews. I made this request on my first visit to schools to enable the DMs to prepare the samples in advance. The samples were handed over to me on my second visit to each school. Only the samples that answered the research questions (Rapley, 2008), were collected guided by the checklist. For instance, student progress data which revealed the data use practices in school and aligned with the research questions were collected. Digital samples relevant to the study (e.g., inspection reports) were harvested from the schools' websites (Dencombe, 2014). Although this approach boosted the collection of data samples, I am also aware it is subject to control by 'gatekeepers' who decide what is posted online and that is something beyond the control of researchers.

3.6.6 Data analysis

Qualitative and quantitative data were analysed separately then merged during interpretations (Creswell & Plano-Clark, 2011). To me, that was a better way to gain a thorough understanding of data use practices because interviews and documents yielded qualitative data which augmented the quantitative data. It allowed checking for convergence and divergence in the data sets. Below are accounts of how the different data sets were analysed in the study.

3.6.6.1 Qualitative data

3.6.6.1.1 Interviews

To permit analyses, all audio data from the interviews were transcribed verbatim using NVIVO 11 qualitative data analysis program (Braun & Clarke, 2013). Since transcription can lead to a 'partially cooked' data due to loss or alteration of meaning (Sandelowski, 1994a, p. 312), I took three steps to ensure that my transcripts were thorough, meticulous and of high quality: indicating what was said, who said it, and how it was said (Braun & Clarke, 2013).

First, it was crucial that what respondents said during interviews were preserved and safeguarded as much as possible during transcription to prevent losing or altering their accuracy and meaning. Such a task is never simple, neutral or straightforward (Braun & Clarke, 2013; Potter, 1996). Moreover, attaining an accurate transcript is near impossible (Sandelowski, 1994a). However, to safeguard the accuracy of my transcripts, I transcribed all the actual words spoken and the semantic sounds participants made during the interviews. Nothing was edited or corrected during transcription in what Braun and Clarke (2013) call 'verbatim' transcription (p. 162). For example, when a respondent said, 'I gonna do this or that...,' I transcribed it as uttered. De Vault (1990) warns against editing interview data to make respondents appear fluent, yet, spoken language is often messy. Moreover, the whole idea of collecting spoken data is to 'capture how people express themselves' (Braun & Clarke, 2013, p. 163). Therefore, I avoided correcting what I heard during transcription. This prevented me from compromising the meanings of what respondents said.

Another way I safeguarded what respondents said was by returning to double-check what I transcribed against the audio recording. Often, I replayed some segments of the audio recordings

many times in slow, pause or rewind modes within NIVO 11 to decode, confirm, correct omission or correct mishearing in the transcript (Blake & Poland, 2002 cited in Braun & Clarke, 2013). Although Braun and Clarke (2013) acknowledge that 'there is no right way to manage the transcription process' (p. 168), at least one double-check of each transcript is recommended (ibid). Consequently, I double-checked each transcript twice against the corresponding audio-recording. To ensure the effectiveness of each double-check and to further identify omissions and mistaken words or phrases in the transcripts for corrections, I took breaks at regular intervals during transcription to reduce fatigue and lack of concentration. Braun and Clarke (2013) posit that one should leave a bit of time between producing the transcript and checking it because such a move enables one to hear what they could not hear the first time they listened to the recording. To further safeguard what respondents said, I transcribed the audio data immediately (within three days) after collection. This way, transcription was optimised when a considerable amount of interview details of what was said remained clear in my memory. Braun and Clarke (2013) argue that peoples' working memory fades fast and delays in transcription can result in fading of details and context from our memory thus compromising the meaning of what respondents said.

Second, I identified who said what in the transcripts (Braun & Clarke, 2013) to enhance transcript quality. For confidentiality purposes, I identified respondents in the transcripts by their roles (e.g., CT, interviewer or SL) and not their real names. Furthermore, in the transcripts, each speaker's statement started on a new line, what Braun and Clarke (2013) call 'turn of talk.'

Finally, I safeguarded transcript quality by indicating in it how respondents reacted to certain questions. For example, I indicated where respondents struggled to express themselves, laid emphasis, laughed or hesitant to inform the analysis and interpretation. I therefore developed an annotation system to make the transcript rich and complete in capturing what respondents said and how they said it. In it, for example, I used three dots (…) to indicate hesitation by respondents, and brackets [ ] to indicated participants' semantic sounds such as laughter inter alia. I considered this adequate since 'a very thorough verbatim transcript generally capture enough details on words, experiences and observations made (Braun & Clarke, 2013, p. 169). The three steps enhanced the quality of my transcripts and made it easy for me to analyse and code the data.

3.6.6.1.2 Document analysis

'Documents can also provide a rich vein of analysis' (Hammersley & Atkinson, 1995, p. 173). Before coding the data samples, I first checked their source, bias, and format (Kumar, 2011) to ensure they were trustworthy. Next, I read and analysed the content of each data sample (Denscombe, 2014), to determine their meaning and use, after which I coded them in NVivo 11 program in a similar fashion to the interviews.

3.6.6.2 Data Coding

All qualitative data (interview transcripts and documents) were analysed by coding (Braun & Clarke, 2013). The coding was done in NVivo 11 program in line with the conceptual framework and the research questions (Miles & Hubberman, 1994). For example, I coded the first research question as either 'input', 'process', 'output' or 'context' data. For the second question on the data use, the responses were coded, for example, 'to improve teaching'. For the third question on data interpretation, I coded the responses, for example, 'use of norms.' Finally, in the last question about how school leaders support data use in the schools, for example, I coded 'structuring time' to use data as depicted in the conceptual framework of the study**.**

Whilst having a conceptual framework at the beginning provides security, focus and makes analysis comparatively straightforward (Miles & Hubberman, 1994; Punch, 2014), Simons (2009) cautions overreliance on the framework to guide data coding. Simons argues that over-reliance on a framework may lead to a tendency of trying to make the data fit the framework, and hence, fail to see the unexpected from data. I therefore combed the data in search of both the expected and the unexpected. This was achieved by reading the transcripts, the survey results and the documents again and again in search of similarities and contradictions across different themes; different respondents (e.g., SLs verses MLs); different data sources; and different types of schools (e.g., local authority verses an independent school). For instance, I compared the data sources such as qualitative and quantitative and was able to identify other ways teachers interpret data such as 'use of longitudinal analysis of trends' which was not immediately evident in the quantitative data. This way, convergence across the data sources provided stronger evidence about how teachers interpret and use data while a contradiction across the data sets or respondents revealed more about the complexity of the phenomena. The contradictions provided an opportunity to deeply reflect on the possible explanations through further engagement with the relevant literature and practitioners.

3.6.6.3 Quantitative data

3.6.6.3.1 Survey

The survey data were analysed in SPSS program where I formulated descriptive statistics of means, standard deviations and percentages arising from each survey question. For instance, in question one, responses which were on a 3-point scale of (2=often, 1=sometimes and 0=never) were computed into means to identify the most common data use support teachers received, and standard deviations to establish variability in teachers' responses. I have used consistent boundaries of qualitative descriptors to summarise the quantitative mean data (X) from the analysis of the questionnaires (see Table 3.3). I will also give standard deviations (SD) and comment on them only when they do not approximate a normal distribution. The survey findings were merged with the interviews in search for convergence or divergence between the two data sets, and to reveal insights and complexities underlying the data use phenomena within the English schools.

Table 3. 3: Qualitative descriptors for quantitative data

Mean range (X)	Qualitative descriptor
X= 0.00	Never
X>0.00 but ≤0.50	Very infrequently
X>0.50 but ≤0.89	Infrequently
X>0.89 but ≤1.29	Moderately infrequently
X>1.29 but ≤1.69	Moderately frequently
X>1.69 but ≤1.99	Frequently
X=2.00	Very frequently

3.6.7 Data presentation

For easier understanding, I prepared summaries of tables showing the rich qualitative evidence within the cases (Voss et al., 2002). This permitted an in-depth analysis including checking for similarities and differences across the coding categories and across participants such as CTs, MLs and SLs. I identified and used quotes that demonstrate a common view held by respondents around specific research questions and those that diverge as part of evidence. Also, I used mean, standard deviation and percentages from quantitative data where appropriate together with interview

quotes to reveal compelling evidence, contradictions and complexities surrounding the data use phenomena in England.

3.7 STUDY LIMITATIONS

No research is without limitations (Simons, 2009) and this study is not an exception. I had to make some research choices, some of which I could not avoid, but still went ahead to achieve the study aim. Beneath, I explain the limitations of this study and the choices I made to mitigate the identified limitations.

Firstly, as I hinted earlier, this study cannot be generalised to other English schools because that was not its aim. Rather, it aimed for insights about what is happening in the diverse secondary school sites in England regarding what teachers do with data at that level without making statistical generalisations. Therefore, I used case study which is better suited for in-depth exploration of complex issues in their context. Also, this explains why the five case schools that partook in the study are not a representative sample (Denscombe, 2014) but rather convenient cases for the sake of generating insights about data and data use in the schools as I elaborated in the 'case selection' section. The study thus served well in generating the needed insights about the phenomena. This also justifies my purposeful selection of respondents (Etikan et al, 2016).

Secondly, teachers' self-perceptions of data were used to study their interpretation and use of data. I am aware that this constrained the study. For example, it could be that some respondents' responses reflected more on policy rather than their data use experiences. However, statements made by the teachers were well probed for details and examples to remedy the limitation. Essentially, the interviews were rigorous and concentrated on probing of thoughts and reflections related to interpretation and use of data by teachers as evident in the interview schedules. The interviews gathered per school were triangulated with documents and survey data thus providing clear perspectives of teachers (Braun & Clarke, 2013). Although the interviews may present one-sided 'picture' of the issue and the fact that teachers' interpretation and use of data is a complex issue beyond self-perceptions (Breiter & Light, 2006), I contend that what the teachers said in the interviews is starting point for producing insights into how English teachers interpret and use data. Moreover, certain aspects of data use such as how teachers interpret data are interpretative and hard to measure, let alone observe (in case such methods were to be employed).

Lastly, the outcome of interpretative studies such as this one may contain researchers' bias (Creswell, 2007). This bias may arise from the fact that in interpretative research, the meanings are mediated via the researchers-as-instrument (Braun & Clarke, 2013). That is, the researcher is involved in constructing and reporting the meaning of peoples' lived experiences. This approach is inductive, and the outcome is descriptive (Merriam, 1998). My strategy in this study, however, was a focus on how teachers construct their own meaning about data and data use experiences. I probed for details and examples to illustrate teachers' lived experiences without allowing my own perceptions to overshadow those of the teachers. Most importantly, my thinking aligns with that of Flyvbjerg (2006) who argues that no research is immune to researchers' own interpretations. From my own understanding, research data never speak for themselves. Rather, researchers must form meaning from data. Apart from the study limitations, I encountered some challenges while conducting this study which I discuss beneath.

3.8 STUDY CHALLENGES

'Research is a process, not just a product' (England, 1994, p. 82). That process and product according to Rose (1997), is shaped by the complex dynamics of the researcher, the institutional contexts and the research participants, all of which, may bring challenges to a study process and progress. I therefore tracked the study challenges by keeping a research diary (Braun & Clarke, 2013; Simons, 2009) which 'told me the other' story that my data did not tell (e.g., emotional aspects of the study including joy, frustrations, and anxiety). According to Hallowel et al. (2005) cited in Bassey (1999), such emotions can affect the research and the researcher. The research diary enabled me to manage such emotions by reflecting on the challenges and adjust accordingly. For example, the diary enabled me to reflect on how best to gain and maintain access to schools and guide the remaining stages of my research process. Through it I was able to minimise the challenges before, during and after data collection as I detail below.

3.8.1 Before data collection

Before data collection, cultural barrier, access, and poor response from schools were the main challenges. Cultural barrier (my race and identity) as a foreign researcher from Kenya researching a sensitive topic in a different cultural context (Yasmin, 2003) significantly set the basis for my research and the principles I used to research in England. I had little knowledge about the English

education system, the school workings and procedures that could have affected other areas of my study. Without a firm grasp of the context, for example, I would have lacked conversational knowledge when interviewing the English teachers and, it would have been difficult for me to 'unpack' some of the hidden cultural and contextual messages that emerged during data collection, analysis and interpretation. Thus, knowing the context although challenging, was crucial for success in the study. I had to acquire this with extreme effort and networking.

As a stranger, I was ignorant of the procedures and the working of English schools. Hence, gaining initial access to the 'gatekeepers' of the schools presented a challenge. Creswell (2007) defines 'gatekeepers' as 'individuals who are members of or have an insider status within a cultural group' (p. 125). 'Gatekeepers' are the first contact to direct a researcher to other participants (Hamersley & Atkinson, 1995). The school 'gatekeepers' in this study were the Headteachers (HTs). Convincing the HTs why I chose their schools, my study intent, and how that would not disrupt school operations was difficult. A slow approach was necessary to deal with gatekeepers who hail from a different socio-cultural system from mine (Creswell, 2007). I therefore wrote consent letters and requested my supervisors to make the first contact with the HTs on my behalf. In January 2017, five HTs granted access and referred me to their DMs. Unfortunately, 'gaining access to sites and individuals involves several steps' (Creswell, 2007, p. 123). I had to negotiate my way past the DMs to access the schools and teachers. This required utmost diplomacy on my part. Procedurally, the DMs were to secure appointments with the rest of the respondents. Unfortunately, a few of the DMs were inaccessible until July 2017. At this point I realised I had my own research time-table, but schools had their own programmes completely different from mine. The schools wielded power over when I should visit, which meant some adjustments in my study timetable.

Also, schools did not respond promptly to emails and phone calls. Some schools often forgot to reply to emails or call back when they promised to do so. This at some point made me anxious. I had to again seek my supervisors' intervention. The intervention coupled with persistent phone calls to schools did improve access. For instance, I persistently reminded schools that I was available to visit anytime they were ready.

3.8.2 During data collection

The main challenges encountered during data collection were: sensitive topic, stringent school schedules, limited access to teachers, and difficulty to access some data samples. The topic of data

use in schools is sensitive and, researching a sensitive topic can be challenging (Braun & Clarke, 2013). For instance, two interviewees were not interviewed probably because they were unable to talk about the topic. Also, not all the case schools had 'outstanding' Ofsted rating- an indication of internal challenges some schools faced. My arrival to talk about data use thus may have been seen by some teachers as a judgment on their part such that some appeared guarded with their responses. To minimise this challenge, I posed non-judgmental questions, keenly observed respondents' body language during the interviews and probed for more information and tangible examples in cases where a respondent's answer left some doubt in my mind. I also reassured respondents of confidentiality (already discussed in the 'ethics' section).

Strict school schedules were another challenge during data collection. As I already indicated above, schools had their own schedules which I had to fit into. In one school, for example, data collection spilled over to late November 2017. The tight school schedules affected how schools managed my interactions with them. For instance, some schools at certain points reduced duration for interviews from 50 to 35 minutes and restricted my visits to two. In some schools, interview respondents reduced from five to four or three because some respondents were unavailable for interviews despite my persistent email prompts. From my perspective that suggested that they withdrew from the study, which again, was their right. To counter these challenges, I quickly adopted the changes the schools proposed. For instance, in some interviews in some schools, I focused more on asking questions which lacked saturation and clarity from previous interviews. Also, I focused specific questions to specific staff who could provide in-depth answers to them. For instance, questions about pupil behaviour and attendance data were posed more to the pastoral-MLs and CTs.

Again, there was limited access to teachers during data collection. As I already indicated, negotiating past the DMs to establish contact with teachers to complete the questionnaire proved difficult leading to a low questionnaire response rate of between about 15%- 23% per school. I had to contend with Denscombe's (2014) observation that 'survey responses are often quite low and getting a reasonable response rate can be quite a challenge to researchers' (p. 30). Denscombe (2014) adds that low response rates for questionnaire can be aggravated when a researcher has no personal contact with potential respondents. Thus, data from interviews remain primary in this study than questionnaires. This did not compromise the study because it was qualitative, and questionnaires only augmented in showing variation between people.

3.8.3 After data collection

Member checks according to Yin, enables respondents to validate the transcripts. However, after collecting data, conducting 'member checks' (Yin, 1994) became a challenge owing to teacher workload and tight school schedules. For example, I gave some respondents digital transcripts to validate and received no response. Bassey (1999) advises that 'a researcher can judge whether member checks are possible in the circumstance of the inquiry' (p. 78). I therefore made a deliberate decision to instead safeguard the validity of my transcript through immediate verbatim transcription, using a transcript annotation system, and, re-playing the audio, again and again, to ensure it accurately reflected respondents' utterances as elaborated in the 'data transcription' section. I also used my research diary to countercheck the accuracy of various sections of the transcripts. Another challenge was being a researcher-cum practitioner having previously been a teacher in Kenya. Preventing my experience and thinking from colouring my analysis and results was crucial. Rather than rely on my past experiences, I relied on the evidence from data. Having outlined the challenges of the study I will now reflect on these challenges.

3.9 REFLECTING ON THE CHALLENGES

Overall, the challenges of access, poor responses and strict school schedules tell me something about the study context. It reveals how schools in England engage with the research community and are under no obligation to cooperate with researchers. At one point I felt anxious and thought I was getting behind schedule because my visit to the schools depended entirely on teachers' schedules. It appears that researchers in England have less control over when to visit schools for research activities, which of course, can interfere with a researcher's time-table (Simons, 2009). Perhaps an advantage in this kind of school engagement with researchers is teachers being honest with their responses since they are not out to impress researchers.

The access challenge reveals the different levels of access when researching within English schools. The inability to negotiate my way past the DMs is a testament to this. My data collection process and progress, for example, depended on the goodwill of schools and teachers. The school gatekeepers and the DMs, however, were supportive and played crucial roles in scheduling the interviews. To accommodate the study, for instance, one DM scheduled the interviews after teaching hours. The challenge on the part of the DMs, in my opinion, was persuading other teachers

to participate in the study as a few were reluctant to do so. Nevertheless, the DMs, like me, had to ensure the research proceeded ethically and voluntarily.

Low response from schools and the reluctance of teachers to participate in research may reveal how schools in England work in isolation. Teacher workload and performativity demands on English teachers (Ball, 2003) might be responsible for this. A possible explanation for the low questionnaire response rate in the study might be that the English teachers are already bogged down by numbers that they neither have room nor interest to further engage with paperwork, especially quantitative surveys from external researchers. Because of poor response in questionnaires, most data for the study came from interviews.

Going by the above experience, I might be tempted to believe that qualitative studies might be more promising in English schools than quantitative or mixed research. This is because qualitative studies do not require large sample sizes of respondents (Creswell, 2007). Moreover, qualitative studies permit face to face contact hence an opportunity to convince teachers from their busy schedules to participate in a study. A lack of contact with respondents, for example, impacts on questionnaire response rates (Gray, 2014). Therefore, upon realising that gathering data with questionnaires presented challenges, I immediately exploited interviews where I obtained most of the data. Conducting qualitative studies thus might be promising, at least at this point in time when the English schools are under performance pressures.

CHAPTER 4: RESULTS

This chapter presents the study findings. Because in research question 1 there is so much commonality between the schools, I will answer it across the schools and just point out the differences in the cross-case analysis section. However, question 2 to 4 will be answered case by case to avoid repetitions. In this chapter, Appendices F1, F2, F3 and F4 are the survey results showing teachers' perceived ways of interpreting, using, supporting and feelings about data use respectively. I have used a consistent approach for expressing quantitative data in qualitative terms (see Table 3.3). To answer the research question: how SLs and teachers use data, I used the survey results, interviews and documentary evidence (inspection reports). Also, in this chapter, school leaders of schools 1 to 5 are abbreviated SL1 to SL5 respectively whereas the word teachers refer to MLs and CTs, unless specified. Results show that English teachers collect large amounts of similar forms of data. A few exceptions are the independent school which neither collects nor uses SATs and pupil premium data. Also, most student-related data are quantitative. In terms of access, SLs have access to all data followed by the MLs and CTs respectively. Teachers mainly use norm-referencing and criteria-referencing to interpret data. Data, however, is used in three main ways: (1) to set targets, (2) to assess and monitor who is falling behind in terms of progress, and (3) to report progress and ask pupils to try harder. Going by Wieman's (2014) position, these teachers' data-informed teaching is mostly diagnostic with little evidence that data is used to improve teaching methods (see section 2.5.1.1). Finally, schools support access to data and internal collaboration around data, but, do not partner with universities and other schools around data.

4.1 Question 1: What data schools collect and who accesses it

Table 4.1 provides a summary of the contextual information of each case school to help us contextualise the results.

Table 4.1: Contextual information of the case schools

School	Type	Size	Teachers (T)	Approx. no. of pupils (P)	Ratio (T:P)	PP	SEN	Ofsted inspections
1	Comprehensive	Small	55	700	1:13	B. A	A	2009 (Good) 2012 (Good) 2015 (Good)
2	Academy	Medium	60	980	1:16	A. A	A	2012 (Satisfactory) 2014 (R. I) 2016 (R. I)

3	Local Authority	Large	114	1480	1:13	B. A	B. A	2010 (Satisfactory) 2012 (Good) 2017 (R. I)
4	Community	Large	115	1500	1:13	B. A	B. A	2012 (R. I) 2014 (R. I)
5	Independent	Small	40	600	1:15	-	-	-ISI (Outstanding)

Key: PP= Pupil Premium compared to national averages; SEN= Special Needs students compared to national averages; A = Average; A. A= Above Average; B. A= Below average; R. I= Requires improvement

Next, I present in Table 4.2, the types of data each case school collects. Where data was mentioned but samples are lacking in the table, it could mean the data was confidential, or the SL was unable to provide it during the study. However, where data was neither mentioned nor sample provided, the implication is that it was not collected, or respondents forgot to mention it but collects it. Brief descriptions of these are in Appendix L.

Table 4.2: Data collected and who accesses it

DATA TYPE	**SCHOOL**									
Input data	**1**		**2**		**3**		**4**		**5**	
	Avail.	*Access*	***Avail.***	*Access*	***Avail.***	*Access*	***Avail.***	*Access*	***Avail.***	*Access*
Pupils intake/ demographic	√	SLs	√	SLs	√	SLs	√	SLs	√	SLs
Special Educational Needs (SEN)	√√	ALL	√√	ALL	√√	ALL	√√	ALL	√	ALL
Pupil premium	√√	ALL	√√	ALL	√√	ALL	√√	ALL	X	- -
Primary school KS2 SATs	√	ALL	√√	ALL	√	ALL	√	ALL	MidYIS/ ALIS	ALL
School Development Plan	√√	ALL	√	ALL	X	- -	X	- -	√	ALL
Cognitive Ability Tests (CATs)	√	ALL	√√	ALL	√	ALL	√	ALL	X	--
Diagnostic entrance exams	X	--	X	--	X	--	X	--	√	ALL
Process data										
Lesson observations	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs
Teacher attendance	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs
Teacher personal information	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs
Pupil behaviour	√√	ALL	√√	ALL	√	ALL	√√	ALL	√	ALL
Pupil attendance	√√	ALL	√√	ALL	√	ALL	√√	ALL	√√	ALL
*Pastoral	√	ALL	√	ALL	√	ALL	√	ALL	√	ALL
Progress/assessment	√√	ALL	√√	ALL	√	ALL	√√	ALL	√	ALL
Fisher Family Trust (FFT)	X	- -	√	SL	√	SL	X	- -	X	- -
Output/outcome data										
School inspection/ISI report	√√	ALL	√√	ALL	√√	ALL	√√	ALL	√	ALL
Achievement/GCSE/League tables	√	ALL	√	ALL	√	ALL	√	ALL	√	ALL
RAISE online	√	ALL	√	ALL	√	ALL	√	ALL	X	- -
School leavers (NEET)	√	*SLs*	√	SLs	X	- -	√	SLs	√	SLs
Self-evaluation	√	MLs, SLs	√	MLs, SLs	X	- -	X	- -	√	MLs, SLs
Teacher appraisal/performance	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs	√	MLs, SLs
Context data										
Staff surveys	√	SLs	√	SLs	√	SLs	√	SLs	√	SLs
Pupils/ parents' surveys	√	SLs	√	SLs	√	SLs	√√	SLs	√	SLs
Pupils interviews	√	SLs, MLs	X	- -	X	- -	X	- -	X	- -

KEY

Avail. = Available
√√ = *Mentioned, sample provided*
√ = *Mentioned, sample not available*
X = *Not mentioned, no sample*
- - = Not applicable

MidYIS= *Mid- Years testing*
CATs = *Cognitive Ability Tests*
NEET = *Not in Education, Employment or Training*
League Tables and Ofsted reports are public data

Accesses= who accesses the data
SLs = *Senior leaders [i.e., Governors, Deputy headteachers, & Data Managers]*
MLs = *Middle Leaders [i.e., Heads of Departments/ faculties, Year leaders, & Progress leaders]*
ALL = *SLs, MLs and Class Teachers (CTs).*

4.1.1 Data collected: similarities

The results in Table 4.2 show that schools collect significant amounts of data. For example, due to electronic registration, individual student attendance data is collected five times daily in all schools (i.e., per lesson). With 190 days in a school year, this translates to 950 attendance collection points per student per year. Progress data is collected and reported to parents in all the schools every year as follows: three times in schools 1 and 4; four times in school 3; five times in school 2; and every 6 weeks in school 5. Behaviour data is also collected daily when a student misbehaves inside or outside lessons (e.g., failure to complete homework). Working with every six weeks progress data collection points, and assuming the remaining eleven pupil-related data sets in Table 4.2 (including behaviour) are collected twice per student per year, that gives 28 pieces of data per student per year. Overall, this translates to about 978 pieces of data per student per year (excluding staff and school-related data). In addition, most teachers especially CTs, perceived data collection as one of their key responsibilities.

Also evident is that schools collect similar forms of data (Table 4.2). The few exceptions are the independent school 5 which did not collect SATs and pupil premium data. A brief definition of these data is provided in Appendix L. Generally, the data schools collected were similar types of: input data (e.g., pupil intake and special needs); process data (e.g., progress); output data (e.g., inspection reports); and context data (e.g., pupil surveys). However, most data that schools collected were about pupils' progress (e.g., assessment, attendance and behaviour data). Most of these data is integrated into the School Information Management System (SIMs) of the respective schools.

Some distinctive results also emerged. First, data collection in the schools was hierarchical. For instance, CT collected mostly pupil-level data (e.g., assessments), MLs collected some staff-level data (e.g., lesson observations) and pupil-level data (e.g., SEN), and SLs mostly collected school-level data (e.g., pupil surveys). Second, although teachers complained of KS2 (e.g., SATs) being quantitative and limited, they themselves generated significant amounts of quantitative data about pupils. Pupils' progress, CATs, attendance, behaviour and survey data were quantitative suggesting that pupils were defined by numbers than staff whose data (e.g., lesson observations) was qualitative. Third, pastoral data was not stand-alone data in the schools. Rather, it was a collection of pupil management data including pupil Progress, Attendance and Behaviour (PAB) data. For instance, when asked about the pastoral data, a pastoral-ML in school 2 linked it to PAB data, saying:

> As a pastoral system, we use 3 loops called PAB (Progress, Attendance and Behaviour). We look at the behaviour if they have got a number of behaviour points, and the attendance because we do find sometimes that if they have got a low attendance, and a low behaviour points, it would massively affect the progress. (Pastoral-ML)

Fourth, schools collected a variety of KS2 data from primary schools as transition data. They included SATs, SEN, Pupil Premium, pupil attendance and behaviour data which are initial indicators to schools about pupils' ability and background. However, state school respondents expressed cynicism about SATs arguing that it was limited and sometimes inaccurate. For example, SL3 said, '*We sometimes find that KS2 SATs are not an accurate reflection of the pupils' progress when they come to us. That can be problematic'.* Respondents felt that SATs data was problematic because primary schools mostly taught pupils how to pass the exam rather than teaching the broader curriculum:

> Primary schools have their own agenda to get the best SATs results, and I fully support that. But it does a disservice to some of our students because I think what ultimately happen in year 6 is that students are taught to pass the exams. (ML, school 4)

Finally, schools collected additional qualitative data and CATs to understand new pupils who join year 7. This suggest that teachers trust their own data as opposed to those generated by others. However, the qualitative data schools collected from primary schools may be limited due to the inadequate time for primary school visits and conversations skewed to primary headteachers or head of years 6: '*We basically collect qualitative data which is just anecdotal stuff from the Headteacher or head of year 6 on issues such as what the child hates*' (pastoral-ML, school 1). The primary school CTs who should have been consulted about individual children were not.

4.1.2 Who accesses the data

The results show that access to data was also hierarchical. Table 4.2 show that SLs had access to all data, followed by MLs then CTs. SLs accessed all school-level data (e.g., staff surveys); staff-level data (e.g., teacher appraisal); and pupil-level data (e.g., pupil progress). Therefore, it can be reasonably argued that more decision-making responsibility came with access to more data. The MLs were second to SLs in terms of access to data. They accessed pupil-level data and some staff-level data that were relevant to their roles because staff data were confidential as pointed out by SL5 who said, '*most*

data on staff are confidential'. This confidentiality may be attributed to the English data protection act of 1998 and the recent General Data Protection Regulation (GDPR) which took effect in May 2018. GDPR demands confidentiality over personal data held by institutions. Respondents were aware of it. Finally, CTs had the least access to data. That access was limited to pupil-level data (e.g., pupil progress, behaviour, attendance and SEN) which were accessible to everyone. When asked who accesses pupil attendance and progress data, SL1 said, '*all staff*' whereas SL4, replied, '*everybody*'. In the section that follows, I consider each school in turn, in order to answer the remaining research questions, case by case.

4.2 SCHOOL 1

4.2.1 Contextual information

School 1 was a small comprehensive state school. It had a 12-member governing body and was partially controlled by the local diocese. It is a mixed-sex day secondary school which follows the National Curriculum and caters for KS3 and KS4 (ages 11- 16). It had about 700 students and 55 teaching staff, hence a teacher: student ratio of 1:13 during the study. The school's mission statement was grounded in a religious scripture of faith, hope and love (school's website). Its vision is 'to develop a well-rounded and motivated young adults'. The school publishes some of its data, policies, and processes on its website for public scrutiny. Such data included Ofsted reports, pupil premium, Special Educational Needs (SEN) reports, school development plans, parents' survey, and, policies on safeguarding, pupil behaviour and attendance. The website had evidence of a transition link with primary schools including a visit by its pastoral leader to primary schools where the school gets its year 7 pupils and KS2 data.

Because high stake accountability from Ofsted inspection can impact on data use practices in schools, I highlight the three immediate Ofsted judgments of the school. In 2009, 2012 and 2015, Ofsted judged the school as 'good' (GOV.UK-Ofsted). The 2015 report, however, identified quality teaching, support for SEN and pupil attendance as areas that needed improvement. The report proposed that teachers needed to match tasks and activities more closely to pupil needs, especially for the SEN group so that pupils make the best possible progress. On attendance, the report highlighted a need to reduce pupil absenteeism by tightening systems for recording and reporting absence. Finally, the school emphasises learners' progress by embedding targets and 'challenge' targets for all pupils (school website).

4.2.2 Question 2: How teachers interpret data

Use of criteria

Interview data shows that respondents mainly used criteria-referencing approach to interpret data. The criteria were set by school authorities or external agencies and respondents used it mainly to interpret pupil progress data. A CT at the school said that: '*Every time they do a test, this bottom blue line [showing on a computer screen], is the progress they should be making. A pupil whose performance is below the blue line, is below target; and above it, is above target*' (CT). Here, the 'blue line' sets the criteria for expected performance making it easy to interpret the data. The approach, however, can impede teacher professional judgment and drawing of deeper meaning from data.

Criteria were also used to interpret pupil attendance and behaviour data: *'When attendance starts to fall below 95%, we highlight it in Amber. Anything below 90% attendance we consider as 'persistent absenteeism'* (SL).

Use of norms

Evidence show that teachers also use norms to interpret data. For example, the SL reported using SATs to compute targets for students against students of the same cohort at the national levels. Also, students were ranked and the last 10 in the class spoken to (their performance notwithstanding):

> One activity that the year leader may do would be to rank that data (assessment). And in ranking it they may say of all the 140 children in the year group, we got may be 10 children here who got the lowest effort grades. These 10 grade D children, we need to speak to. (SL)

This interpretation might be unwarranted since the difference between the last 10 pupils and the 11th may be insignificant. Hence, the use of norm interpretations can mislead and needs caution.

Use of prior knowledge and experiences

The survey results in Appendix F1 showed that respondents in school 1 frequently relied on prior knowledge and experiences (M=1.80, SD= 0.42) to interpret data. The approach involves teachers

concentrating on data which supports their prior knowledge and experience and thus may fail to see other parts of data that may negate or challenge those beliefs. A CT used this approach to jump to a conclusion linking pupils who drift below target to lack of revision at home:

> With the class data, I do it more individually… it might be if you see a pupil starting to drift below target, you can have a look at what are they revising or are they doing any work at home…. again, often you find those two things are always a lack of revision causing lack of progress. (CT)

Using prior experiences to interpret data can be error prone. For instance, the CT's statement attempts to simplify the complexity of what causes a drop-in pupils' performance to a lack of revision at home, not teaching quality. However, prior knowledge and experiences when triangulated with other data sources, can enable deeper interpretation of complex social relationships behind numbers:

> One thing I did once was I had a suspicion of the reasons behind one pupil's poor behaviour, I tried to find data and there wasn't really any link. I couldn't find a pattern. Instead, I thought, why don't I have a look at which individual teachers they are getting the behaviour points. Because sometimes, they get it in English, sometimes they don't. So, when I looked at the teachers, it quickly became apparent to me, it was the gender of the teacher. This lad always misbehaved for female members of staff but never for male teachers. (Pastoral-ML).

Here, the pastoral-ML's prior experiences triggered hypotheses to be tested over a pupil's misbehaviour in class. By consulting the profile of teachers who awarded behaviour points, the ML was able to unearth a link between the pupils' behaviour and teachers' gender.

Triangulation

Triangulation which is also understood as corroboration of multiple sources of evidence was also used to interpret data. Although triangulation was commonly used by the pastoral-ML to compare PAB data for meaning and relationships, sometimes it applied in team discussions such as departmental meetings where teachers discussed and interrogated data to develop meaning:

> And then they, department, might say-right, year 10 did not do very well in Biology exams. Is that, let's look at every teacher. Have they underperformed for every teacher? Yes. Right, then what's the problem? They have underperformed with one or two teachers- right! Is that a problem with the teaching method used or is it a behaviour problem in that class? (Pastoral-ML)

The possible reason why the pastoral-ML used triangulation is because the pastoral data (i.e., PAB) is tightly linked to complex social relationships to warrant criteria interpretations.

Longitudinal analysis

Although rare, some teachers used longitudinal analysis to interpret pupil progress data. A CT said, '*as a teacher, I look at individual children's track over several tests to see if they are progressing over the correct level.*'

4.2.3 Question 3: How SL1 uses data

Targets

SL1 used KS2 SATs data (from primary schools) to generate targets grades for pupils on entry. Targets were generated by converting SATs scores of individual pupils into a predicted GCSE grade. The SL also assigned a Challenge Target (CTAG) to every pupil. The CTAG was one point above the target grade (e.g., a Target of 5 points had a CTAG of 6). The school's focus on performance progress may have necessitated the inclusion of CTAGs. Furthermore, the SL viewed targets as a measure of progress to be achieved by teachers, possibly through their planning and teaching. The SL said:

> My job is to generate targets for children… so, the teachers know the ability of the child and what is expected of the child at the end of year 7 and so on. (SL)

The targets were fixed, and the SL explained why:

> KS2 data is very a limited piece of information…but it is key because based on it, the government puts an expectation on secondary schools on what outcome should be at the end of KS4. (SL)

Seemingly, secondary schools were made accountable over pupil test data from primary schools. Probably this would explain why targets trickled down to pupils. Making secondary teachers accountable over primary school data can undermine their professional judgment because it assumes that data is flawless and that pupil progress towards targets is linear (change in school or home context notwithstanding).

Ability setting

SL1 used SATs data to put pupils into initial ability sets in Maths. Ability setting is the grouping of pupils of similar abilities for teaching at uniform level and pace. Setting may be beneficial when pupils of different ability are given differentiated teaching in similar-ability classes where high ability students can cover more content. However, its basis on SATs scores may be problematic. For instance, a SL vehemently argued that SATs scores are limited because they are based on numbers which although may be precise, did not tell everything teachers need to know. Setting pupils in Maths could be intended to improve outcomes in the subject.

Evaluating underperformance

The SL used data such as GCSE results and lesson observations to evaluate teacher performance. Lesson observations were conducted twice a year to evaluate whether teachers met lesson expectations, inspired and challenged students. The SL also reported that Staff appraisals data informed setting of target for teachers who had to write how they were doing towards those targets. Also, performance management review was used to justify teachers' pay-scale:

> Teachers get targets when the year starts. The targets might be about teaching and learning, doing extra work in school, being in clubs…At the end of the year, this information is reviewed… and from that, teachers may move up or down the pay-scale. (SL)

Setting teachers' pay scale in this school through data was interesting because it seems to consider both academic and school activities teachers engaged in such as clubs. This seems to align with the school's vision 'to develop well-rounded adults' (see the contextual highlights of school 1 in the section 'case selection'). This may also explain the availability and use of pupil interviews data by SL1.

Identifying needs and planning

The survey shows that SL1 sometimes used data to identify needs and inform planning. Inspection reports, pupil interviews and all surveys data, for example, supported identification of needs (e.g., likes and dislikes) of respondents and planning to address those needs. The SL gave an example, saying,

> If we are getting certain message that come through from staff surveys such as something they like or dislike, we consider that in our development plan. (SL)

The SL also used RAISEonline to identify areas of weaknesses in cohorts for targeted support and for self-evaluation (e.g. if SEN performs better than pupil premium cohort).

Monitoring progress and conversation

The SL sometimes monitored achievement of targets at the school level:

> Three times a year we collect progress data. And every teacher who teaches the child has to give us information on key things like at what level is the child performing? At what grade are they working at? Is the child on track of where they should be by the end of the year? (SL)

The SL reported highlighting underperforming students in a spreadsheet and asked teachers to intervene to bring them back on track. The SL explained: '*we also talk about their attainment and progress, are they on target?* This statement suggests that data use by SL1 mostly informed diagnostic approach to teaching. There was little evidence that data use by SL1 improved teachers' teaching methods. For instance, there was no evidence of follow-up activities by the SL to see whether teachers revised their teaching methods for underperforming pupils.

Strategic use

There is evidence that SL1 had a strategic focus on English and Maths SATs data because schools were judged by it at KS4. The SL strategically, for example, focused on Maths SATs data to group pupils into ability sets.

Distinctive results from SL1: awards

SL1 motivated pupil attendance through data. Pupils with 100% attendance received certificates. This seems to align with the school's inspection report which recommended a need to tighten attendance.

4.2.5 How teachers use data

Ability re-setting

After receiving targets from SLs, the academic-MLs analysed pupil SATs, re-tested pupils via CATs immediately they arrive to re-set them accordingly into different classes. This is an indication of the school's lack of trust in SATs. Some teachers argued that ability setting enabled differentiated teaching. Pressure to performance could be the reason for ability setting. The academic-ML for Maths hinted this, saying,

> The only department I liaise with in terms of data and targets would be English because now obviously our two subjects are double weighted in GCSE. And we do lots of intervention and usually we must liaise about which pupils we can take in. (ML)

Although setting pupils according to ability may be helpful for targeted support, it can also add performance pressure on teachers who teach the different sets. Students may also experience pressure to either maintain or improve their performance to maintain their sets or to move up the sets.

Teachers argued that by re-testing pupils, they were able to build a 'richer picture' of pupil ability. Pupil assessment data were also utilised for this purpose as argued by the SL:

> Class teachers since they teach them for the first 7 weeks, we also have assessments on classwork, and they start to build a much richer picture of the child's ability. (SL)

Identifying needs and planning

After ability setting, other pupil-related data from primary schools were disseminated to CTs. The data included students' attendance, intake, SEN, and Pupil Premium (PP). CTs used these data to for diagnostic purposes such as identifying pupils of concern (attendance-wise, physically, mentally or deprived) in their classes and plan support. For example, a CT explained how pastoral and progress data was used to identify pupil needs and to plan to address those needs:

> If you know a student who is shy or quiet, or maybe they struggled with the subject in the past, you can use that to try and inform the planning to try and get some groups which share a lot. (CT)

SEN data helped teachers in lesson planning. For example, the data helped teachers to diagnose what pupils can or cannot do such as what subject they struggled in previously. I did not find evidence that data use improved the teachers' methods or teacher approach to teaching as outlined by Wieman (2014).

Monitoring progress to identify underperformance and for conversations

As shown in Appendix F2, teachers have a perceived moderately frequent use of data to monitor pupil progress (M=1.60, SD=.52). Teacher monitored progress to identify pupils who were below targets:

> The subject leader would look at that data (progress). They would identify children who are not on target for where they should be. (SL)

> The pastoral head and the year heads use that assessment data to track progress to see which pupils have fallen behind targets. (CT)

Targets were made precise for fine monitoring:

> We subdivide each target grade into three…, we have 1d equals 'developing knowledge', 1s equals 'secure knowledge' and 1e equals 'extended knowledge'. 1d is grade 1 but on a lower level, while 1e is on a higher level. Similarly, we have 2d, 2s and 2d. (CT)

The tool for monitoring progress was formal assessment tests. Pupils took them every six weeks. Using technology (4-metrics), assessment test results were transformed into visual tracking sheets for quick reporting of progress to SLs and students. The tracking sheets showed whether a pupil was on, below or above target. Additionally, 4-metrics color-coded pupil performance in traffic-light format. That is, Green, Amber and Red to highlight pupils above, on and below target respectively:

> If we see someone is on Red because they are below target or not making progress, then that would be flagged up for intervention. (ML)

Although interventions varied, they were mostly conversational (see figure 4.1). A persistent lack of progress prompted teachers in school 1 to either talk to pupils to add effort, move pupils down sets, or involve parents. When students performed beyond targets, teachers added a challenge target to drive performance forward. Evidently, the above intervention clearly had little influence on teaching. Nevertheless, one ML reported providing some occasional remedial lessons for weak students.

Teachers also monitored pupil behaviour and attendance through data. This was done by the pastoral-ML and the year leaders supported by the SIMs technology. For example, a ML said, '*I get message pop-ups (on SIMs) saying, 'disruptive behaviour', I will click on it and it will give me the pupil's name and comments'.* To permit tracking, teachers awarded behaviour points to pupils: '*…a minor misbehaviour like forgetting to do homework might be 1 point. But a fight would be 5 points*' (CT). The consequence of accumulating more behaviour points was a sanction or a detainment over lunch.

Data on attendance was in colour-coded percentages of: '95% is Green', 'between 90 to 94% is Amber' and 'below 90% is Red. Attendance outcome had varied interventions. For example, 100% attendance was awarded certificates, below 95%, causes were sort (e.g., medical, home situation etc.) and 90% invited more actions including calling parents and local authorities to reverse it.

Teachers perceived poor attendance and behaviour as barriers to progress. For instance, teachers paid close attention to attendance and behaviour data whenever pupil progress was interrupted. This

suggests that Progress, Attendance and Behaviour (PAB) data were early warning systems about student under-performance, absenteeism or misbehaviour.

Distinctive results from teachers in school 1: Accountability, self-learning, teaching

Teachers used data for some accountability. For example, Pupil premium, SEN and PAB data are monitored, and performance reported to SLs, parents and external agencies. Also, after every assessment point (every six weeks), SLs asked teachers to explain why their pupils did not meet targets and the interventions they planned. It seems the teachers were held accountable for pupils meeting or not meeting their targets.

Self-learning or reflections from data can be useful for student and school improvement. Surprisingly, respondents did not link students' lack of progress to their own teaching practices. Rather, they talked about interventions and seem to associate them with teaching:

> If there are any pupils that are not on track to meet the target in the next department meeting, I will highlight those pupils and just let the staff aware… and then feed in intervention episodes within the classrooms. They need to intervene with those pupils to get them back on track. (ML)

The level of agreement in the survey data (Appendix F2) for school 1 (M=1.40, SD.70) suggests that the teachers have a moderately frequent use of data to improve teaching. However, interviews data revealed that teachers frequently use data to inform their diagnostic approach to teaching such as talking to pupils and providing remedial lessons (see figure 4.1). Evidence from interviews data shows that these teachers neither used data to change their teaching methods nor to improve their knowledge about effective teaching (Wieman, 2014).

Only the pastoral-ML reflected from data by querying whether pupil's absenteeism was teacher, subject or pupil-triggered. Probably the complexity of pastoral data prompted the pastoral-ML to reflect from data unlike other teachers who focused on objective numbers. Failure to self-reflect from data may deny teachers self-improvement opportunities such as research-informed teaching.

4.2.6 Question 4: How SL1 supports data use

Appendix F3 provides the survey results showing how often teachers received data use support in their schools in the last twelve months. As indicated in Appendix F3, respondents in school 1 frequently perceived access to data (M=1.80, SD=.42) as a major support. All respondents had access to data. For instance, a ML when asked whether she had access to data she needed in her work replied, *'too much of it.'* The use of a School Information Management system (SIM) by the school may explain this seamless access to data. SIMs facilitate effective storage and dissemination of data to all teachers as asserted by the CT who said, '*I have all the data I need. It's all there in the SIMs*'.

Internal collaboration around data was frequent in school 1 (M=1.70, SD=.48). Interviews showed that teachers collaborated by sharing data with different teachers at different levels in the school: '*We do collaborate with colleagues in departments, subject leaders, teachers and share data*' (SL). A CT then narrated how he shared data with a departmental colleague, saying, '*I remember doing reports, entering the data and taking back to the department again and say, does that kind of look right?*' (CT). The small size of the school (in terms of population), and a focus on pupil progress may be encouraging this internal collaboration around data by teachers of school 1.

Appendix F3 shows that school 1 never partnered with universities (M=0.00, SD=.00) around data. All interviewees confirmed this. A SL, for example, said, '*we do not partner with universities to use data*.' Also, school 1 partners very infrequently with other schools around data use (M=0.22, SD=.44). Interviews data, however, show that a ML sometimes asked teachers from other schools about whole school performance figures: *'We don't share data with other schools. Maybe percentages like last year we got to share our performance in Maths and we asked, what is your performance, what is your progress 8, but then that's it*' (ML). External competition and high stakes accountability may be preventing external collaboration around data.

Distinctive results on support in school 1: time, statistician, visions, training

Although structured time to use data was very infrequent in school 1 (M= 0.50, SD=.53), interviews show that the SL and the MLs had three hours per week to look at data and prepare lessons: '*We are given free non-contact time to prepare lessons and log-on data. It's about 3hours per week*' (ML). A CT, however, argued that time would never be enough to do anything in school. It could be that teachers waste too much time collecting significant amounts of data, rather than engaging with it.

A trained statistician is infrequently perceived to support teachers in school 1 (M=0.60, SD=.84). Teachers, however, seems to disagree in their responses on this matter as indicated by a higher SD of .84. Data from the interviews explained this response variability by confirming that the available Data Manager (DM) in the school mostly assisted the SLs, not the MLs and CTs. For instance, when asked how the DM supports his data needs a CT responded, '*No. We don't. We just look after our own data*.' A ML added that the DM mostly provided training on how to use SIMs, not data analysis and interpretation: '*We have a data manager in the office. If there is anything SIMs-related or data software-related, I could go to him. But If I need to do something on the spreadsheets, …the expertise is certainly in the department not in there*' (ML). Perhaps, teachers had little confidence with the DM's ability to satisfy their data needs. These finding also suggests that the DM mostly administrated data. Probably, inadequate funding prevents the school from employing a qualified statistician to support teachers' data needs.

Also, a moderately infrequent understanding of the vision and goal for using data (M=1.00, SD=.71) was evident in school 1. The interviews confirmed a lack of shared vision and goal for using data. Respondents understood data use goals and vision only according to their roles. To a CT, for instance, the vision for using data was to track progress whereas to the SL, it was about collecting data to inform the teacher, pupils and parent; and to intervene where necessary. It seems the SL's vision for using data was clearer because he understood it from a wider school position. The vision then scattered down to the junior teachers who understood it from a narrow role-based position.

Data use training was moderately infrequent (M=0.90, SD=.57) despite school 1 being data-rich. Although teachers had basic training about SIMs, they were on their own as far as data use training was concerned: '*We get training on how to use SIMs. It is not so much on how to analyse or use data. That's very much up to you to work out*'(ML). But through years of experiential knowledge, teachers through trial and error possessed some data use knowledge and skills. A CT confirmed this saying, '*on training, I have never done one really …I learnt it you know, almost by osmosis*. A ML added, '*I have skills and knowledge to use data but only because I have developed them myself*' (ML).

4.3 SCHOOL 2

4.3.1 Contextual information

This was a medium-sized comprehensive state school which applied to change into a converter academy. It is a mixed-sex school catering for KS3 to KS5 (i.e., ages 11- 18) from over 30 primary schools. This suggests that the school has pupils of diverse backgrounds. During the study, the school had about 1,000 students and 60 teachers hence, a teacher: student ratio of 1:16. The school is government-funded but governed by 19 people drawn from the local community, parents and staff. The school's mission and vision focus on ethos, school development, information and partnership (website). It aims to create independent creative learners in sports and performing arts, and to build a partnership with pupils and parents. The data available on the school's website included Ofsted reports, SEND report, pupil premium, parents' voice, term dates, and school policies (on safeguarding and attendance). Additionally, the website reveals transition activities for year 7 including primary school visit events suggesting an interest in KS2 data.

In 2012 Ofsted judged the school 'satisfactory' while in 2014 and 2016, it was judged as 'requires improvement' in pupil outcomes (GOV.UK-Ofsted). The 2016 Ofsted report cited areas for improvement as: setting high expectation and challenge to students; pushing the most-able students to achieve higher GCSEs grades and; reducing performance gap of disadvantaged pupils in comparison to other schools. This suggests that the school may use data to satisfy the inspectorate. The report, however, praised the school's positive improvements in: teaching and learning of Mathematics and English, progress in all subjects, student behaviour and all its graduates being in universities or employment (GOV.UK-Ofsted). The report highlighted that the school had above average number of pupils receiving Pupil Premium and SEN support. This suggests that the school is in a deprived area.

4.3.2 Question 2: How teachers interpret data

Use of criteria

Respondents in school 2 mainly used criteria-referencing to interpret data. Pupil attendance and behaviour data are interpreted via criteria:

> We have behaviour logs. Pupils now get a number between 4 and 1 with 4 being the best and 1 the lowest. If a pupil is well behaved, well equipped, does their work, contributes in class, they

> get a 4. Then it slowly comes down and obviously, 1 is a behaviour log which then leads to a detention or worse depending on what the issue is with that child. (CT)

Use of prior knowledge and experiences

13 respondents completed the same survey given to school 1. The results (see appendix F1) showed that respondents very frequently used prior knowledge and experiences (M=2.00, SD=.00) to interpret data. A CT demonstrated how prior experiences makes data from low ability sets to be interpreted with leniency: '*if that group of pupils is a bottom set, for example, if a pupil has not met their target grade, it's really important for you not to get worried'.* (CT). This suggest that low ability pupils had lower expectations in terms of targets. A ML also gave an insight into how past experiences enabled quicker interpretation of academic success or failure:

> What we find in this school is their ability to revise for exams is a bit of an issue. That is why if I see a 50% and a 90%, I know the 90% pupil and I can probably find the evidence where they are doing everything within their power at home to learn the material. (ML)

This teacher's statement is similar to that of the CT in school 1. His implication that a 90% score is a student who does more at home might be unwarranted. It is not easy for a teacher to know exactly what happens at a pupil's home. Yet, the statement seems to suggest that pupils' results are consequential on their home circumstances, rather than the quality of teaching.

Use of norms

The SL and the MLs reported the use of norms to interpret pupil progress against targets. For example, the use of SATs to compute targets against the performance of other students in the country.

Use of 'experts'

Respondents in school 2 frequently relied on an 'expert' (M=1.85, SD= .38) to interpret data (see appendix F1). The 'expert' had experience in data analysis, had no teaching duties and was focused on supporting teachers' data needs. A CT highlighted how the 'expert' helped him interpret pupil achievement data when he was unable:

> I went to him (expert) about my year 11 data last year and he helped. Where I thought pupils had done badly, he helped me understand the data better. He helped me analyse it in a much better way and it worked out that they did a lot better in English across the school than I previously thought. (CT)

This statement suggests that a teacher's interpretation of data might not be very accurate at times.

Triangulation

Some teachers used triangulation to interpret pupil's performance data. Triangulating data with what other stakeholders said was important because, as this Head of Department argued, it enabled a 'complete' understanding of what data means:

> You've got to look at the whole picture to get meaning out of it really. One number doesn't sum up a child sometimes. So, it starts with the individual teacher looking at the data, then discusses it in a group meeting with the faculty members or with parents. (CT)

This teacher's statement also indicates collaborative inquiry to inform data interpretations.

4.3.3 Question 3: How SL2 uses data

Identifying Areas For Improvement (AFI) and planning

SL2 identified improvement areas planned from data. Data such as the GCSE results, RaiseOnline, FFT, staff data, all surveys and inspection reports are used to identify AFI to prioritise in the school development planning:

> ...after inspection there is always an area for improvement. That area of improvement informs our development of the school development plans for school improvement in the following year two years. So, if they say what you need to do is 'increase the number of grade A's, so that will become a priority for ourselves as a school. (SL)

The SL's statement aligns with the school's 2016 inspection report which recommended the need to push the most-able pupils to achieve higher grades in GCSEs. But school 2 is in a deprived area (from 2016 inspection report). Its pupils may be disadvantaged in many fronts thus hindering them from producing favourable test outcomes despite the inspection report noting that the school had improvement in teaching and learning in all subjects and in pupil behaviour. This points to flaws associated with a lack of context-sensitive interpretation of data. SL2, however, tried to address the context issue using pupil demographic data and the Income Deprivation Affecting Children Index (IDACI) codes. IDACI codes are postcodes ranked by wealth indicator, from the wealthiest to the least wealthy in England. The SL combined pupil demographic data and IDACI codes to comprehend pupils' socio-economic backgrounds to support them socially. However, the success of this support was yet to be visible.

Monitoring progress and outcome

As indicated in Appendix F2, data was very frequently used to monitor pupils progress at school level (M=2.00, SD=.00). SL2 monitored the progress of pupils on Free School Meals (FSM) via FFT data:

> I can go and ask the data manager, how many pupils here are receiving Free School Meals and are not making progress. And he pulls out the data from the FFT for me. (SL2)

Although SL2 did not set targets for pupils, he monitored their achievement and asked teachers to intervene for pupils who are below targets. The CT explained:

> Whatever pupils score in that assessment goes into SIMs to [name] who puts them in a spreadsheet and sees if the student is making good progress. If they are below target, he asks what interventions can be put in place. (CT)

Outcomes were also monitored via data. For example, NEET data was used to monitor former students in employment or training, whereas staff-level such as staff attendance data was utilised to monitor staff absenteeism and to inform attendance-improvement conversations. Also, school functioning was monitored via surveys: '*Surveys tell us what is positive and what is going on'* (SL).

Teachers very frequently perceived an external accountability pressure as evident in Appendix F2 (M=2.00, SD=.00). The pressure for pupil performance and publication of school data in the public domain may be contributing immensely as hinted by the SL in the interview:

> Whole school data including examinations and Ofsted reports are picked up by external agents like Ofsted, DfE and parents….and when we get inspection, inspectors will want to see these data. (SL)

Evaluating teacher performance

Interview data showed that the SLs evaluated teachers' performance using data. For instance, lesson observation and teacher information data were used to evaluate teacher's pedagogical strengths and weaknesses for support, especially teachers who were weak pedagogically. The SL explains, '*from lesson observation we look at the teachers who have done really well and we say right, carry on then. You don't need to go out on professional development*.' This implies that the SL also used the data to justify staff-related decisions and that only the weak teachers attended professional development after identification through data.

Strategic use

There was a strategic focus on English and Maths data. For instance, the SL said:

> From the KS2 SATs, the information which is most important to us is the reading scores and Mathematical skills which we work with. (SL)

Distinctive results from SL2: no targets, self-learning, awards

There were three unusual ways teachers use data in this school as compared to the other schools. First, pupil targets were not set by SL2 but rather teachers (see section 4.3.4). Most likely, SL2 believed in teacher professional judgment (a very frequent accountability pressure of M=2.00, SD=.00, notwithstanding). This was also evidenced in his statements about target setting for teachers and the school's vision for using data. He argued:

> If we have a target of say, 'to improve learning of lower ability students', there is no point me coming up with that target and then go 'that's it. That's the target'. (SL)

> The vision is to make sure pupils do the best they can, that the pupils make progress they possibly can, regardless of their abilities and regardless of their starting points. That is key. (SL)

Second, SL2 grouped pupils into initial ability sets for Maths and English. Possibly, the SL used the skilled DM in school 2 to do it thus relieving teachers from data analysis workload (see, section 4.3.5). Last, the use of data by SL2 to motivate staff was moderately infrequent (M= 1.23, SD=.60). Although the survey result suggests a frequent data use for self-learning or reflections (M=1.92, SD=.28), interviews data provided little evidence that data was used for self-reflections. Good behavior, however, earned pupils an opportunity to attend a reward afternoon:

> We have a rewards' afternoon when company X comes in. If the pupil hasn't received amount of behaviour points on the rewards, then they will not be able to go to that reward afternoon. (ML)

4.3.4. How teachers use data

Targets, identifying, planning and change teaching

The academic-MLs set targets for pupils in Maths and English using SATs scores. They also re-tested pupils via CATs the first day they join to establish what they know to support them. Furthermore, Appendix F2 suggests that teachers believed they frequently used data to improve teaching (M=1.92, SD=.28). The interviews data revealed that teachers used data for diagnostic approach to teaching such as identifying which pupils need targeted teaching. The MLs analysed individual pupil performance topic by topic from year 6 Maths and English SATs scores to identify their areas of weakness. This information was given to CTs who used it to re-teach those year 6 topics:

> We do question-level analysis to inform teaching and preparation for students in year 7 when they arrive. If we have students where Geometry is a strength, we don't have to focus that with

> them. If we have another group of students where Geometry is a weakness, we focus on that. (ML)

The above statement suggests that although data use to improve teaching was diagnostic, the approach taken by teachers in school 2 seemed more sophisticated than that of school 1. However, it is doubtful whether all pupils in the school would have a single strength or weakness.

Monitoring progress to identify underperformance, conversations and accountability

Appendix F2 shows that teachers in school 2 very frequently used data for monitoring students' progress (M=2.00, SD=.00). Interviews corroborated this. Using assessment data, teachers were able to monitor students' progress against targets. Pupils below targets received interventions as explained by a ML:

> I would track the data in the SIMs, and say, let's look at these kids individually. If a pupil is not doing well in English, Maths or science, …we would pick the pupil and tell them they are below these ones, set them additional targets or work to make sure they improve, and they get a bit of intervention. And we would write that intervention down and next time we collect data we would be able to track if they got better at that or not. (ML)

Here, tracking of progress via data was evident. Tracking of progress was used to identify underperforming students for interventions such as talking to parents and adding targets and more work to students when progress outcome was inadequate. Also, teachers monitored pupil attendance and behaviour in percentages and behaviour points respectively. Every behaviour log got a point; 4 being the best and 1 being the lowest. A CT reported, '*if a student is well-behaved, does work, contributes in class, they get a 4'* (CT).

Teachers linked pupil behaviour and attendance data with progress:

> We use 3 loops. It's called PAB (progress, Attendances and Behaviour). We look at behaviour points and attendance because sometimes if they have low attendance, it would massively affect progress. (ML)

> …if a student is below target and they have low attendance, …then obviously there is a correlation between that because they are not getting interventions from the teacher to help them. (CT)

Although the statement by the ML may be true, the one by the CT raises questions about what happens to pupils with poor attendance but are above targets. Moreover, there is evidence that teachers equated misbehaviour with non-commitment to learning: '*we also assess pupil's behaviour. But we don't call it behaviour but rather, 'students' commitment to learnin*g' (SL). Although this may be true, disruptive behaviour could have many triggers (e.g., boring lesson, attention-seeking, difficult task, home situation and peer pressure), not necessarily non-commitment to learning. A perceived need to very frequently use data for accountability (M=2.00, SD=.00) and a frequent use of data to justify decisions in school 2 (M=1.92, SD=.28), may have oriented its teachers to equate misbehaviour and poor attendance with non-commitment to learning. This signals the teachers' perceptions of locus of control. The teachers exhibit an external locus of control by not attributing failure to themselves but rather to other people in this case, students.

Distinctive results from teachers in school 2: ability setting and no self-learning

Ability setting

A ML and a CT confirmed that school 2 teachers not only set students in Maths but also in English. A CT who teaches English said:

> We obviously set in English. We have a top set who would more than likely meet their expected targets and go above it, and a bottom set with more challenging and disengaged students. (CT)

I found no evidence that data use by teachers in school 2 led to self-learning or critical reflections. A very frequent accountability pressure (M= 2.00, SD=.00) might have narrowed teachers' focus away from reflecting on data.

4.3.5 Question 4: How SL 2 supports data use

Availability of a DM was very frequently perceived as the main support in school 2 (M=2.00, SD=.00) as shown in Appendix F3. All respondents mentioned a DM who took most of the data work away

from them to enable them focus on teaching: '*Now we have a data manager who would analyse and give me all the numbers and then I can just look at the data'* (ML). Another ML reiterated that his data needs were provided by DM, saying,

> If I want to have a look at a new way to do the behaviour system or the rewards system, I literally go and get him and say, look! I want so many pupils with so many behaviour points and any questions like these he does. (Pastoral, ML)

Although Appendix F3 shows that the DM was infrequently perceived as a qualified statistician (M= 0.62, SD. 87), there is some evidence that he was committed and skilled in data analysis. This might explain the confidence teachers placed on his work. The SL remarked:

> The data manager supports me a lot. He is skilled in IT and Excel. He can produce the data very quickly for me…. So, his background is data analysis. He gives me what I need. (SL)

Access to data was frequently perceived as the second major support (M=1.92, SD=.28). The SL confirmed this, arguing, '*first, all the data are made available to all staff. That is key. And then we have got tables of data that go out*.' A CT added: '*yes, the data are accessible on the SIMs'*. Access to data in school 2 was probably facilitated by the skilled DM and the SIMs technology.

A moderately infrequent partnering with universities and other schools at (M=1.08, SD=.86) and (M=1.23, SD=.73) respectively, were the least support in school 2. This converged with interviews. For example, a CT when asked whether they partner with any external institution to use data replied, '*not so much with universities but certainly with other schools.'* A ML provided more insights into the nature of this collaboration with other schools, saying:

> We have like a group of regional schools. But it wouldn't be for me. It would be for faculty leaders and department leaders. And the department leaders would meet with other department leaders from different schools which I think is good because although they are not using like pupil data, they will speak about what they need to improve. (Pastoral-ML)

There is also evidence that the academic-ML partnered with other schools around Maths data:

> I have been involved in what is called the schools' alliance for Maths. Every time we do a set of mock raise test, we collaborate with other schools to look at their data. (ML)

Perhaps a need to improve its pupil outcome as was highlighted in the school's recent inspection report could be orienting school 2 to explore outside for improvement tips. A ML hinted on this, saying,

> They do get people from outside the school to help them analyse data… and then he puts in sessions for the Senior Leaders and heads of the faculty where they analyse everyone's data. Kind of to say if your school is struggling, look at another school to follow… what's making their pupils better that we can kind of copy-cat it. (ML)

Distinctive results on support in school 2: devolved responsibilities, vision, pressure, training

School 2 frequently devolved its data use responsibilities (M=1.85, SD=.38). For instance, respondents exhibited data use awareness which cascades to everyone: *'everybody is using data, everybody knows what is talked about all the time'* (ML). Also, respondents had some data use responsibility at their job level. The CT, for instance, reported having the responsibility of keeping an eye on the class data to ensure that everyone is making progress. There are also meetings where the SLs discuss data with the MLs and CTs every fortnight. These also suggest internal collaboration around data and some structured time to engage with data.

The vision and goals for using data in school 2 was somehow clearer to respondents. The vision was simple: using data to remain informed and to improve pupil achievement:

> I always make sure there is a vision that we keep up to date on what is going on. And again, the data is used to try and provide the pupils with the best possible outcomes. That is what it's all about. (SL)

Clarity of data use vision and goals in school 2 could be attributed to devolved data use responsibilities and the data use training which targeted all staff. Next, there was a moderately frequent pressure on staff to use data (M=1.69, SD=.48). The pressure, however, was felt in different ways by different people. For example, for the academic–ML, the pressure was on meeting

submission deadlines for the attainment data failure to which he was asked to explain why? For the pastoral-ML, the pressure had become normalised:

> I could say yes on pressure. But now we have been doing it for long. It doesn't feel like a pressure anymore. It's just automatic. We do it automatically. (ML)

But for the SL, the pressure was externally instigated:

> The only pressure I get come from external agents like Ofsted, DfE, governors because of the pressure to develop a high outcome. Also, the data we make must tackle progress and you have got to perform. (SL)

Finally, there was a moderately frequent internal data use training (M=1.31, SD.48) for teachers in school 2. The training targeted all staff and entailed both data entry and interpretation. For instance, teachers were taken through what numbers meant in data, particularly for teachers without a background in math.

> We usually have professional development, which helps us sometimes understand what other numbers mean…particularly if you are rubbish at Maths like me. (CT)

4.4 SCHOOL 3

4.4.1 Contextual information

This was a large comprehensive state school managed by a local authority. Like school 2, it is a mixed-sex school catering for KS3 to KS5 pupils from over 30 primary schools. The school had about 1,500 students and 114 teaching staff employed by the local authority, hence a teacher: student ratio of 1:13. The school is government-funded but administered by a local authority through a 22-member governing body whose role is to provide strategic leadership, support, challenge, and to hold the school and the headteacher accountable for school performance. Whereas the school's mission and vision are to build aspirations and attain excellence, its ethos aimed to provide opportunities, resilience and respect for all students and staff. Thus, the school aimed for holistic development of pupils via impartation of life skills (school website).

Ofsted judged the school 'satisfactory' in 2010 which is equivalent to 'requires improvement' in the current Ofsted rating. In 2012 it was judged 'good' and in 2017, 'requires improvement' in all areas except in pastoral, personal development, behaviour and welfare which were judged 'good' (GOV.UK-Ofsted). The report emphasised the need to support disadvantaged pupils, improve the quality of teaching so that all pupils especially boys and middle-ability pupils make progress, and, enhance consistency in leadership and management. The report noted improvements in: school improvement plans and teachers using challenging teaching approaches. The report concluded that pupils receiving Pupil Premium and the SEN support in the school had below average attainment compared to the national averages.

On the website, the school's policies emphasised pupil attendance, behaviour and safety; SEN and inclusion; safeguarding (e-safety); homework; narrowing gap; staff-code of conduct; recruitment; very able and talented; marking, and assessment. There lacked online evidence about transition activities (i.e., visits to primary schools) where the school gets its year 7 students. The website also showed that in year 7, the school set pupils based on ability in math and science. However, at years 8 to 12, the setting is wide-spread and focusses on math, science, and English. The remaining subjects are taught in mixed ability sets. Unlike the higher ability sets, the lower ability sets are taught two extra lessons every fortnight.

4.4.2 Question 2: How teachers interpret data

Use of criteria

Respondents testified that criteria-referencing was the main approach used when interpreting progress attendance and behaviour data:

> We use 90% or below attendance and we regard that as persistent absence…. 90% is the national benchmark. (SL)

Basically, the percentages and the behaviour points awarded reflect the criteria used to aid data interpretation.

Use of norms

The SL reported use of norms based on national benchmarks as aiding data interpretation:

> Ultimately there are benchmarks and the national standards at end and the meaning or the levels are kind of imposed on us- you know. If it's 68%, that's because the exam board decided that 68% is a grade B and that is how it will be for everyone. So… whether the interpretation is done at individual or by group, it would still have to follow some criteria unless where none exists. There must be criteria, otherwise it's just numbers on a page! (SL)

However, this statement mistakenly confuses criteria-referencing to norm-based interpretations as evidenced in the last three lines of the statement. The statement also attests to the fact that without clear criteria to interpret data, teachers were likely to struggle for interpretations.

Triangulation

Triangulation is not only about corroborating different data sets, it can also be about consulting meaning from different participants (e.g., in staff meetings or parents). Although rare, teachers in school 3 sometimes used triangulation-based discussions to build meaning from data. A ML explained: '*we have meetings with the deputy heads… they would talk to us about the data and what it shows and what we think it is showing'* (ML).

4.4.3 Question 3: How SL3 uses data

Targets

Results show that targets were set for pupils by the SL using KS2 SATs and FFT data. FFT data provided performance trends of individual pupils right from KS1 through to KS4. SL3 analysed these pupil performance trends from FFT and compared it with SATs scores to set target grades for pupils. The SL explained how this was done, saying,

> We use FFT for target setting… we would look at what data year 7 come in with and FFT would anticipate the likelihood based on the statistical modeling that FFT do, where they would end up. So, we use that to benchmark their progress over the five-year schooling. (SL3)

Identifying underperformance

SL3 sometimes identified school strengths and weaknesses through data for interventions. School–level data (e.g., GCSE results, RaiseOnline, FFT, surveys and Ofsted reports) supported this purpose. For instance, pupil survey enabled identification of pupils' problems for action:

> From pupil surveys, we identify potential problems of groups of students or subjects. That enables me to analyse where hotspots are or areas needing further support. It may be a teaching and learning problem, or a group of students who perhaps are not accorded issues. So ideally, we use it to pre-empt any issue or to react to them. (SL3)

This statement suggests that the SL's focus was on students and subjects that can impact negatively on the school's performance.

Monitoring progress and conversations

Results show pervasive monitoring of different aspects of progress by SL3. Appendix F2 confirms a very frequent use of data to monitor progress (M=2.00, SD=.00). The SL monitor pupil progress at the school level four times a year via assessment data. He used that information to determine performance trends in relation to pupil targets:

> We would gather assessment data and obviously, do structured series of assessments. And those assessments feed into our reporting system. The system would look at where pupils are currently in terms of assessment and where they should be according to what we call progress paths… and we start to see any issues for students falling below that path and we do something with it. (SL)

SL3 also monitored departmental and subject functioning. The SL said, '*on the SIMs, we can see which teachers allocate more behaviour points to students*.' Students' feelings in subjects was also monitored as the SL stated, '*We do those subject-based surveys to monitor subjects*' (SL). The SL argued that monitoring helped in early identification of issues for interventions, which were mostly conversation-based, for example, talking to teachers to improve pupil performance. This widespread monitoring by the SL via data might be partly due to a frequently perceived need to meet

accountability demands (M=1.83, SD= .41), and his doubling-up as the school's DM. While it can be reasonably argued that monitoring through data to inform Professional Development (PD) in school 3 was moderately frequent (M=1.67, SD=.52) as Appendix F2 suggests, respondents did not provide examples of data-informed PD programs in the school.

Evaluating teacher performance

SL3 used staff-level data to evaluate staff performance. Lesson observations, staff appraisals and teacher information data were used to assess teacher performance in class. For example, the SL stated, '*from staff appraisal data we start to pick threads of underperformance or areas of weaknesses*' (SL). He continued, '*we look at the data (lesson observations) in terms of their performance in certain classes.*' However, the SL did not grade teachers' performance as 'good' or 'requires improvement' because Osted did not:

> Teachers would have formal observations each year which they would have formal feedback for. They are not graded on their teaching… we have moved away from that... because Ofsted don't work in that way either. (SL)

The statement suggests that the SL's use of staff-level data might be influenced by Ofsted's framework or just the approach they use more generally.

Staff appraisal data was utilised to determine progression through pay scale. The SL stated, '*There is a requirement that teachers hit certain standards before they can progress through their pay scale. And that is what the appraisal system does*.' However, this was done by the local authority which managed the school.

Strategic use

Again, there was a strategic focus on KS2 Maths and English scores as opposed to other subjects. For instance, pupils were set in Maths and English. The English government policy emphasis on progress in the two subjects might be responsible for this.

Distinctive results from SL3: planning, policy development and accountability

There was no evidence that SL3 informed planning and policy development via data. Being new in his position, it is possible SL3 is yet to plan or develop policies for the school based on data. Alternatively, it could be that the school being large-sized, planning may be devolved to MLs in the departments. This suggests that data from SL3 needs to be treated with caution owing to his relative inexperience.

The pressure to meet accountability requirements was frequent in school 3 (M=1.83, SD=.41). Evidence from data samples such as inspection report, SEN and surveys show that SL used these data for external accountability. The schools' inspection judgment of 'requires improvement' may have prompted this accountability pressure.

4.4.4 How teachers use data

Ability setting

Academic-MLs used KS2 SATs data to set pupils in Maths and by extension, Science:

> We have data from primary school (KS2 SATS) … that is used in year 7 to set in Maths. I'm a science teacher. So, in sciences we just go with the Math's decision on where they should be placed in sets. But across the other subjects, there is mixed ability setting. (ML)

Clearly SATs data provides teachers an indication of pupils' prior learning in math for setting decisions. Apart from Maths and Science, the rest of the subjects were taught in mixed ability sets at year 7. Students were also set in English subject but only from years 8 to 12 (Website).

Vulnerable pupils were also set based on SEN data. This was to permit individualised teaching:

> We have an age group here of pupils with special needs that are quite vulnerable…. They are set in small group with a different timetable. (SL)

Besides KS2 SATs, teachers profiled pupil abilities using CATs. This happened in the first week when pupils arrive. Teachers argued that CATs enabled them to know for themselves, the ability of the children they were working with (in terms of reading, literacy and numeracy). This suggests that SATs data was there as information but not a ceiling for teachers to work with. It seems teachers trusted their own data as reliable:

> We get to know students for ourselves because some students have done very well in primary and seem to struggle at secondary school and other children move on a lot more at secondary than you would expect from those results. (ML)

Monitoring progress to identify underperformance and for conversations

Teachers in school 3 very frequently used data to monitor students' progress (M=2.00, SD=.00). All teachers indicated that through assessment data, teachers carefully monitored pupil progress four times yearly to identify pupils who are falling behind targets. Each progress outcome was reported to parents and SLs after which, additional interventions was given to pupils who were below targets. The interventions included: talking to pupils and their parents to add effort after which a pupil may be moved down a set if they do not show progress (see figure 4.1). However, pupils who show sustained progress are given a challenge target and moved up a set:

> Pupils are expected to remain on their estimated attainment pathway (EAP) throughout their time in school. However, they can move up to the next EAP if they show sustained progress over time. (School's website)

This emphasis on progress seems to follow one of Ofsted's inspection recommendation which advised the school to, ensure all pupils make progress and achieve the outcomes they are capable of.

Pupil attendance data was also monitored by the MLs against some benchmarks to identify poor attendance for interventions. For example, a ML said:

> We monitor attendance weekly. We use that data to identify anybody that is becoming of significant concern in terms of their attendance…So, decisions are made, and we look at what

> are the underlying problems for the attendance data being not quite really what it should be. And then obviously we have a range of different strategies to put in place. (ML)

Teachers also monitored pupil behaviour data to pre-empt disruptive behaviour. Behaviour was monitored in praise and demerit points (i.e., sanction-reward system). Praise points earned praise or prizes to reward pro-social behaviour whereas demerit points earned sanctions such as detention at lunch, withdrawal from class, talking to the pupil or contacting home.

Distinctive results from teachers in school 3: reflections, teaching, planning

A pastoral-ML reflected about causes of misbehaviour during lessons:

> I can look and see (in the system) and I say so, pupil X is getting too many negative points. But when I look it's in Maths. It's a skill where we need numeracy. Have we got problems with numeracy? (ML)

Here, the ML phrases misbehaviour as a hypothesis, rather than suggesting that he has found the cause. The ML may be aware that pupil misbehaviour in lessons can be caused by many factors including teaching approach, peer pressure or home problems. Teachers also monitored SEN and pupil premium pupils for additional support already stated above.

Although one may expect data outcomes to refine processes teachers take such as teaching methods and activities, the was no interviews evidence that it did. Although the survey results in Appendix F2 suggested that most teachers in school 3 had a moderately frequent use of data to improve teaching (M=1.50, SD=.55), the interviews data show that data use mostly supported teachers' diagnostic approach to teaching. Possibly, teachers' perceived need to frequently use data for accountability (M=1.83, SD=.41) and for frequent justification of decisions (M=1.83, SD=.41) might have prompted their response.

Again, not all teachers in school 3 used data for planning. The SL confirmed this in the interview when he remarked:

> In theory, that data (KS2) should be used quite readily by teachers of all subjects in planning. However, I don't think we would be the only school here. But we would certainly have work to do on a number of teachers that actively would use that data and plan accordingly. There is a lot of data in the school and whether it's used effectively by everyone, I would doubt. (SL)

4.4.5 Question 4: How SL3 supports data use

Appendix F3 shows only six respondents in school 3 completed the survey and thus needs interpretation with caution. Nevertheless, interviewees largely confirmed these survey results. Results show a perceived very frequent availability of technology (M=2.00, SD=.00) to support data use in school 3. All interviewees testified to this. For example, when asked whether he had technology to support his data use needs, a ML replied, '*Yes. We have software programs like Class Charts system for behaviour and go4school to monitor pupil progress.* A previous lack of a DM (M=00, SD=.00) in school 3 possibly made teachers to rely largely on technology to support their data needs: '*We haven't had a data manager for about 18 months…'* (ML).

In school 3, access to data and internal collaboration around data were very frequent (M=2.00, SD=.00) and frequent (M=1.83, SD=.41) respectively. Interviews confirmed that all respondents had access to relevant data they needed in their work. The SL, for example, indicated that access to data was not the problem but rather, the time to get the data. It can be alleged that access to data in this school was facilitated by technology such as go4school whereas internal collaboration around data use was facilitated via meetings. For instance, while responding to whether they collaborate to use data, a ML answered, '*certainly, within the departments*.' The SL also said, '*yes. There are lots of discussions over data'.*

School 3 never had a qualified statistician to support teachers (M=0.00, SD=.00). The SL seem to equate a statistician to a DM by stating that he doubled-up as the school's DM. Consequently, the SL expressed the desire to have a DM to enable him to dedicate more time on leadership matters:

> We lack a data manager at the moment… I would need one because my job is the leadership of what happens with the data. And it's not the responsibility of a senior leader to be spending time administrating data which is what I do a lot at the moment. (SL)

Clearly, data adds to the SL's workload, hence a need for a DM who has the time to focus purely on data. One might then be prompted to ask whether crunching data is indeed a productive way to use a SL's time or to spend time with teachers, students and parents.

Distinctive results on support in school 3: minimal partnering, pressure, time, training and visions

First, partnering with universities and other schools to use data by school 3 were very infrequent (M=0.17, SD=.41) and infrequent (M=0.67, SD=.82) respectively. However, there is some evidence that the SL began partnering with a few schools to share data systems rather than data:

> It's quite a closed system and schools sometimes look for various reasons to share data. We often work together and support each other with the systems, but very rarely do we share data between schools. (SL)

Since the school was judged 'requires improvement' by Ofsted in 2017, teachers in this school would probably be under pressure to partner with teachers in other schools for improvement. However, this was not the case and it is hard to explain why.

Second, there was a moderately frequent pressure on school 3 teachers to use data (M=1.67, SD= .52). In this regard a ML, for instance, argued: '*Whether it's under-achievement or progress, that is defined by the Middle Leader who sets it within the mark books. And I'm very strongly directed to use data'* (ML). But this pressure was both externally and internally-driven. A ML explained:

> It all comes from external…if the external pressure wasn't there, there would be no internal pressure. So, one drives the other. (ML)

Third, the SL attended some data use conferences but not workshops. This suggests that the data use training was theoretical and skewed to administration of data. Interestingly, without data use training, some respondents in this schools were confident about their data use knowledge and skills. For instance, a ML argued, '*I don't have any problems with data and stuff*'', and another stated, '*I think I have data use knowledge and skills. It's more of experience than training'*. The confident ML was a science teacher who probably had more knowledge about data issues and processes than the other who was an English teacher. Clearly, there is no training for MLs in this school.

Fourth, structured time to use data was moderately frequent (M=1.33, SD=.52) for SLs and MLs of school 3. A ML reported this saying, *'I have some management time to use data whereas normal teachers would probably not have the same'.* The SL also reported that although he did not have adequate time to use data, sometimes he had time available use data. This was because it was part of the SL's job to administrate data.

Finally, school 3 struggled for clarity about what the goals and visions for using data were. For example, responding to whether the school had clear vision and goals for using data, the SL replied, '*yes. I think it's clear what we are trying to do with it.'* A ML added, '*Yeah. It's getting there. It's getting clearer more recently than it has been*'. It seems previously the school collected a lot of data but recently decided to simplify its system to focus on essentials as evidenced by what a ML said: '*I would say a couple of years ago… we did collect more data. Now the data is streamlined back just to get the essentials*' (ML). From these statements, it can be argued that the goal and vision for using data in this school still needs development because respondents associate it with simplified data systems rather than purpose.

4.5 SCHOOL 4

4.5.1 Contextual information

This was a large mixed-sex community school catering for KS3 to KS5 from diverse backgrounds of at least 7 neighbouring primary schools (school website). The school had approximately 1500 students and 115 teaching staff, hence a teacher: student ratio of 1:13. The school is community-governed but state-funded. It had a 16-member governing body that governed it on behalf of the local community. The governing body decides upon the curriculum, standard of behaviour, selects teaching staff, and, decides on budget-spending. The school's mission and vision implicitly focused on instilling hard work, respect and honesty in pupils (school website). Also, the school's website had some data, a majority of which were like those of school 2.

Whilst in 2010 and 2012, Ofsted judged the school 'requires improvement', in 2015 it was judged 'good' in all areas (GOV.UK-Ofsted). The 2015 Ofsted report advised the school to improve teaching across the school through the provision of more challenging learning opportunities for the ablest pupils in KS3 and KS4 Maths. The report recommended standardised marking that clarifies to

students their strengths and weaknesses and highlighted the need to improve the quality of leadership and management in areas of monitoring and evaluating actions. Finally, it reported that the school's pupils eligible for Pupil Premium and SEN support was below average compared to the national averages.

4.5.2 Question 2: how teachers interpret data

Use of criteria

Criteria-referencing was commonly used to interpret pupil Progress, Attendance and Behaviour (PAB) data:

> We work out progress in numbers. So, 1 is overachieving, 2 is on target, 3 is working towards targets and 4 is below target…Anyone who is on a 1 or 2 is doing what they should, those who are on a 3 or 4 we intervene. (CT)

> There is an attendance percentage on the spreadsheets so that we can clearly see who is well within the acceptable figure… It should be above 95% attendance. Below 90% we've always thought there is an issue there. (ML)

In the above statements, targets, attendance percentages, and the behaviour points were the criteria for expected pupil performance standards.

When teachers lack criteria to guide interpretations, perhaps due to sudden policy shifts, this opens a huge range of interpretations and leads to confusion which can be problematic for teachers. Sometimes out of such confusion, teachers are likely to resort to guessing to assign meaning to data. A good example of this problem is recently playing out in England with a change in the GCSE grading from letters (A-G) to numbers (1 to 9) in the GCSEs (DfE, 2016). A ML explained why this was problematic:

> Teachers do not know, for example, what a grade 5 would equate to or what it might be in the new GCSEs grading. This brings huge uncertainty to teachers who have to struggle with its interpretations while preparing pupils for GCSEs. (ML)

Use of prior knowledge and experiences

Survey results from 19 respondents (Appendix F1), indicate that respondents frequently used prior knowledge and experiences (M=1.84, SD=.38) to interpret data. A ML revealed how prior knowledge and experiences synchronised with interpretation of pupils' progress data:

> It might be a pupil is 3 grades below their target and a teacher looks at the exercise book and sees no writing. Then what a teacher should do there is to give writing frame because it is obvious there that they are not processing writing quick enough. (ML)

A CT also said, '*So if they underperform on subjects and the attendance is really low, it stands out to be the attendance*' (CT). Here prior knowledge and experience makes the ML and the CT to jump into simplified conclusions. The CT identifies underperformance as due to absenteeism rather than a complex issue whose causality might be the reverse (e.g., a negative attitude towards a subject or the teacher).

Use of norms

Norm-referenced interpretations were used in school 4. A ML explained how they used Advanced Level Performance System (ALPS) to aid norm-based interpretation of national test data on subject performance based on a normal distribution curve:

> We compare the performance of a subject, say English literature, to the rest of the country. When it is ALPS 3, it means you are in the top 20% in the country. Last year we were ALPS 3 in English literature. (ML]

Use of triangulation

There was some evidence of the use of triangulation to interpret data in school 4. A ML confirmed this, saying, '*We've got Key Stage 2 data on this hand, we have our own baseline assessment on this hand, and we marry them up. We compare them to get meaning.'* (ML)

Longitudinal analysis

Although uncommon in school 4, a CT sometimes used longitudinal analysis to interpret pupil progress data: *'My role is to work with the individual pupils and look at progress data and we see the trends of underperformance and that allows me to identify which pupils are underperforming for intervention'* (CT). Conducting longitudinal analysis is time-consuming. The availability of time to use data was infrequent (M=0.79, SD=.63). This might be hindering teachers from using longitudinal analysis.

4.5.3 Question 3: How SL4 uses data

Targets and accountability

SL4 used KS2 SATs to set targets for pupils when they join year 7. This was because SATs data was the starting point by which the school was judged as part of accountability:

> From those starting points, the government dictates how much progress students should make by the end of KS4 if they don't make sufficient progress, the progress 8 score of the school would be less than it should be, and the school will be deemed to be inadequate. (SL4)

It seems targets were disseminated to teachers and to pupils. Pupils received targets to push their performance in progress 8. 'Every student' becomes 'every grade' and the statement below explains why:

> Every student matters. Every grade matters. The way progress 8 works it is absolutely critical that every student gets their best grades possible. (SL4)

The SL also used other forms of data for external accountability. For example, the SL reported that school inspectors always wanted to see GCSEs results, pupil premium, attendance, behaviour, SATs and surveys data whenever they visited the school.

Identifying, planning and policy development

Pupils and parents' surveys data supported identification of what needs to be done which then informed school improvement planning:

> The parents' questionnaire we use it to inform our school improvement plan. To have a look at what the parents are saying about how we can improve the school. (CT)

There is evidence that SL4 developed policies from data. For instance, the school's 2015 inspection report recommended a need to engage and challenge students during learning. The school seem to have heeded this. It developed ways to measure students' Engagement With Learning (EWL) and Engagement With Homework (EWH). EWL measures students' effort and performance during teaching and learning whereas EWH measures how well students do and hand-in quality homework. EWL and EWH work in a 4-point system from 1=outstanding to 4= unacceptable. Here, the school replicates the Ofsted's 4-point measuring system to measure and label students within the school. This indicates that as the inspectors treated the school, so the school treated its pupils.

Monitoring progress and conversations

SL4 occasionally used data to monitor school and students' progress. The SL, for example, used survey outcomes to monitor impacts of various policies (e.g., safeguarding). The SL also monitored pupil progress at various data catchment points (every 6-7 weeks) to spot underachieving pupils. The SL then asked teachers to intervene for such pupils. The SL explained:

> This student (showing in a computer) is performing extremely badly in modern foreign languages. So, the head of modern and foreign languages will now need to pick that up and find out why that is and then put something in place to remedy that. (SL)

The statement suggest that what is put in place was vague. Moreover, the data-informed wave 1 and 2 interventions that were in place were mostly about improving Wieman's (2014) diagnostic approach to teaching (see pp. 137). There lacked additional evidence that wave 1 and 2 interventions and data use by teachers in school 4 were only about providing more teaching (see section 4.5.4).

Evaluating performance

The SL evaluated staff performance via data. He compared the GCSE with internal assessment data for inconsistencies and challenged teachers:

> At their GCSEs we can compare the estimates that staff produce throughout the year to the terminal grades that students achieve and look for inaccuracies. And if there are significant inaccuracies, we then challenge the staff. (SL4)

This suggests that the SL checked for consistency of students' outcomes possibly to safeguard against fabrications of data by teachers.

Strategic use

SL4 emphasised KS2 English and Maths SATs scores. This is possibly because Maths and English are double-weighted in the new GCSE grading system. The focus therefore could be to boost the school's ranking in the league tables.

Distinctive results from SL4: teaching, attendance awards and self-reflection

First, I did not find strong evidence that data use by SL4 led to improved teaching in terms of teaching methods and activities that teachers employ in class. The interventions suggested by the SL, for example, were mainly about talking to teachers to intervene to improve pupils' progress via wave 1 and wave 2 interventions already mentioned above. A link between data and teaching may be complex. Second, it was interesting that the SL awarded prizes to the class with 100% pupil attendance. This might imply that students apply pressure on their classmates to attend consistently. Probably, the school had a problem with pupil attendance. Lastly, data neither enhance the SL's self-reflections nor motivation of staff. A lack of data use training and teachers workload may have contributed to this finding.

4.5.4 How teachers use data

Ability setting and teaching

Academic-MLs used KS2 SATs data for setting pupils in Maths. The setting was linear as it involved sorting pupils into low, middle and high ability groups. There is evidence that SATs data is used to support diagnostic approach to teaching. For example, teachers used SATs data to identify which pupils they should focus on at admission. Here, teachers' focus involved two types of interventions: wave 1 and 2. According to a ML, wave 1 is intervention in class such as helping pupils in reading skills. The assumption here is that teachers can teach reading skills but cannot teach everybody these skills, so wave 1 identifies which pupils teachers should focus on. Lack of improvement in wave 1 leads to wave 2 interventions which involves withdrawal from class for one-to-one tuition. Like in the other case schools, there is no evidence that wave 1 and 2 interventions improved the methods or the teacher approach to teaching as suggested by Wieman (2014). Rather, it is an assumption that wave 2 intervention being one-to-one tuition, is intensive and therefore more effective. Moreover, wave 2 intervention comes with challenges. According to the ML, wave 2 depends on finances and staffing and therefore may not be available for all pupils. Nevertheless, both interventions seem aimed to ensure that no pupil was left behind as they go through KS3 to KS4.

Baseline testing

Teachers also conducted baseline testing to triangulate pupils' SATs results. According to the SL, CATs data helped them know the ability of pupils without SATs results and to identify pupils who achieved below their SATs results for intervention. The ML also explained: '*We would issue an assessment to our students and if we think that is not of equal quality as what SATs are telling us, we put a bit of intervention there'*. The interventions are discussed in the subsequent paragraphs.

Identifying needs and planning

Teachers used data to identify and focus on more needy pupils. For example, a ML reported that the pastoral-ML used SEN and pupil demographic data to identify and develop care plans for the dyslexic and gifted pupils. Selection of SEN-related teaching and learning resources was one of this care plans:

> If a student is dyslexic, we adapt our teaching. Learner support will tell us which students would prefer to write on blue paper or green paper. Whether they would like a reading slide

> where you can isolate lines of reading as you read through. So, we would adopt our teaching, our methods and views. (ML)

Although the survey result (Appendix F2) shows that the teachers perceived that their use of data to improve teaching was moderately frequent (M=1.32, SD=.67), the above ML's statement is perhaps a clear indicator of what teachers meant by adapting their teaching using data. The statement by its very nature points to a diagnostic use of data in teaching. Although adapting teaching methods was mentioned, the statement by the ML provides no evidence that data (including SEN) informed teachers' teaching methods except for providing paper of different colours and a reading slide.

Again, only the ML used data for self-learning or reflections. A possible explanation is that the MLs engaged in data analyses and interpretation and therefore had opportunities to reflect from data than CTs who were mostly engaged in data collection.

Monitoring progress to identify underperformance and then conversations

Progress monitoring was the main use of data in school 4. As evident in Appendix F2, most teachers in school 4 frequently used data to monitor pupils progress (M=1.95, SD=.23). Interviews confirm this. Teachers talked of measuring progress from the start and collecting assessment data every half-term to monitor progress. Teachers compared achievement data with targets to measure the progress pupils made. Achieving targets was equated to meeting the expected standards while the reverse invited interventions:

> We work with numbers. 1 is overachieving or above target, 2, on target, 3, towards target and 4, below target. And we divide our intervention accordingly there. Anyone who is on a 1 or 2 is doing what they should…those on 3 or 4 are below target and so we intervene. (ML)

Interviews show that teachers also monitored pupil attendance and behaviour in percentages and points respectively (as occurs in other case schools). Teachers linked these data with progress. For instance, school 4 used two sets of behaviour data which linked closely to progress: Engaged with Learning (EWL) and Engaged with Homework (EWH). Through these data, pupils were ranked to determine underperformance for intervention. The interesting bit is that teachers used a similar system used by Ofsted to judge students. The SL explained:

> We ask for two sets of behaviour-oriented data. We ask for EWL which is an effort grade (in class) on a scale of 1 to 4… We collect that at 6 points throughout the year. We analyse that in a spreadsheet and give every student an EWL score for all subjects…. The other one is EWH which looks at how pupils are performing outside the classroom, the same 4-point system: 1 is outstanding to 4, unacceptable. So, you can rank them to get your very bright ones and the very engaged at the top and the less engaged ones at the bottom… So, 4 is a red line meaning kids are significantly underperforming. So, intervention will go in. (SL)

As indicated by the SL, poor ranking in behaviour or attendance activated interventions for the underperforming students. The interventions were mostly interviewing pupils to establish why they do not attend or engage with learning and homework.

Distinctive results from teachers in school 4: teaching, self-learning

Data was used to improve teacher approach to teaching as Wieman (2014) suggests. For example, there was provisions of teaching resources such as coloured worksheets which some teachers provided to support the learning by special needs children (see section 4.5.4). However, there was no strong evidence that teachers in school 4 used data to adapt their methods approach to teaching. Moreover, only one ML used data for self-learning and reflections in this school.

Also, whilst 74% of the teachers surveyed agree that data can be misrepresented for accountability, those interviewed disagree. It could be that the sensitive nature of data-use in the English schools prevents the teachers from speaking openly about it in relation to themselves and their schools as depicted in one ML's response, '*not in this school. If data is misrepresented, no. Not with me*.' Perhaps because surveys are more anonymous, they felt more able to air their views through it.

4.5.5 Question 4: How SL4 supports data use

First, interviews confirm that all respondents collaborated in departments to use data. A SL explained this collaboration: '*There is collaboration. Some of the data is published as a department and that data is linked with line manager departments and SLTs links who also talk to MLs about the data. Staff also have to write reports based on the data*'. This suggests that data use in this school was shared at levels of the school.

Second, access to data was not a problem to respondents. Respondents indicated that they had access to all the data they needed in their job whenever they want. Access to data in school 4 could be mediated by a frequent internal collaboration around data use (M= 1.84, SD= .38).

According to survey results in Appendix F3, School 4 partners very infrequently with universities and other schools around data use (M=0.11, SD=.32). This suggests that school 4 also worked in isolation on data use matters. Interviews, however, show that the SL sometimes partnered with teachers from other schools to share ways to present data: '*I have had meetings with a data manager of another school to help him prepare some KS4 data and different ways in which you can present data'* (SL). This collaboration was not a policy of the school as confirmed by an academic-ML who said: *'collaboration is not a whole school policy, but I have contacted other schools to compare year 11 data in my department'.*

Distinctive results on support in school 4: time, training, pressure, and visions

Results in Appendix F3 shows an infrequent availability of time to use data in school 4 (M=0.79, SD=.63). This converged with the interviews. A SL said, '*I do not have so much time now in school to use data'*. A ML also reported inadequate time to use data in school and reported that sometimes he extended data-related work at home. The large size of the school could mean teachers are collecting a lot of data about pupils and staff leaving them with little time to use the data.

Next, provision of data use training was moderately infrequent in school 4 (M=1.11, SD=.74) and teachers' responses in this regard was varied at SD .74. Data from the interviews confirm that although data use training was provided by experienced teachers in the school, it only targeted the SLs and the MLs, and focused on the basics of analysing pupil performance data according to the new changes in the GCSE measurements. Nevertheless, respondents had pre-requisite data use knowledge and skills which they wanted to be improved. Asked whether he was data literate, a ML replied, '*Mostly yes! But not fully'.* The SL added, '*Yes I have data use knowledge and skills but not enough'.* Probably, these teachers are only realising that data training might help them.

Third, a moderately frequent pressure to use data was evident in school 4 (M=1.67, SD=.59), probably to improve pupils' grades. The SL confirmed this arguing that teachers had to know data about

individual pupils to support them get the best possible grades. Interestingly the ML and the CT had no problem with this pressure. A ML argued, *'it's not pressure! I think it's an expectation. If we don't use data, I think the question to ask is why? You have to use it…You are just expected to'.* It could be that data use has been normalised in school 4 to the extent that respondents considered it part of their job expectation.

Last, the survey result suggests a moderately frequent clarity of the vision and goals for using data by respondents (M=1.37, SD=.60). From the interviews data, however, the vision according to the SL and the ML, was about improving pupils' progress and grades. When challenged about the school's vision for using data, for example, the ML replied, '*Yes. To be forensic. To help in progress and attainment'.* It appears this vision had little to do with holistic development of pupils.

4.6 SCHOOL 5

4.6.1 Contextual information

This was an independent mixed-sex school catering for KS3 to KS5 (school website). It was not state-funded, and students pay a fee to attend the school. It had about 600 students and 40 teachers hence, teacher: student ratio of 1:15. The school employs and pays its staff and is headed by a headteacher but governed by an independent managing director.

School 5 aims to provide academic, pastoral, moral and social support for pupils (school website). Its ethos was to help learners succeed in an environment of love, care and an understanding that every student is unique. The website had some data available such as data about SEN, parents' survey, term dates and school calendar. There was also policy on safeguarding, attendance, behaviour, homework, recruitment; marking and assessment, and SEN code of practice. The website indicated that the school was judged 'outstanding' in all areas by the Independent School Inspectorate (ISI). The report, however, was not available for analysis at the time of the study. The website highlighted that the school had over 90% success rate in GCSEs and that 100% of its students were offered university places of their choice. Details about student background, however, were insufficient on the school's website. According to the website, students selected to join the school came from a wide range of independent and public primary schools. The prospective students had to sit internal entrance exams in Maths, English and Science to be admitted in year 7

class. Interestingly, the school had a small class-size policy of 21 students per class so that children receive personal attention from teachers (school website).

4.6.2 Question 2: How teachers interpret data

Use of criteria

Criteria-referencing was the main approach school 5 teachers used to interpret data. Teachers used the approach to interpret Progress, Attainment and Behaviour (PAB) data. For instance, progress was interpreted against targets, attendance and behaviour data in point system. A ML, for example, said:

> Based on the child's performance on the MidYIS at the start of year 7, we then have a predictive flight path giving their predictive grade and their progress is measured against that flight path. (ML)

This statement indicates pervasive use of criteria-referencing to interpret various PAB data about pupils. However, abrupt changes in criteria (e.g., in GCSE grading) was problematic for teachers:

> A child is no longer scored from grade A* down to G but from 1 to 9 in the new GCSE…so we must make our own assessments where that pupil sits in the new GCSE scale, which is quite tricky. (CT)

Longitudinal analysis

Longitudinal analysis was used to interpret pupil progress and whole school data. It involves looking for trends in data. For example, the SL reported that they always looked at subject and whole school trends over the past five years to see how the school has developed. The pastoral-ML also used the approach to pose questions about trends in pupils' behaviour: '*Where the data shows a marked decline in positive behaviour that would be the point we would ask, why is this happening? Is it the environment? Is it the logistics of the site? Is it a lack of staffing?*' (Pastoral-ML). This use of data to pose questions is important and indicates a quest to search for deeper rather than surface interpretations of data.

Triangulation

Triangulation approach was used by all teachers in school 5. For instance, the pastoral-ML triangulated pupil PAB to understand why pupils did not attend or misbehaved and whether that affected their progress. The pastoral-ML explained:

> We look at data with the child to know the bigger picture. Pastorally, has that impacted on how they have achieved?... are they doing so many subjects, do they need support, or can we change activities? (ML)

Further, team discussions were held every six weeks by the MLs where data about pupils were triangulated to ensure no one was left behind. The CT explained:

> I am aware that the whole heads of years and the heads of faculties, they would sit together at the end of each half-term to make sure that no one slips through the net. So, there is a lot of data in that meeting there which is digested. (CT)

Use of norms

Norms were used by the SL but on rare occasions. The SL highlighted that target grades from MidYIS were based on a normal distribution curve of percentage chance of pass rate: '*We would have a normally distributed curve. Obviously that curve may be skewed one way or the other, depending on how intelligent or weak the pupils are. But at the peak, of this curve is what we would normally go with as their target grade'* (SL).

4.6.3 Question 3: How SL5 uses data

Targets and ability setting

The SL utilised external data (MidYIS and ALIS) to formulate target grades for pupils when they arrive. MidYIS is a baseline computer testing program which predicts pupil's likely score in GCSEs. The predicted score for each pupil then became their target grades. A big data analytics company generates the targets from MidYIS. The CT explained how this happens:

> The score on that (MidYIS) gets compared with hundreds of thousands of pupils who have gone through the system previously. That then gives each pupil a percentage chance of what they're likely to score in each GCSE subject even if the pupil doesn't take that subject. We tend to go for one that's got the largest percentage chance. (CT)

This statement suggests that the SL used MidYIS data to set target grades and partly to select or direct pupils to specific GCSE subjects. This aligns with the survey results showing that SLs agreed that data helps identify pupils who can improve school performance. The SL continued: '*… data also helps me highlight those who are not going to achieve well, that would drag down the scores.'* (SL). Seemingly, data enables SLs identify underperformers for interventions. At A-levels, ALIS data was used to predict A-Level grades.

Although target grades provided pupil some focus, school 5 intended to abolish its use in 2018. The intent is to allow Carol Dweck's growth mindset in students. The SL explained the reason to abandon targets, arguing:

> … our vision is that if you give a child a target grade, they would aspire to be at that grade and they would not push themselves further on…or they would see it as a cut to their learning. If you remove the target grades, then the child may want to push themselves further, and with the right encouragement, they should... (SL)

Ability setting

Ability setting in Maths was done by the SL using entrance examinations. It is possible that MidYIS was also used for ability setting as confirmed by a ML who said: *'...We would do our MidYIS testing in year 7. And then that would generate target grades and then we can set children accordingly' (ML).* However, because of the intent for growth mindset in students, the SL reported that mixed ability setting will be used across the school in 2018. This is to enable the bright and the weak pupils to assist each other during learning. The intent to pursue a growth mindset. The intent to use growth mindset and mixed ability setting in 2018 is unique to school 5 and indicates that the school uses data to experiment with new approaches and possibilities. Possibly the school being independent and 'outstanding', has room to try new things with data than the state schools whose inspection judgments were good and below. It could be that state schools focused on how to improve their

inspection judgments and therefore did not want to risk trying new things with data for fear of not achieving immediate measurable outcomes.

Identifying Areas For Improvement (AFI) and improving teaching

SL5 indicated in the survey that he often uses data to identify needs. Interviews reveal that the SL used GCSE results, teachers', parents' and pupils' surveys data to identify AFI. Pupil questionnaire, for example, identified safe guarding issues for investigations and solutions:

> Whenever the pupil questionnaire highlights something, we investigate. It may be something as simple as school meals are not good enough and the pupils won't be eating. If the pupils are not eating, then we have a safe guarding issue. So, we would look at what is being offered instead of a wide range. If it is deemed okay, we would go back and discuss that with the student council. (SL)

GCSE and assessment data informed the SL's approaches to teachers and teaching. In this regard the SL5 gave an example of previous underperformance in Music where a Music teacher was identified for lesson observations and improvement conversation around teaching:

> There was a teacher not so long ago whose teaching was what we would class as below good. He wasn't passing the lesson observations. The uptake for the subject was going down, the grades the children were obtaining were also going down. We saw this data very early on….We gave him areas that he needed to improve on and we gave him help and provided training so that he could improve. We then went back weeks later because you got to give it time to embed and get into practice. The lessons still hadn't improved. The metrics still looked low…that teacher was then not renewed his contract at the end of the year. (SL)

The SL's view seems to be that teachers can either teach well, in which case they pass their observations, or they teach badly in which case they are dismissed from their posts. The SL's statement also demonstrates that the focus on data by the SL is about improving teaching and pupil performance, which again, determines the action he takes such as training or relieving teachers from duty. Improving teachers' teaching methods via data, however, seems complex. For example, weeks after training, the SL reported that the teacher did not change his teaching. Also, a ML reported that

the parents' surveys had enabled SLs to identify e-safety knowledge gaps leading to parents' training on how to support their children's safety over the internet.

Monitoring progress and conversations

The SL monitored pupil progress, saying, '*We use MidYIS tests in year 9. It's another checkpoint for us to see whether they are on track*' (SL). Assessment data reported by teachers every six weeks also supported SLs' monitoring and explaining of progress trends:

> Our focus as a school is always pupils' progress. If pupils are making progress, that is great, and we would continue to promote that. But if the pupils aren't making progress, it is only then that we start to look to see what the reasons for that are. Is it the teacher? Is it the trend or just one-year group? Is it because they are male or female, or because they come from a certain area? (SL)

The questions the SL posed show that sometimes he reflected about the causes of an outcome from data. This further suggest that school 5 is more sensitive than others, to the idea that poor pupil outcomes might be the consequence of poor teaching. Additionally, the mention of the students' gender might imply that the SL believes that the match of the teacher-pupil gender is important. The SL also used data such as pupil, teacher and parents' surveys to monitor the school's functioning, saying, '*the surveys give us more of an overview about the school*'. Staff-level data such as teacher appraisal and attendance enabled monitoring of teacher performance and absenteeism respectively. Also, internal self-evaluation was conducted thrice annually to monitor achievement of departmental targets. The monitoring of progress by the SLs went hand in hand with improvement conversations with teachers of students whose targets were below targets. The conversations were mostly about progress made, intervention required, and support needed for improvement.

Planning and policy development

SL5 sometimes uses data for planning and policy development. SLs used inspection report, school development plan, pupil, staff and parents' surveys for strategic planning and policy development. For example, pupil surveys informed the development of anti-bullying and e-safety policies whereas the school development plan informed action planning (e.g., resource allocation) to certain aspects of the curriculum which needed improvement.

Strategic use

SL5 also had strategic focus on pupils' Maths and English achievement data for students joining the school at different points. The English education policy focus on pupils' Maths and English data seems to orient this school leader to focus on the data.

Distinctive result from SL5: public relations

Some data aided public relations aimed at promoting the school. For example, the 'outstanding' judgment and the GCSE pass rates were advertised on the school's website. A ML also said:

> Last year we had a student who had a predictor grade C in the GCSE and she got an A. She had done better than anybody else who had a predictor grade C in the country. So, we could again use that to promote the school and to show how good we are. (ML)

Using data to promote the school is probably a strategy to attract more fee-paying students.

4.6.4 How teachers use data

Ability setting, identifying needs and planning

The MLs used entrance examination data, presentations and interviews to evaluate pupil ability in Maths, English and science and set them accordingly. School 5 being an independent school used entrance examination to admit pupils at different entry points. The entrance examination data also enabled teachers to identify learning needs of pupils (e.g., SEN) for additional support. Teachers also agreed in the survey (Appendix F4) that data is used to identify pupils who can improve school performance (M=3.22, SD=.68). This suggests that teachers used data to spot and target performing and underperforming pupils. The identification of needs led to some planning by teachers. The academic-ML used data to plan for lessons and department: '*We have SEN data…we use that to aid planning in our day-to-day and to see what support or consideration they need for the external GCSE exams. For example, do they need a laptop, a reader or things like that*' (Academic-ML). The plan for laptops and readers suggest that the ML engages in a bit more sophisticated planning about adding resources more than other schools.

Improving teaching

Although the survey result in Appendix F2 suggests a moderately infrequent use of data to improve teaching (M=1.22, SD=.44), interviews data showed that the CT sometimes used data to diagnose and improve teacher approach to teaching. For example, there was data-informed selection of teaching resources and class management. The CT and the ML selected large texts or coloured worksheets to address learning needs of SEN pupils. Based on data, the CT also reported changing sitting arrangement for pupils who disagreed with each other to miminmise disruptive learning environment. The CTs also provided an example of how he uses pupils' SEN and intake data to inform diagnostic and teacher approach to teaching:

> When I'm planning my lesson, there are certain data that I will need at my fingertip…I will have whether they are SEN, gifted or talented and the sex makeup of a class. If a class is heavily female-weighted, I might use female sports rather than football analogy to put Maths into context. (CT)

However, there was no compelling evidence that the CT used data to adapt his teaching methods.

Monitoring progress to identify and target underperformance

The survey results in Appendix F2 shows that teachers in school 5 very frequently used data to monitor pupil progress (M=2.00, SD=.00). Teachers utilised different data (e.g., assessments, progress, behaviour and attendance) for monitoring pupil progress against targets. For example, a ML said, '*the target grades give us an indication whether a child is making the progress that we would expect based on the MidYIS scoring*.' Similarly, teachers monitored pupil attendance in percentages and behaviour in points against some criteria (e.g., below 90% attendance was unacceptable). Interventions were instituted when pupils failed to meet the set criteria. Interventions included talking with SLs, teachers and pupils. It also includes giving ultimatum to pupils to add effort add or moving pupils down a set after talking to the parent. The CT said, '*And we will give them another 6-weeks and if there is no improvement, then we move Billy down a set*' (CT).

Self-learning

There was some evidence that teachers in school 5 used data for self-learning. Self-learning is reflecting critically and questioning data outcome from different perspectives. For example, teachers in this school attributed data outcomes to their own teaching practices and actions. For example, the pastoral-ML said:

> We live in a culture where we tend to blame ourselves rather than looking at the children. But there is no harm, looking at it from both perspectives because it might well be these children, but it might well be us. (pastoral-ML)

Distinctive results from teachers in school 5: accountability and staff-related decisions

Data use for accountability was moderately infrequent in school 5 (M=1.22, SD=.44) and skewed to pupil progress. Teachers, however, had to explain why pupils did not attain targets and what interventions they planned. The surveys show that the academic-ML often had more accountability pressure than the pastoral-ML and CT. This pressure might be emanating from a focus on pupil progress which is mostly the work of the academic-MLs.

Teachers very infrequently used data to make staff-related decisions (M=0.44, SD=.53). Interviews confirmed that staff-related decisions in this school were made by the SL, for example, the termination of contract of an underperforming Music teacher mentioned above.

4.6.5 Question 4: How SL5 supports data use

According to Appendix F3, internal collaboration around data was moderately frequent (M= 1.62, SD= .52). Respondents confirmed this in the interviews. For example, the MLs had meetings every six weeks to discuss data whereas the CTs supported in collecting data for these meetings. A ML explained, '*class teachers only put the data in, and I'll come to represent them in the faculty meeting*.' The pastoral-ML added, '*everybody supports the pastoral system, in terms of logging and recording good and bad behaviour*.'

Access to data was also moderately frequent in school 5 (M=1.56, SD= .53). Technology mediated that access. All respondents argued that they had access to all the data they need because it was shared in Double Fast, the school's information management system. A ML remarked, '*Any data I need I can see through the technology…it goes on a shared area'* (ML*)*.

However, the school never partners with schools nor universities around data (M=0.00, SD=.00). Asked whether the school partners with external institutions around data use, a ML replied: '*we are quite on our own in that respect as far as I know*'. The pastoral-ML added, '*I am not aware of it happening in my role as a pastoral leader.'* This shows that the school worked in isolation on matters data.

Distinctive results for support in school 5: visions, training, time and technology

It was interesting that although the survey shows that school 5 frequently had a perceived clear goals and vision for using data (M=1.89, SD=.33), interviews data showed that teachers did not have a common goal and vision for using data. The SL, ML and the CT understood it based on their roles whereas one ML did not know it. For instance, the SL said that the vision for using data in the school was to push pupils to achieve excellence and be the best school in the country whereas a CT said that the vision was about reporting pupils' progress. One ML then associated the vision to data use meetings they have been having, saying, '*Yes. We do have goals and visions for using data because we have all these meetings.'* Therefore, it can be argued that the school's vision and goals for using data was yet to be a shared. It could be that in the survey, respondents mistook the school's excellent performance in the GCSEs and inspections to mean having clear vision and goals for using data.

Next, despite being data-rich, data use training and time to use data were infrequently provided in school 5 (M=0.78, SD=.67). A CT summed up training, saying, '*I don't really get training to be honest*'. But there was some evidence that the SL attended some data use courses. He said, '*I have been on courses on 'Double Fast', I have gone to MidYIS courses, but generally, I don't attend many data use courses*' (SL). Double Fast was the school's information management system. Concerning time, the SL and the MLs indicated having limited time to use data while the CT did not. The structured meetings for MLs to discuss data every six weeks and the CTs constant daily collection of data for instance on pupil attendance might explain this difference between the SL, MLs and the CT's views.

Finally, technology was infrequently available in school 5 with the SD showing varied responses (M=0.56, SD=.88). The interviews data corroborate this response variation by showing that the technology supported the SL and the MLs more than the CT who did not have an adequate understanding of its workings. The CT reported,

> All our data is collected through Double Fast… I don't know what it does. But lots and lots of data is in that system, held and how we manipulate it, I don't know. But I and most of the other teachers just give us data. We are not interested; you just tell us what it is (laughs). (CT)

4.7 CROSS-CASE ANALYSES

This section provides a brief analysis of the similarities and differences among the case schools in terms of what data is collected and how data is interpreted, used and supported.

4.7.1 Data collected

There were a few differences in the input data state schools collect as compared to those collected by the independent school 5. First, school 5 did not collect Pupil Premium (PP) data because it did not get state funding for it. Second, school 5 did not collect SATs data because it followed a different curriculum. It therefore collected MidYIS and ALIS data to set targets (see, Appendix L). In contrast, the state schools (1 to 4) collected SATs data because the government judged them by it at KS4. One SL explained, '*That data (KS2 SATs), is quite limited but is so important because from it, the government puts an expectation on secondary schools as to what outcome should be at the end of KS4*.' Respondents found this problematic but also helpless about it: '*We can't get around it. We do treat it with caution of course KS2 data…, but officially, we are bound because that is government diktat, we can't escape that'* (ML, school 4). Third, the independent school collected diagnostic entrance examinations data because it admitted pupils at different points.

Finally, some SLs did not mention particular forms of data. Either they forgot, or they did not use them (Table 4.2). For example, whilst SL3 and 4 did not mention school development plan, SL1, 4 and 5 did not mention Fisher Family Trust (FFT) data. Also, SL 3 and SL5 did not mention self-evaluation and RAISEOnline data respectively. Although SL3, 4 and 5 did not mention NEET data, the websites

of schools' 4 and 5 had the percentage of students proceeding to university- an indicator of NEET. Only school 1 collected pupils' interviews data suggesting this data was optional for schools. A brief definition of these data is in Appendix L.

4.7.2 How teachers interpret data

From the above findings, I present in Table 4.3, a summary of the frequency counts of respondents per school who mentioned a particular data interpretation approach. The totals column provides the total number of respondents who mentioned the use of each approach in the entire study. The Table shows that all teachers across the schools used criteria-referencing and norm-referencing approaches to interpret data. Inadequate time and teacher workload could be promoting use of these two approaches. Mainly academic-MLs, CTs and SLs used the two approaches as compared to pastoral-MLs who interpret social relationships. Interestingly, there was some evidence that absence of a criteria posed challenges to data interpretation by teachers.

Table 4.3: Cross-case analyses- Data interpretation

Approach	**Teachers who mentioned the approach**					**Total**
	School 1	School 2	School 3	School 4	School 5	
Criteria-referencing	4	4	3	3	4	**18**
Use of Norms	4	SL, CT, A-ML	SL, P-ML, A-ML	A-ML	SL, CT, A-ML	**14**
Triangulation	CT, P-ML	CT, P-ML	A-ML, P-ML	A-ML	4	**11**
Prior knowledge and experience	CT, P-ML	CT, P-ML	Nil	CT, A-ML	A-ML	**07**
Longitudinal analysis	CT	CT	Nil	CT	SL, CT	**05**
Use of 'experts'	Nil	4	Nil	Nil	Nil	**04**
KEY **P-ML**= pastoral-ML; **CT**= Class Teacher; **SL**= school leaders; **A-ML**= academic-ML						

Triangulation was also used to interpret data across the schools. However, Table 4.3 shows that mostly the pastoral-MLs and CTs used it. The responsibility for the effect of behaviour on achievement, perhaps encourage tight relations between pastoral-MLs, CTs and pupils hence, triangulation of data sets for holistic understanding of pupils. This applied less to academic-MLs and SLs who mostly understood pupils via quantifiable achievement data. Also, it could be that triangulation is time-consuming for SLs and academic-MLs. From Table 4.3, all respondents in school 5 used triangulation. This suggests that its teachers aimed for in-depth understanding of pupils. The

small class size policy of 21 pupils in school 5 could be enabling use of triangulation. In school 4, the pastoral-ML was unavailable, but the academic-ML who teaches English indicated using triangulation. Possibly, the pressure for progress in English subject might be orienting this academic-ML to pursue holistic understanding of pupils to enhance progress in English subject.

Prior knowledge and experience approach are used more to interpret data in schools 1, 2, and 4 than in school 5. There is no evidence that school 3 teachers used this approach (see Table 4.3). Possibly, teachers in schools 3 were reluctant to admit this. Alternatively, it could be that these teachers did not want to introduce experienced-based bias into their data interpretation. However, there can also be the pitfall of teachers mechanising data interpretations when they entirely abandon experience-based interpretations.

Most teachers avoided longitudinal analysis, perhaps because it is time consuming. This suggests that most respondents relied on snap-shot interpretation of data (e.g., criteria-referencing and norms) rather than understanding what data say about pupils at different points in time. Mostly CTs mentioned using longitudinal analysis to check for trends in their pupil progress data (i.e., flight paths). Respondents in school 3 did not mention using longitudinal approach (Table 4.3). Possibly, they forgot to mention it, or they do not use it.

Only school 2 used a data 'expert' to aid data interpretation. This suggests that teachers may rely on a trusted-skilled data expert to interpret data when provided.

In summary, respondents mainly relied on criteria and norm-referencing as benchmarks for interpreting data. This was mainly to answer the question who is falling behind and who sits where against other students in the school or across the country. The pastoral-MLs, however, blended criteria, triangulation and prior experience. In few occasions, data interpretation was made by teams of teachers, but data managers or researchers were rarely used to interpret data.

4.7.3 How SLs use data

All case results have been explained within the specific-case analysis. To avoid repetitions, the cross-case analysis in Table 4.4 only provides the key highlights concerning how each SL uses data.

Table 4.4: Cross-case analyses- how SLs use data

DATA USE	School 1	School 2	School 3	School 4	School 5
Evaluate pupil ability and set them targets	Yes	No	Yes (*SATs & FFT)*	Yes	Yes *(MidYIS)*
Ability setting	Yes *(in Maths)*	Yes *(in Maths +English)*	No	No	Yes *(in Maths)*
Identifying needs and planning	Yes	Yes	Identify needs & *pre-empt issues (hotspots)*	Yes	Yes
Developing policy	No	Yes	No	Yes	Yes
Monitoring progress and conversations	Yes	Yes	Yes	Yes	Yes
Evaluate teacher performance	Yes	Yes	Yes *(Lesson observation & appraisal)*	Yes	Yes
Distinctive results					
Attempt to improving teaching	There is little evidence that data use by the SLs improved teachers' teaching methods				Yes- (*improving teacher and methods approach*). *See section 4.6.3*
Improving provision	Yes *(e.g., remedial lessons) in section 4.2.5*	Yes *(re-teaching year 6 topic). See section 4.34*	Yes *(differentiated timetable) in section 4.4.4*	Yes *(one-to-one teaching) in section 4.5.4*	Yes *(additional support for SEN). See section 4.6.4*
Improving resources	None	None	None	Yes *(coloured worksheets for SEN). See section 4.5.4*	Yes *(provision of laptops) in section 4.6.4*
Strategic focus on Maths and English	Yes	Yes	Yes	Yes	Yes
Self-learning/ reflections	None	None	None	None	Yes
Accountability and justifying decisions	No	Yes	Yes	Yes	No
Awards	Attendance	Behaviour	None	Attendance	None

4.7.4 How teachers use data

To avoid repetitions, Table 4.5 summarises the highlights of how teachers use data in each school.

Table 4. 5: Cross-case analyses- How teachers use data

DATA USE	SCHOOLS				
	1	**2**	**3**	**4**	**5**
Target setting	No	Yes	No	No	No
Identifying ability on entry via CATs (i.e., baseline testing).	Yes	Yes	Yes	Yes	Yes
Ability setting and re-setting	Re-setting in Maths	No	Yes *(Science Maths, SEN)*	Yes *(in Maths)*	No
Identifying underperformance, needs and planning	Yes	Yes	Some	Yes	Yes
Monitoring progress	Yes	Yes	Yes	Yes	Yes
Reporting progress and conversations	Yes	Yes	Yes	Yes	Yes
Challenge Targets (CTAGs)	Yes	Nil	Nil	Nil	Nil
Distinctive results					
Attempt to improve teaching	Yes- diagnostic e.g., remedial classes	Yes- diagnostic e.g., teaching year 6 topics	Yes- diagnostic e.g., knowing prior knowledge.	Yes- improving diagnostic and teacher approaches.	Yes- improving diagnostic and teacher approaches.
Self-learning/ reflections	None	None	None	A-ML	Yes
Accountability and justifying decisions	Yes	Yes	Yes	No	No

Next, I present a model (Figure 4.1) to summarise how the SLs and teachers generally use pupil achievement data.

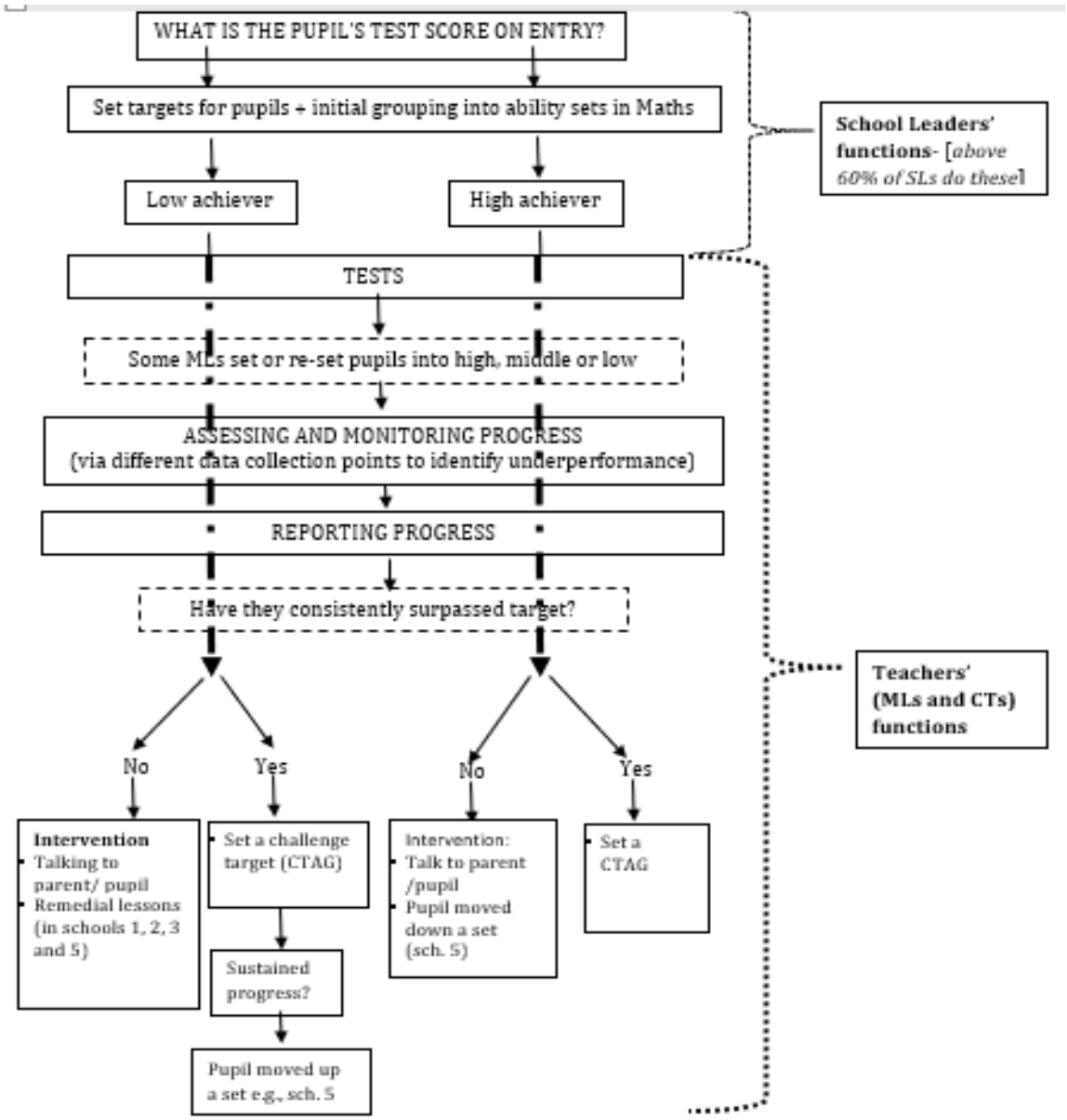


Figure 4.1**:** A model of how SLs and teachers use pupil test outcome data.

Operationalisation

The model shows that SLs (at the top), mainly use pupil-attainment data to set targets for pupils before they arrive (see Table 4.4). Pupils with low KS2 score are given low targets while those with higher scores are given high targets (e.g., school 2). That is, individual student's KS2 score in primary school SATs examinations (in the case of state schools), and MidYIS in the case of the independent

school, is used to determine their targets. Target here, is the progress pupils are expected to maintain or surpass in KS4 examinations.

After targets are set, teachers in schools 1, 3 and 4 assess pupils via CATs. The outcome from such CATs is used to set or re-set pupils accordingly within six weeks after they arrive (Table 4.5). Pupils are re-set when their CAT score is below or above their KS2 scores. Afterwards, teachers (in all the schools), again assess pupils at every half-term to monitor their progress towards targets. After every assessment, progress is reported to SLs who remind teachers to intervene for underperforming students. Here, interventions in most cases involves talking to pupils who fail to meet targets (sometimes in the presence of their parents) to encourage them to add effort. On the other hand, pupils who consistently surpass targets may be moved up a set (in school 5) or in the case of school 1, are given a Challenge Target (CTAG) to drive performance forward. Underachieving however, students may be moved down a set and their parent talked to (e.g., school 5). There is no compelling evidence that data is used to adapt teaching in terms of classroom teaching methods and activities (Wieman, 2014). Rather, data is used, for example, to inform talks with pupils to add effort; to move pupils between sets; or for remedial lessons. Here, it seems the assumption is that pupil effort or additional teaching will help, not better teaching. But perhaps more important are the triggers and consequences resulting from these teachers' and SLs' data use practices which I discuss below backed by evidence from the study.

4.7.6 Triggers and consequences to data use

The study reveals three external and four internal triggers influencing data use practices in these English schools. The three external triggers are government, inspections and parents as shown in figure 4.2. Some government accountability requirements, for example, may depress and undermine teachers' professional ethics thus making them to comply cynically. SL2 highlighted this, saying:

> There are certain external data-requirement, and sometimes I think some of these external requirements have flaws. But they are external and needs to be done. (SL2)

The SL elaborated this with an example saying:

> You get a figure like progress 8 from government to compare schools. Its averaging averages… sometimes that is a bit depressing because it is not a true reflection of what is happening. (SL2)

Another external trigger on teachers to use data in certain ways is inspections. Some teachers felt they have to do certain unnecessary requirements for the sake of inspections:

> Schools in general don't like Ofsted and don't appreciate the work that they do. They find it...just like passing your driving test. Everyone hates passing their driving test. But they know after that they can drive the way they want to. It doesn't mean you are a good driver just because you are holding the steering wheel perfectly. Does it? (ML)

The last external trigger is parents who have certain data use expectations from teachers. A CT in school 5 hinted this arguing:

> I don't agree with target grades, but I have to put them in there as part of school policy. The parents want it regardless of whether I agree or disagree with it. (CT)

The results also show four triggers internal to the schools which influence teachers' use of data in the schools: data outcomes, SL's approach, roles and individual resilience. First, unfavourable data outcome (e.g., in tests), can cause anxiety thus impacting negatively on the well-being of teachers:

> It stresses because you are judged on the progress of your pupils. If your pupils are not making progress, then you get to think ooh God! This is gonna look bad on me. (CT, school 2)

> Data depresses if you have prepared a class and it turns out they don't do very well. (ML, school 1)

In contrast, favourable data outcome impact positively on the well-being of some teachers. For example, a teacher argued: '*Data use impacts positively on your well-being when you see a positive impact on what you do*' (CT, school 4). An academic-MLs added:

> The competition fortunately does not depress because we are a high attaining school. It's quite refreshing. (ML, school 4)

> We got thirty-nine percent A and A* in English and literature. That motivates us to make sure we do better next time. (ML, school 5)

Second, there is some evidence that pressure from SLs can undermine teachers' professional ethics. Consequently, some teachers cynically comply with data use demands they do not agree with (e.g., targets). The pastoral-ML in school 1 stated*, 'sometimes you are just asked to collect data and you barely know the child'.* Another ML in school 3 added:

> … sometimes you feel like you are doing it for the sake of somebody else who wants it presented in a certain way and I'm not going to use it that way. (ML, school 3)

In other cases, teachers award grades that pupils do not deserve, to present the department of the school in the best possible light. Results also show that SLs' pressure affects teachers' well-being. Some SLs empathise and support teachers:

> Data helps me do my job, but not my well-being. It affects me badly. I get ill once a half-term because I get run down pushed to my limits to doing it… Sometimes it's work-related, so that has a negative impact on your life at home. The SL has been supportive giving me time off to recover from stress. (ML, school 2).

However, some teachers resist the negative consequences of using data. One ML stated,

> I don't let data use take me away from my teaching. My teaching comes first, marking second and then I will do data. If data is required and I'm supposed to teach, I will teach first, data later. (ML, school 3)

Third is the roles different teachers play in school which may increase their workload. This is particularly true with the MLs many of whom argued that collecting, analysing, monitoring progress and presenting data sometimes deny them the time to plan and deliver quality lessons. Most CTs, however, only experienced data use workload every seven weeks when they get pressure to enter pupils' grades into the school data systems. Despite most teachers appreciating the need to collect data, some expressed concern about the quantity of data collected. A CT in school 5 argued: '*not all data is relevant. What is the point of putting in data if you are not going to use it?*' Surprisingly, except

for SL3, the rest of the SLs interviewed felt that data use did not add to their workload because it was part of their job.

Evidence also show that teachers' data use roles can impact negatively on their well-being causing stress and anxiety on them. In this regard, the pastoral-ML who handles social matters of pupils in school 5, said, '*data use only impacts on my well-being because I worry about the children'.* A CT from the same school reported that entering data every six weeks into the data systems impacts negatively on his well-being. SL3 also mentioned the stress levels associated with his data use role in the school:

> Data use sometimes adds to stress levels… in my position, I guess you get frustrated with people who don't use it properly or those who don't enter it in the SIMs by the deadlines. (SL 3)

Intrestingtingly, teachers were divided on whether data use policies motivate their job performance. In this regard, a CT in school 1 argued that data use incentivised his pay. Some teachers also argued that data use policies motivate their job performance because it supports their roles such as monitoring of pupils' progress and setting of targets by the MLs and SLs: *'data motivates my job performance because it gives me the individual targets that I could hit with the individual pupils*' (SL1). A pastoral-ML in school 2 added: '*data helps in my job. It enables me to know where pupils are, their well-being and behaviour*.' But for some teachers, data use policies did not motivate their job performance because of its focus on accountability: '*data use does not motivate my job performance. It makes me accountable*' (SL 3). Last, although data use impacts negatively on the well-being of some teachers, a ML in school 3 resisted it, saying, '*life is too short to be depressed. No. It might make me annoyed or frustrated but not depressed*.' Clearly this teacher seems to compartmentalise negative emotions from data outcome better than other teachers.

Based on the above finding, I present a model (Figure 4.2) about the triggers and consequences of data use. The model accommodates both positive and negative uses of data. It shows external pressure to use data coming down to schools (top-down arrows) and the flow of data collected flowing in the reverse (bottom-up arrows). For example, CTs and MLs have different responsibilities to collect different data and give them to different people. The model also shows that CTs give data directly to SLs and parents and get pressure from them.

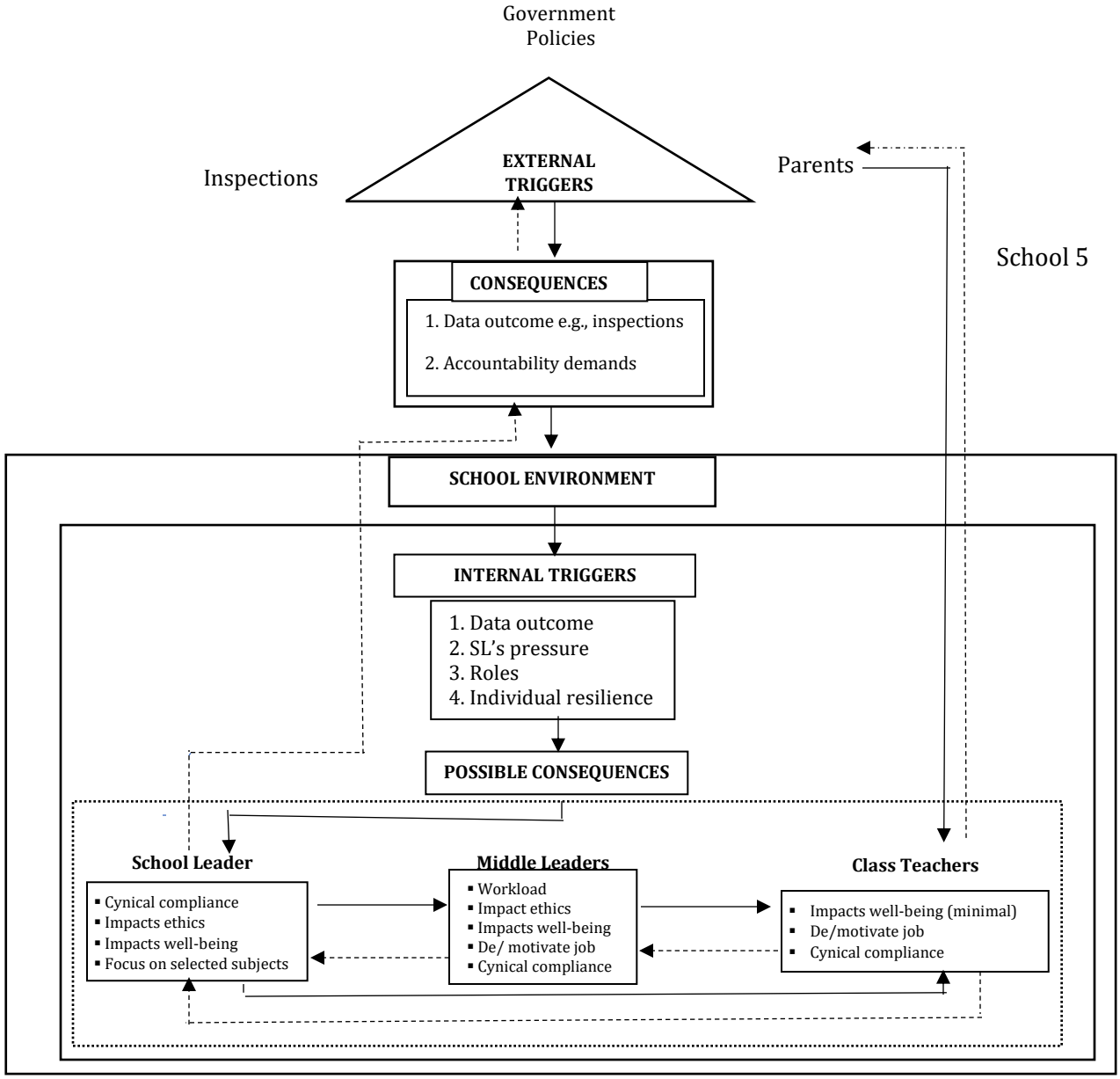


Figure 4.2: A model of triggers and consequences to data use

Operationalisation

The model shows that triggers and consequences to data use in schools come from sources that are internal and external to schools. External triggers include government policies and parents as shown

in the model. Such external triggers arise from accountability requirements (e.g., progress 8) and data outcomes (e.g., pupil achievement) which pile pressure on schools to improve. Consequently, teachers may either comply, comply cynically or resist some accountability requirement. Next, school internal triggers such as data outcome (e.g., inspection or test outcomes) then increase pressure on teachers to use data. For example, because of poor data outcome, school leaders (SLs) are forced to demand for interventions and better outcomes from teachers and pupils. Such pressure may narrow teaching to focus on certain subjects like English and Maths as evidenced in this study. Depending on the pressure from SL, roles of some MLs and CTs may be overburdened than others. For example, some MLs get additional workload caused by tracking of students' progress data whereas for the CTs, data outcome may or may not motivate their job performance (See section 4.7.6). Here, individual resilience of a teacher then seems to determine the extent to which data use impacts on them (whether positively or negatively). Evidence show that some teachers compartmentalise and cope with the pressure from data usage better than others (section 4.7.6).

Finally, due to the chain of command, the SL's may pile pressure on MLs who also transmit it to CTs. But there are also instances when the SLs engage CTs directly, for example, when inquiring about the kind of interventions that has been put in place to support the underperforming students (see section 4.2.5, 4.4.3, 4.5.4 and 4.6.3). Similarly, there is evidence in school 5, that parents can engage CTs directly either to demand certain data (see section 4.7.6) or to help teachers talk to children to add effort (e.g., see section 4.2.5). This way, the CTs may get pressure from all directions. The model derived from the evidence gathered from this study (figure 4.2) might help school's stake holders (policymakers, practitioners, parents and teacher unions) to understand better, the triggers and consequences of data use and therefore, assist to minimise them.

Generally, this study's results show that SLs mostly used data to set targets for pupils and to evaluate and monitor teacher performance. Data is also used to monitor pupil progress and school functioning. Some academic-MLs, however, used data to put pupils into ability sets, monitor their progress and to identify underperforming students for conversation-based interventions such as asking pupils to try hard. Data use hardly informed teaching methods, teaching activities and self-reflections (except for school 5). Rather, it triggered some unintended consequences on teachers.

4.7.7 How SLs support data use

Table 4. 6: Cross-case analyses- How SLs support data use in the schools

	SUPPORT	SL1	SL2	SL3	SL4	SL5
1.	Access to data	√√	√√	√√	√√	√√
2.	Internal collaboration around data	√√	√√	√√	√√	√√
3.	Pressure to use data	X	√√	√√	√	X
4.	Provision of technology	√	√	√√	√	√
5.	Provision of statistician to support teachers	X	√√	X	X	X
6.	Provision of time to use data	X	√	X	X	√
7.	Shared data use goal and vision	X	√	X	√	X
8.	Provision of data use training	X	√	X	X	X
9.	Devolved data use responsibilities	X	√	X	X	X
10.	Partnering with other schools to use data	X	√	X	X	X
11.	Partnering with universities to use data	X	X	X	X	X
	KEY: √√ - Often provided					
	√ - Sometimes provided					
	X - Never provided					

From Table 4.6, it is evident that access to data and internal collaboration around data are the main support teachers received across the schools. Seamless access and dissemination of data in the schools was mediated via technology such as SIMs in state schools and Double Fast in the independent school. Probably this explains why in the absence of a DM in school 3, respondents reported technology as the main support. However, in school 2, a trained dedicated DM was perceived as a major support unlike in schools 1, 3, 4 and 5, where teachers from Mathematics department who were non-statisticians and had other competing duties in their schools played the role. This finding suggests, that teachers in this study are willing to get support from a trained qualified statistician when provided.

The least support in the schools was partnering with universities or other schools around data. This means that the schools worked in isolation; a probable characteristic of a closed system. Evidence show that mostly school 1 and 5 worked in isolation. The two schools were judged 'good' and 'outstanding' respectively in their last two inspection reports. It could be that favorable judgment by inspectors encouraged the schools not to look beyond for improvement tips. Although school 2 and 4 attempted external collaboration around data, this was purely out of individual teachers' efforts, not school policy. In school 3, a DM was previously unavailable, and respondents indicated it as the least support. This finding when compared to that of school 2 where the DM was perceived a major

support, suggest that teachers in school 3 value the availability of a qualified-supportive DM. Unfortunately, most of the DMs in the schools were merely administrators of data. Mostly they support SLs and not MLs and CTs. This implies the DMs contribute little to improve teaching through data.

Finally, some distinctive results emerged. First, despite the schools being data-rich, only school 2 had a trained statistician to help teachers. Second, the visions and goals for using data were unclear in all schools except school 2. Respondents in this school showed some shared vision and goal for using data. Devolved data use responsibilities, data use meeting and data use trainings targeting all teachers might have contributed to a shared data use vision in the school. In contrast, respondents in the other schools struggled to state the data use vision and only understood it according to their roles rather than a shared school-wide vision. Nevertheless, it is important to note that the visions seemed clear to SLs than it was to MLs and CTs. Third, despite being data-rich, respondents across the schools highlighted inadequate time to use data. It could be that continuous collection of a wide variety of data denied teachers the time to engage deeply with it. Furthermore, it maybe that it conflicted with their core mandate of teaching. Fourth, the schools rarely provided data use training to teachers. Teachers mostly managed through effort and experience to learn data use. Furthermore, with the exception to school 2, the little training provided mostly targeted SLs. Finally, it was interesting that the pressure on teachers to use data was greater in school 2, 3 and 4. Apparently, these schools had their immediate inspection judgment as 'requires improvement'. This suggests that the pressure to use data in the schools were probably triggered by inspection judgments. It could be that these schools viewed data use as a root to improving such judgments.

In summary, the results show that all the schools support access to data and internal collaboration around data use, but, partner less with external institutions around data use. The results further show that although the schools are data-rich, they struggled with similar data-support challenges including lack of: trained qualified statistician, time to use data, clear vision and goals for using data, and lack of data use training.

CHAPTER 5: DISCUSION AND CONCLUSION

This chapter is divided into four sections. The crucial findings of the study are highlighted, and new findings discussed. Section 5.2 revisits performativity as a concept used to understand the findings. In section 5.3, findings that accord with previous research are discussed, and the concept of performativity deployed to make sense of the findings. Section 5.4 is a conclusion highlighting the implications of the study for policy, practice and research.

5.1 INTRODUCTION

This study has four new findings or new knowledge that it brings. These are, (1) The state schools are more constrained in data use than the independent school (2) English secondary schools do not partner with each other around data use (3) pastoral data is not a stand-alone data and, (4) data collection and access is hierarchical. These new findings are discussed below.

First and perhaps more striking is that the independent schools is less constrained in data use compared to the state schools. This is because unlike the state schools, the independent school collects the data it pleases. This notwithstanding, it is interesting that the independent school which is not required to collect so much data actually does so much in that respect (see Table 4.2). In section 4.11, whereas the state schools collect SATs and pupil premium data, the independent school has the options to collect the data it pleases (e.g., MidYIS). Previous research has not reported this. This finding tells us something about the context under which these schools operate. It is a context under which a culture of data collection seems normalised to the extent that schools feel they should collect as much data as they can even when they have the freedom to choose what to collect. This finding differs from previous research findings probably due to the selection of state schools and an independent school in the study. Although Schildkamp et al. (2014) studied best case schools in terms of inspections reports, it is highly likely that the study did not include an independent school(s). The reason why the independent school does not collect some data collected by the state schools is discussed in section 4.1.1.

Second, English secondary schools do not partner with other schools around data use. This implies that the schools work in isolation. High-stakes accountability and sanction (Perryman, 2006; West et al., 2011) and competition brought about by ranking of schools in the league tables (Downey & Kelly,

201) might be subjecting these schools to a culture of isolation and self-interest. I will revisit this issue in section 5.3.

Third, I found that pastoral data in English schools is not a stand-alone data. Rather, pastoral data represents a collection of pupil management data such as PAB that supports the work of pastoral-MLs (see section 4.1.1) for details. This suggest that in these particular schools, everything is sub-servient to academic progress since PAB data are used by the schools to ensure uninterrupted performance. This new finding may be due to the researcher's deeper probing and analytical rigour (Braun & Clarke, 2013) which might have led to deeper insights about what respondents said about pastoral data. The reason why pastoral data is collected in English schools is probably due to safeguarding legislations, inclusion and Ofsted inspection framework that judge student behaviour and schools' care condition for children (DfE, 2016).

Finally, the last new finding is that data collection and access in the schools is a hierarchical phenomenon. Although data use by teachers has been reported elsewhere as a multi-level phenomenon (Coburn & Turner, 2012; Schildkamp & Kuiper, 2010), data collection and access has not. This finding that data collection and access is hierarchical may be attributed to the data protection Act of 1998 in England and the European Union's General Data Protection Regulation which came into effect in May 2018 (GDPR, 2018). The legislations restrict access to personal data by unauthorised persons. This means staff only access data which relates to their roles, which again, is reasonably sensible because collecting and accessing data which lacks relevance to someone's role is needless and adds to unnecessary workload. The hierarchical nature of data collection and access in this study is striking because it depicts stratification meant to impose hierarchical power structures in schools. The power structure comprises of SLs, MLs and CTs and aligns with the NPM's or private sector's hierarchical management structures. Although this kind of management structure might be perceived as inappropriate for schools, I feel the contrary. I feel that just like in other organisation, schools' staff need division of labour so that teachers know what they are supposed to do and the extent to which they should do it. The hierarchical management structures in this study helps to achieve this.

Apart from the above-mentioned new findings, the study also shows six crucial findings: (1) most students-related data are quantitative (2) shifting of focus from teaching to datafication (3) Superficiality in data collection, interpretation and use (4) data collection as a form of surveillance

(5) Data use spreading through hierarchies and, (6) teachers' positive and negative responses to data use. These findings are important because they have implications for policy, practice and research as presented in the conclusion part of this chapter (see section 5.4). Many of these findings accord with previous research. The alignment of all findings to previous literature and the concept of performativity are in section 5.3. Next, I will focus on the crucial findings while at the same time aligning them with previous research and what Stephen Ball and others say about performativity.

5.2 PERFORMATIVITY

This section defines and gives a brief overview of how performativity is used in this chapter to make sense of all the study findings. In section 5.3, supportive examples from the study findings are aligned with both previous research and the concept of performativity in education as argued by Stephen Ball and others. According to Ball (2003, p. 216), 'performativity is a technology and a mode of regulation that employs judgments, comparisons and displays as a means of incentive, control, attrition and change based on rewards and sanctions (both material and symbolic)'. This is why Ball (2017) concludes that performativity is a 'system or a culture of terror' (p. 57).

Performativity can be used to explain the study findings. It is displayed in the schools' data collection and use which focuses on performance measures characterised by high-stakes accountability, datafication and systems of data tracking and reporting. It also manifests in the high-stakes competition, sorting of students (e.g., into sets and targets) and testing systems, all of which are pervasive in this study's results (see Table 4.2 and Figures 4.1 and 4.2). Table 4.2 shows what data schools collect whereas Figure 4.1 is a model showing how teachers use of data to set targets, monitor, and report pupils' progress. Figure 4.2 on the other hand is a model of the effects of using data in the schools. Table 4.2 and the two models (figures 4.1 and 4.2), for example, help to reveal what schools and teachers have become in the era of performativity. To make these easy to understand, I have summarised the crucial findings from sections 4.1.1, 4.7.6 and 4.7.7 into themes which I have gone ahead to discuss in this chapter as evidence of performativity. That is, a discussion in terms of how teachers use data to think and act on themselves and to others such as students, parents and inspectors for the sake of performance.

Inspired by Stephen Ball's concept of performativity, I view how these teachers interpret and use data as driven by performativity. This is why I use the concept of performativity to make more

apparent what performative regimes has brought into the data use practices of these English teachers. My intention is to use performativity as a tool for making sense of the data use practices these teachers engage in within the case schools. Performativity as a concept, for example, helps me to expose how policy technologies of accountability works on, rules, and shapes how these teachers interpret and use data.

As I mentioned in the literature review chapter, performativity technology as used in English education emanates from NPM ideologies perpetuated through successive policy reforms. Such reforms are increasingly changing the roles of teachers from non-performative to performative ones. Perhaps this is why Ball argues that performativity is what we do rather than what we are (Ball, 2003; 2012; 2017). I argue that how these English teachers interpret and use data can be understood through the lens of policy-driven performativity regimes which are incrementally and increasingly becoming 'authentic'. I draw on the study results to suggest that performativity permeates deeply into the data-use practices of these English teachers. Some of these practices have been reported in the available literature (see for example, Ball, 1998; 2003; Cain & Harris, 2013; Courtney, 2014; Perryman, 2006; Perryman et al., 2011; Troman et al., 2007). Having discussed the new findings and introduced performativity as a concept I use to interpret the study findings, next I will discuss the crucial findings highlighted in the last paragraph of section 5.1 while at the same time aligning them with previous research and performativity.

5.3. CRUCIAL FINDINGS AND PERFORMATIVITY

5.3.1 Most student-related data are quantitative

The study shows that more pupil-related data are quantitative than staff-related data. There are three possible explanations for this. Possibly, pupil-related data is prepared for other stakeholders such as inspectors, SLs, MLs and parents who are interested in specifics for quick decision-making. Another possible explanation is that pupil-related data is prepared for comparisons whereas staff-related data is not. That is, what SLs do with student-related data might be different from what they do with staff-related data. Moreover, staff-related data is mostly given attention when pupil performance is falling below expectations or is used for pay reviews in some schools. The last possible explanation is that a lot of data in the schools is about pupils. Therefore, teachers are possibly trying to minimise workload that may result from pupil-related data. As a result, teachers

quantify the data to make it easy to work with. Quantitative data, for example, are quicker to input into the schools' data tracking systems (SIMs) and are also easy to compare and interpret.

Although quantitative data might be beneficial to teachers and schools for ranking and comparison purposes, it also has two disadvantages to theses teachers work. First, quantitative data seem to narrow teachers' focus to performance measures leading to loss of details and possibly, a damage to relations because it provides breadth but lacks depth (Denscombe, 2014; Creswell & Plano-Clark, 2011). Last, numbers are objective and have the tendency to reduce students to objects to the extent that their totality and the human aspects are either lost or neglected. For example, quantitative data can help identify a struggling student in a subject but cannot explain why the student is struggling. Furthermore, it cannot prescribe to a teacher on what to do with the struggling student. It is therefore reasonable to argue that most teachers in this study seem to have a superficial understanding of their students. This is because of the excessive use of numbers to represent pupils neglect details such as what makes a particular student to engage in disruptive behaviour.

These teachers' focus on quantitative data shows that they have a greater preference for the number. Many aspects of students' life and performance in school is converted into measurable numbers, probably as part of performance metrics. As already indicated in the above paragraph, most student-related data are quantitative to permit comparison between them (see section 4.1.1). Schools are turning most information about students into numbers even when it makes little sense to do so. For example, measuring students' behaviour and engagement with homework in points makes little sense but these teachers engage in it (see sections 4.1.1, 4.2.3, 4.3.5 and 4.5.4). This reveals a deep-sited performativity culture where data about students is quantified to facilitate the agenda of other stakeholders whose main focus is on monitoring performance via ranking, comparisons, quick judgments and reduction of teachers' workload as discussed in section 5.1. This confirms Ball's (2003) observation that, 'central to the functioning of performativity is the translation of complex social processes and events into simple figures or categories of judgment' (p. 217). Similar findings have been reported in the Early Years of English education (see Bradbury, 2014; Robert-Holmes & Bradbury, 2016; Wrigley & Wormwell, 2016). These studies showed subjective judgments on young children being translated into numerical information to permit monitoring and prediction of early years' educational performance. The same is evident in these secondary schools. In all these, one crucial question that emerges is - where most student-related data are transformed into quantitative data to satisfy the agenda of teachers, parents and inspectors, then where does that leave students'

interest? Indeed 'performativity brings unhelpful damaging practices, which nonetheless satisfy performance requirements' (Ball, 2017, p. 58). The changing of more student-related data into quantitative data by these teachers might be damaging but nonetheless helps them to show that they are meeting or trying to improve pupil performance.

As we know, performativity revolves around comparisons and categorisation of individuals based on productivity (Ball, 2003: 2017: Lyotard, 1984). These schools as noted earlier, quantify student-related data to enable comparison, categorisations and judgments. This can be likened to production of league tables at the school levels to judge and compare students. Several data use instances in this study show sorting and comparing students, for example, through the construction of sets and targets. All these are evidence of an increased flow of quantitative data in the schools matched with equal data tracking systems such as SIMs which enable teachers to constantly measure, compare and track students' performance from KS2 through to KS4 in relation to targets derived from KS2 SATs data. This confirms Williamson's (2014) argument that databases reinvent teachers and children 'into data that can be measured, compared, assessed and acted upon' (p. 12). Williamson (2014) adds that through data, children become reduced to 'miniature center of calculation' (p. 12). Here, the construction of quantitative data about students is for monitoring performative demands of accountability and performance. For example, due to external accountability pressure, the SLs allocate targets meant to focus teachers' and students' efforts towards producing the expected performance data. This is demonstrated by students who meet the targets. Those who do not are subject to 'interventions' which are mostly superficial in nature such as provision of resources to students who need them. The changing of more student-related data into quantitative data might be due to a highly centralised national system of high-stakes accountability and sanctions (West et al., 2011). This could be shifting teachers' professionalism towards producing objective quantitative data about students similar to quality control processes in the industrial production sector.

Ball (2012) argues that performativity causes 'a loss of a sense of meaning in what we do and what is important in what we do' (p. 30). Similarly, teachers in this study seem to have lost a sense of meaning in the quantitative data they collect as it narrows their focus to performance measures rather than what is in the best interest of students. According to Ireson and Hallam (1999), for example, grouping students into ability sets is associated with students' negative self-esteem but these teachers continue with it despite research evidence showing the contrary. The focus on performance measures represented through quantification of student-related data suggests that the

teachers highly value what is considered valuable in the public eye such performance outcomes and they are trying to do everything to show it. The quantification of students to measure, compare, and judge performance shows this.

Also, most English SLs seem to treat students as data points by focusing on setting targets for children just before they arrive. The targets specify what performance outcomes are expected from individual students during their life in school. Quantitative data then helps teachers to measure and compare students' productivity, behavior and attitude. It also helps them set pupils according to their ability in Maths (evident in all schools) and in English in school 2. This is an aspect of narrowing of teachers' focus to certain students (e.g., the low ability students in Maths and English subjects). It appears that for these teachers as Ball (2003) remarks, performance although necessary, seems to be everything they pursue. Data is constantly used to measure and monitor progress to ensure students and staff constantly perform. For example, while performance appraisal data is used to determine teachers' productivity and performance-related pay (e.g., in school 1 and 3), data from CATs in the public schools and entrance examinations in the independent school are used to determine students' productivity and expected performance. Such a focus narrows teachers' field of vision and is problematic in many ways as discussed below.

First, quantification of student-related data may overlook other non-measurable contributions that individuals make. For example, the empathy shown by teachers such as the pastoral-ML in school 5 (see section 4.7.6), are overlooked because they do not immediately translate to performance required by schools. This means that students' humanistic aspects might be overlooked as schools' focus more on improving their performance ranking in the league tables. Little attention is thus given to using data to improve other aspects that would otherwise benefit students' interest such as learning and teachers' effort to improve their pedagogy. For example, data is frequently used across the schools for diagnostic approaches to teaching. There is little evidence across the schools that teachers used data to adapt their teaching methods as recommended by Wieman (2014). It can then be argued that the behaviour of teachers in this study confirms Ball's (2012) argument that in performative regimes, individuals and institutions shift their focus to production of measurable performances rather than measuring what is valuable such as efforts towards learning or teaching. In concurrence with Ball (2003), performativity seems to orient these teachers and schools to outcomes to the exclusion of everything else. This manifests in the ways in which these teachers and schools have become increasingly responsive to performances. They seem to focus more on what

contributes to performance outcomes and accountability measures but less on the process that would otherwise lead to those required outcomes. For example, they seem to neglect what is in the best interest of students such as valuing students' humanistic aspects.

Second, the representation of students of diverse traits to quantitative data implies that details about them are sacrificed. This means a very synoptic view of students (Gorur, 2016) which is rich in breadth but limited in depth. For example, behaviour points awarded to students might help identify students with behaviour problems but cannot explain why they have behaviour problems and how to deal with it. Therefore, representation of students as pieces of data for the sake of comparisons and performances may also overlook the social and humanistic aspects of students. For example, most teachers talked to children to add effort when they underperform but give little attention to other complex factors such as learning environment and home background which may be invisible but affects student performance in tests. Indeed, 'the technology of performativity appears misleadingly objective and hyper-rational' (Ball, 2003, p. 217). Despite this shortcoming, there were some pastoral-MLs particularly in school 5 who tried to bridge this gap. They triangulated quantitative data with other data sources for explanations- something most respondents did not.

Third, narrowing of teachers' field of vison due to performativity can damage relations (Ball, 2012; 2017). It can damage teacher-student, student-teacher, teacher-teacher, teacher-parent and teacher-government relations (also see section 5.3.2.3). The representation of students as pieces of data in this study, for example, might undermine teacher-student relationship. Teachers may view students as products or objects to be exploited for maximum productivity with little regard for their human worth (Ball, 2003). It can also undermine student-teacher relations due to competing interest of the school and that of students. For example, the student might want to learn but teachers on the other hand set them performance targets because that is what schools are measured against. This implies that underperformers are quickly identified via quantitative data and targeted for interventions such as those in figure 4.1.

Schools in this study, for instance, utilise quantitative data to create performative identities via ability sets where students are branded as either low, middle or high ability individuals. In school 5, students even get warnings for poor performance and are sometimes dropped down sets when their performance keeps dropping (see section 4.6.4). In school 1, students are ranked and the last ten are always asked to improve. All these are practices of sorting which can damage relationships. For

example, students who do not produce the required data can be looked down upon by teachers and other students as a let-down (Perryman, et al., 2011). This effect of students being reduced to pieces of data is also demonstrated by Hutchings (2015) who studied the impact of accountability upon children and reported: 'it is deeply saddening that some of the pupils interviewed felt reduced to a statistic- jumping through hoops for the benefit of others, and with no space to discover the creative and positive learning that school should provide' (p. 1). In this regard, there is a sense in which students in this study have been reduced to schools' statistical 'raw materials' via targets that are exploited and utilised for maximum productivity gains. Every student is labelled as a number and after every assessment point, the SLs are notified whether the student is below, on or above target. Such practices may carry adverse effects on students' well-being as students are put under constant pressure to show continuous improvement.

Teacher-government relationship is also undermined when students are reduced to pieces of data. For example, SLs in state schools are forced to set targets from national SATs data which they doubt its reliability (see sections 4.1.1 and 4.7.6). Also, SLs in the state schools felt they have to implement certain data use practices they do not consider professionally sound such as grouping pupil premium and SEN students together for purposes of monitoring and accountability. These seem to create some tension between SLs and the government. Here, it seems it is no longer an issue of professional judgment but rather that of external agents. Last, the relationships between the SLs and teachers are undermined by the focus on quantitative data about students. The SLs, for example, summon and challenge teachers whose students underperform- something that can potentially undermine relations between SLs and teachers.

Fourth, the narrowing of teachers' field of vision impedes collaborative work among schools. For example, the focus on accountability-related performance data such as quantitative test scores and ranking of schools seem to impede partnering among schools in this study. Stringfield et al. (2008) argue that inter-school partnership can enhance valuable learning opportunities and sharing of best practices. However, the study shows that partnering among schools is constrained. Schools do not partner with each other around data use. Rather, they work in isolation (see section 4.7.7). There is little evidence to suggest that schools share data and the strategies they use to change their data. Possibly, schools are guarded with their data either not to be seen as 'failing' or not to reveal their success strategies to other schools. The only exception is school 2, judged by Ofsted as 'requires improvement' (see section 4.3.1). The school is struggling to partner with others around data use but

also finds it challenging in a competitive high-stakes accountability environment. Here, it appears the market system has polarised schools making it harder for those at the bottom to improve. This is not surprising considering that all competitive business-like environments encourage people to keep their success strategies secret for fear of being dislodged from the market (Apple, 2017; Ball, 2017). The resultant effect is systems or schools which work in isolation. This is because schools are busy competing to achieve or maintain labels of being an 'outstanding' school, 'not like the other school' (Perryman, 2006). Such competitive labels then become increasingly attractive for schools not only to earn a good reputation but also attracts more students from 'parentocracy'-dominated environment (Davids, 1993). A lack of partnering with other schools might be counterproductive to the system. It might hinder improvement efforts because some school improvement strategies and ideas are simply available out there in other schools. High-stakes accountability and competition among English schools (Courtney, 2014; Perryman, 2006; Wrigley & Wormwell, 2016) might be responsible for this lack of collaboration among English schools around data use.

Finally, narrowing teachers' field of vision may result to fabrication of data. As Perryman (2006) observes, performativity has two possible outcomes: performance and fabrications. There is evidence that some teachers and schools in this study are drowned in performativity desires and demands. As a result, they fabricate data in order to present themselves in the best possible light (see section 4.7.6). This might be unhealthy use of data but nonetheless it helps these teachers and schools attain the required performance at least with regard to what the public wants to see or hear.

The representation of students as quantitative data and the collection of significant amounts of data by the English schools (section 4.1.1) leads to the second finding of this study- that is, the shifting of teachers' focus from teaching to datafication which is discussed below.

5.3.2 Shifting of focus from teaching to datafication

5.3.2.1 Datafication

Stephen Ball (2012, p. 30) notes that,

> The first-order effect of performativity is to reorient pedagogical …activities towards those which are likely to have a positive impact on measurable performance outcomes and are a

> deflection of attention away from aspects of social, emotional or moral development that have no immediate measurable performative value.

Murray (2012) adds that 'performativity has rendered much of teachers' work, particularly in teaching and partnership practices, invisible in audit terms' (p. 21). These teachers collect and analyse significant amounts of data (see section 4.1.1). However, the study did not find compelling evidence that teachers across the schools used data to adapt their teaching methods (Wieman, 2014). Rather, teachers mostly use the data for diagnostic purposes such as talking to underperforming students to add effort (see sections 4.2.3, 4.4.4 and 4.6.3); detaining those who misbehave in class (section 4.2.5); or providing coloured papers or reading slides to students with special educational needs (section 4.5.4). There is no doubt that performative regime has changed the nature of teachers' work. For example, teachers' collection of large amounts of data seems to shift their focus away from teaching to production of data. Some teachers (e.g., a CT in school 5) were aware of this anomaly and questioned the collection of large amounts of data some of which do not add value to classroom teaching (see section 4.7.6). This collection of large amounts of data are what Ozga (2009), and Robert-Holmes and Bradbury (2016) refer to as 'datafication' of practices. As noted elsewhere (Perryman et al., 2011), it seems that 'a greater part of a school's work is now primarily focused around measurements derived from the demands of accountability, notably in the production of examination results and the pressure to meet targets and improve performance levels year on year' (p. 183).

The shifting of focus from teaching to datafication is also evident in teachers' ability to generate more data through software than their capacity to understand it. But again, the shifting of focus from teaching to datafication is not merely enabled by technology (e.g., SIMs), but brought into being by that technology of performativity. Teachers found it easy to use software like SIMs to collect data but seemed unable to explicitly articulate how they adapt their teaching methods and teaching activities based on the data they collect. The schools have invested in various data systems which enable data collection, storage and access. For example, schools collect close to a thousand different pieces of data at different points per student per year and most teachers perceive data collection as a key responsibility (see section 4.1.1). There is also a lot of data gathering and fancy ways of keeping it (e.g., SIMs), and presenting it (e.g., as flight paths) mostly for administrative purposes. It could be that using data to adapt classroom teaching is challenging for these teachers than using data for administrative purposes. Moreover, the study shows that teachers spend more time preparing the

needed data which in most cases, compromise their teaching preparations and delivery in class. For example, in every lesson, each teacher roughly spends the first four minutes recording students' attendance data into the school system before the actual teaching begins. As lesson progresses, behaviour data is recorded when students misbehave, which again, eats into teaching time.

This datafication in English schools is widely reported elsewhere (Downey & Kelly, 2013; Earl & Fullan, 2003; Schildkamp et al., 2014), including in early years' English schooling (Bradbury, 2014; Robert-Holmes & Bradbury, 2016; Wrigley & Wormwell, 2016). Robert-Holmes and Bradbury (2016) calls it a culture of 'datafication' (p. 119), where schools regard data collection and use as part of the school culture. Studies (Courtney, 2014; Perryman, 2006; Robert-Holmes & Bradbury, 2016; Wrigley & Wormwell, 2016) argue that datafication in English schools is a performance the government through Ofsted inspections has always demanded as part of accountability systems. English teachers therefore collect and use a wide variety of data as a response to increased accountability because 'production of 'good' data is seen in many quarters as a mark of legitimacy, worth and value' (Robert-Holmes & Bradbury, 2016, p. 127).

In a high-stakes accountability context such as England, for example, data seems to be a tool that teachers use to defend themselves. Performativity through datafication more generally, orients some teachers in this study to a culture of producing evidence of learning such as monitoring for defense purposes rather than learning itself. The problem here is that production of evidence sometimes disguises reality. For example, learning is sometimes messy and not every aspect of learning (e.g., depth of learning) is measurable. But the focus on production of evidence to validate every aspect of learning and teachers' practices assume it to be so. Perhaps this is why most teachers in the study felt that their work is that of collecting data. This seems to shift teachers' focus from teaching to production of data to defend their practices (see Robert-Holmes & Bradbury, 2016; Werler & Faerevaag, 2017).

5.3.2.2 Defense

Defense is teachers' struggle to be accountable. Teachers are trying to be responsive to inspections, targets and performance appraisals through data. The teachers have to demonstrate and justify their worth through performance data such as pupil outcomes and lesson observations. This has indeed intensified these teachers' work pushing them to collect and use more and more data to defend

themselves (e.g., showing progress and behaviour) rather utilising more time in preparing quality lessons. Consequently, these practices incrementally and cumulatively shift teachers' focus from teaching to datafication. The process of datafication involves a focus on data production, analysis and presentations to justify existence and practices. Rather than use data to reflect on practice, these teachers find themselves in an environment where they collect large amounts of data as evidence to defend their actions and practices in the event that students underperform.

Teachers in this study seem to use data to say, 'according to the records, I knew about situation X or I did this because the data showed me this and here is the evidence'. Several examples are available in the study to demonstrate this. For example, SL2 reported collecting and keeping data to share with inspectors if and when they arrive. A middle leader in school 1 also used pupil outcome data to justify students' lack of effort in homework. Other examples are the daily collection of behaviour and attendance data to defend teachers' actions before a student is sanctioned or detained. In school 5, student outcome data is used to talk to parents so that they become aware before their children are dropped down sets for poor performance. But perhaps more interesting is the case where the MLs in schools 1 and 4 were using data to put the blame elsewhere. For example, data on students' engagement with homework (EWH) is collected in school 4 to prove lack of effort at home in the case of student underperformance. All these findings confirm the use of various sets of data as a tool that teachers use to defend themselves if and when needed. Ball (2017) notes that high-stakes accountability 'pushes people to a survival culture of self-interest' (p. 54). In deed these teachers and SLs exhibit a culture of self-interest whereby they use data to defend what they do to authorities such as school inspectors. Based on these examples, it is reasonable to argue that these teachers and SLs are engaging in panoptic performativity (Perryman, 2006; Perryman et al., 2011). Panoptic performativity is where teachers are on the look-out, producing good-looking data to defend themselves because they do not know what inspectors and superiors will want from them especially when things go wrong down the line. As Ball and Olmedo (2013) observed, these SLs and teachers are taking 'care for the self'. They are simply trying to play safe in the system and data is helping them to achieve this.

Playing safe means SLs and teachers constantly record and report their practices making themselves more auditable and accountable. For example, teachers track students' performance (every 6-7 weeks) to account for the progress individual students make. They are always checking whether students are 'below, on or above the 'blue-line' (i.e., targets). This is production of evidence of

learning rather than the learning itself. Ball (2012) confirms these as production of data to defend our existence, stating: 'within the rigours of performativity, we are required to spend an increased amount of our time trying to make ourselves accountable, reporting on what we do rather than doing it' (p. 19). This is exactly what these SLs and teachers are doing. They are playing safe in the system for instance, through issuance of targets.

5.3.2.2.1 Targetocracy

SLs in this study issue targets to students which also shift teachers' focus from teaching to datafication. I call this culture 'targetocracy' because it is a system of learning which is ruled by targets. The SLs formulate targets to be achieved by students and by extension, teachers. But, except for SL5 who attempted to use data to change a music teachers' teaching practices through advice and a second observation (see section 4.6.3), there is no strong evidence that SLs in the state schools did this. Target-setting specifies in advance the desired data outcome in measurable form. Targets shift focus from teaching to data production meant to show whether targets are met. Testing is done and teachers have to defend themselves to SLs and parents when students do not meet targets. This suggests a presumption that inability to achieve targets means teaching is adequate and vice versa. But again, this might be flawed since student performance in tests is influenced by a variety of complex factors such as student situation at home, health, student attitude and others. Therefore, it can be argued that targets shift these teachers' attention to the needed performance data rather than to the teaching process itself (Ball, 2012). Studies (Downey & Kelly, 2013; Robert-Holmes & Bradbury, 2016; Perryman et al., 2011; Schildkamp et al., 2014) also reported target-setting in English schools. Targets reflect the thinking of the schools and SLs about what is important (i.e., performance outcomes). This puts teachers and students in a constant urge to produce more and more of the needed performance data.

Lyotard (1984) argues that in a culture of performativity, we are expected to account for our performance and productivity. This also seems to shift teachers' focus away from teaching to datafication. Target-setting might be schools' response to government pressure that they demonstrate the impact they have on students' progress (e.g., in line with progress 8). Although targets can be beneficial in directing students' focus to what needs to be done, it can also be abused to justify unhelpful practices. For example, these schools might be using targets to identify students to target for good GCSE grades, particularly those on the EBacc pass-fail boundary of A*-C or 4-9 points in the new GCSEs grading system (Gillbourn & Youdell, 2001). Targets thus is likely to be a

way these schools are trying to get as many of their students attain the 4 points pass in the new GCSEs. It is not much about improving teaching methods but more about maintaining or improving students' progress data from KS2 through to KS4. By striking a certain percentage on the EBacc, schools secure a certain place in the league tables that makes them look good in the public eye (Perryman et al., 2011). It can then be argued that the focus on league tables is increasingly changing teachers' work to a game of targets.

Targetocracy or learning motivated by targets can be problematic. In my opinion, targetocracy is a simplistic way of looking at learning yet learning is complex because it is influenced by many factors such as teacher, context, students' prior knowledge and teaching methods, not just the targets. Targetocracy assumes all these factors. Being an extrinsic motivated learning, targetocracy can harm learning because it can kill learners' curiosity, motivation and desire to learn (Ryan & Deci, 2000). We know that curiosity leads to finding out hence learning. Targets on the other hand, may or may not lead to learning. The tragedy in this study is that behind target-setting is an interesting assumption by SLs that targets would lead to more effective management of learning and expected performance. Such is a superficial understanding of data use. Data never provide answers to problems like teaching, rather, humans do.

Ability setting via data also exemplifies a shift to datafication. For example, MLs in state schools use CATs data to justify setting of students by ability while the independent school uses entrance examinations data. These schools set students despite research evidence showing that it impacts little on student achievement (Higgins et al., 2015; Ireson eta l., 2005). Data is used to move students between sets rather than a focus on teaching. But sets themselves may have flaws. I will revisit this topic under superficial use of data in section 5.3.3.

One major possible cause of datafication for defense is accountability criteria. These include inspection judgments of schools, comparisons, and progress monitoring (Ball, 2003:2017; Jeffrey, 2002; Perryman, 2006; Wrigley & Wormwell, 2016). For example, in schools 2 and 3 (both judged 'requires improvement') teachers reported using data more for accountability than in school 5 which had an 'outstanding' judgement. It is possible that in schools 2 and 3, data is used to make teachers more accountable because that is the pressure SL2 and SL3 may be feeling which trickle down to teachers. School 4 also felt some accountability pressure probably because the school moved from 'requires improvement' to 'good'. It could be that school 4 is struggling to maintain or improve its

inspection rating (Courtney, 2014; Perryman, 2006). This means that accountability added pressure on teachers similar to findings reported by studies (Courtney, 2014; Perryman, 2006; Bradbury, 2014). Courtney (2014), for example, found that inspections have become more focused on students' attainment and progress data and school leaders tended to prioritise these in their schools. Datafication in English schools can impact negatively on teachers' work. For example, it increases teachers' workload and undermines teachers' professional ethics and well-being replacing them with 'terrors' of performativity' (Ball, 2017, p. 57). Terrors of performativity is where data production is given priority over pedagogy (see section 4.7.3 and 4.7.4).

5.3.2.3 Negative impacts

Datafication as an element of performativity undermines teachers' professional ethics. It requires teachers to organise themselves as a response to targets, performance indicators and evaluations (Ball, 2003). In this study, datafication is increasingly turning English teachers into bureaucrats-mainly producing data for defense. Accountability-drivers such as inspections also renders teachers to a bureaucratic function rather than a pedagogic function and teachers have to choose between one and the other. Datafication of teachers' work in this study demonstrates that schools have chosen to become bureaucrats focusing on production of good-looking data to defend and justify their existence. For example, there is more focus on using data to formulate targets, organise students into ability sets, monitor, and report academic progress (see figure 4.1) rather than building different talents in children. Such datafication leads to performative practices which can damage relations as discussed in section 5.3.1. According to Jeffrey (2002), performativity affects teacher relations at three levels: with colleagues, with students, and with inspectors.

First, datafication damages teachers' relations with colleagues. Datafication as an element of performativity has created self-discipling teams (e.g., SLs and MLs). These disciplining teams marginalise individuality, stratifies collegial relations and creates subjugator-depersonalised relation between teachers and colleagues. Like had been reported by Jeffrey (2002) teachers have to account to SL and MLs for student performance against targets prepared by SLs. Lesson observations are also conducted to confirm teachers' competence in class. In one instance, a music teachers' contract had to be terminated for poor outcomes in lesson observation and student outcomes (see section 4.6.3). Such performative practices carry the potential to damage relations between teachers and their senior colleagues. Indeed, performativity produces varying effects on individual teachers

(Cain & Harris, 2013) which again seem to create tension in teacher-teacher relations. For example, as teachers shift focus to datafication or performativity, some suffer negative emotions. SL 3, for example, expressed annoyance and frustration when people do not meet data deadlines which might undermine relations (see section 4.7.6). I will revisit this in section 5.3.6.

Second, teacher-student relations also suffer as datafication takes root (Ball, 2017; Jeffrey, 2002). That is, as students are reduced to quantitative data (e.g., targets), the humanistic relations between them and teachers is undermined because teachers then switch focus from students to data. This is evident in this study where relations between teacher and student is distanced by the formulation of targets for students based on SATs data long before they arrive. This suggest that students are treated as data points by SLs such that students are viewed as objects brought into school to meet some pre-determined performance requirements rather than being seen as human beings. Data is also used to group students according to productivity (e.g., into ability sets) and to move them between sets with little regard to their humanity and feelings. All these sorting practices are traits of performativity (Ball, 2003; 2015; Lyotard, 1984) that can undermine teacher-student relations. In such instances, little room is given to understand the talents and needs of the child. In this regard, Jeffrey (2002) noted that 'care for the child is now mainly about 'those standard assessments tests results' (p. 536). Students subjected to such data treatment sometimes feel exploited. A study by Hutchings (2015), for example, found that with too much focus on data, students felt reduced to a statistic- jumping through hoops for the benefit of others. Albeit this focus on data, some pastoral-MLs in this study, probably due to their roles, tried to maintain humanistic relations with students by trying to understand children beyond the numbers.

Last, performative demands also undermine teacher-inspector or teacher-government relations. This applies mainly to the SLs and MLs in the state school (See section 4.76). In this section, some SLs report the frustrations of being forced to comply with certain data use demands they do not agree with (e.g., targets). Furthermore, due to government demands, teachers' workload has increased with datafication leading limited time to engage with data and prepare for lessons as reported elsewhere (Robert-Holmes & Bradbury, 2016; Wrigley & Wormwell, 2016). The SLs and MLs mostly experience unreasonable workload trying to collect, analyse and present data to relevant authorities. This played out with some teachers expressing being overwhelmed by data demands from colleagues and external agents (See section 4.7.6). With this finding, Murray's (2012) argument that performativity 'has resulted in an increased workload through the often-non-negotiable participation of teachers in

government audit procedures and inspection regimes' (p. 21), is confirmed. These practices and demands portend lack of trust which indeed is impacting negatively on the relations between these teachers and the government.

To minimise the focus on datafication, Hazell (2017) proposes that teachers consider the purpose for which they collect data, collect the least amount of data to achieve a purpose, and re-use data (if appropriate). I agree and add that schools ought to focus on students and that is what should give them data (i.e., focusing on data quality over quantity). The problem with datafication in this study is the superficiality employed in the practice which is our next crucial finding.

5.3.3 Superficiality in data collection, interpretation and use

There is considerable evidence of superficiality in the manner teachers collect, analyse and use data at all levels. Superficiality is brought about by standardisation practices in the schools, all of which are elements of performativity (Ball, 2017; Troman et al., 2007; Lyotard, 1984). Below I discuss the superficial use of data by the teachers right from data collection, analysis to use.

5.3.3.1 Data collection

There is superficiality in data collection and the nature of data these schools collect. Significant amounts of raw scores data (numbers) is collected rather than its quality. I have discussed this in the section 5.3.1. Mostly the raw scores of quantitative data collected to represent students such as a1, a2, a4 and others are not very useful but superficial information. Such data have breadth but lack depth. For example, the raw scores helped teachers identify student who are not engaging with homework in school 4 (see section 4.5.4) or misbehaving (in case of behaviour points) but did not tell teachers why students were not engaging or misbehaving. Therefore, it is reasonable to argue that the raw scores provide teachers a superficial understanding of their students and what is going on. Useful information would be, for example, a Maths subtopic for students to work on. But such data is not emphasised because they would not allow for comparison and identification of children to be spoken to.

The superficiality in data collection is probably perpetuated by a lack of clear and shared data use goals and vision in the schools (see section 4.7.7). SLs at least understood their schools' data use visions more than teachers. A lack of shared vision and goals for using data might have also led a

focus on raw scores evident in this study, some of which teachers did not need but adds to their workload. This finding aligns with Schildkamp et al. (2012) and Wayman et al. (2012) both of which reported a lack of shared data use vision in schools. As suggested by Schildkamp et al. (2012) schools need a shared data use vision and goals which focus on collecting useful quality data relevant for their school improvement needs. Of course, some schools may find this challenging in the context of high-stakes accountability requirements. But again, making clear the goal and vision for using data might not only steer schools towards collecting reasonable amount of useful data, but also give them more time to focus on what is important (i.e., teaching and the child).

5.3.3.2 Data interpretation

There is also superficiality in the manner English teachers interpret data. Teachers mainly use criteria-referencing and norm-referencing to interpret data both of which are superficial approach to data interpretation (see sections 4.23, 4.32, 4.42, 4.52, 4.62). For example, in school 1 norm-referencing is used to rank students based on performance and the last 10 are always talked to regardless of their performance. The schools also use norm-referencing to set targets for children based on SATs data whereas criteria-referencing is used as benchmarks for data interpretations (Fulcher & Svalberg, 2013; Sadler, 2005). Approaches such as data triangulation which can provide a more depth and complete understanding of students are rarely used (see Table, 4.3). Consequently, these teachers end up with a superficial or snap-shot understanding of students.

Also, the fact that most teachers in the study do not understand the distinction between normal distribution curve with criteria-referencing interpretations further demonstrates this superficial understanding of data. Moreover, the pros and cons of using normal distribution and quantitative data such as targets is not fully understood. Alternatively, it could be that teachers have ignored these probably due to pressure on them to produce good examination results. Teachers' complaints about increased workload, inadequate training and inadequate time to engage with data might also be other reasons behind teachers' superficial interpretation of data. It is possible that because criteria-referencing permits use of technology (i.e., SIMs), English teachers preferred it because it significantly reduces their workload. Using technology, English teachers are able to quickly interpret students' progress data as above, on or below targets by simply observing the flight paths (blue lines) in SIMs or by using computer spreadsheet. The use of criteria-referencing and norm-referencing to interpret data in English schools can thus be viewed as links to teachers' expectations and beliefs.

Teachers' thinking and interpretation of data in English schools is shaped by the external context (see figure 4.2). For example, data interpretation seems to be shaped by policy on what teachers are going to be judged on. High-stakes accountability policies of standards and reporting (Courtney, 2014; Perryman, 2006; Wrigley & Wormwel, 2016) thus orient teachers to the use of criteria-referencing and norms (also see figure 4.1). Such policies determine what the system wants, what the school wants and what it can do. Continuous reporting of progress, for example, might orient English teachers to criteria-referenced interpretations because it is easy to prepare, and report as compared to approaches such as triangulation which is time-consuming to conduct.

Therefore, it is reasonable to argue that the use of criteria-referencing interpretation by English teachers might be by design. This might be teachers' response to the performative context under which they operate. As noted widely, performativity renders judgments, measurements and comparisons (Ball, 2003; Lyotard, 1984; Perryman, 2006) through a technology of accountability. These teachers are operating under a technology of accountability. Most of the accountability policies they operate under are geared towards objective measurements (Ball, 2003). Hence, these teachers might be using criteria-referencing and norm-referencing to bring openness and objectivity into their data interpretation processes. By grading students' behaviour, for example, these teachers aim for objectivity. However, when data interpretation is reduced to a superficial-snapshot objective activity, there is every reason to worry about the use to which these data are put. This is because meaning precedes and influences use (Spillane & Miele, 2007). According to Masauthegen et al. (2018) and Werler and Faerevaag (2017), simplistic interpretations of data may carry unintended consequences such as distorted judgments which can neutralise school improvement efforts.

Criteria-referencing and norm-referencing interpretations although preferred by teachers, also portend some unseen dangers. They may limit teacher interpretations and professional judgment beyond the criteria and norms, hence, may be flawed. Psychologists call this flaw, 'confirmation bias' (Nickerson, 1998), in which people try to fit new information into established frameworks of thinking (Spillane & Miele, 2007). This might explain why confusion reigned teachers' interpretation of the new GCSEs. The change of GCSE grading from alphabet A-F to numerals 1-9 left many teachers struggling to interpret what each numeral means in their students' data. This is fascinating owing to the fact that teachers felt they lack permission to question the implementation of policy. Instead what they asked is how to do it. In their struggle to interpret the new GCSEs, the teachers appeared to overlook the fact that criteria and norm interpretations do not capture the full complexity of a

students' learning and behaviour. Rather, it is simplistic, lacks details, and can lead to distorted decisions (Sadler, 2009) because it may prevent teachers from looking for the unexpected in data. Such undermines teacher autonomy and creativity which is addressed in section 5.3.5.

Criteria and norm interpretations thus limit teachers' aspects of reality because they disregard the context from which data is generated. Every data is produced within a context which should help people to build some reasonable meaning by determining the story behind data. A failure to contextualise data interpretations is a reductive interpretation of reality which disregards the human aspects from the equation of data interpretation. The result is a mechanised process, one removed from realities of what may be going on and why. It is therefore useful to build richer meaning by contextualising and summarising data. This is what most teachers in this study overlooked except for pastoral-MLs and teachers in school 5 who tried to contextualise data interpretation in structured meetings.

Most pastoral-MLs did not rely much on criteria and norm interpretations. Rather, most of them used multiple approaches including triangulation, prior knowledge and experiences and team discussions to interpret data. This is not surprising and confirms that pastoral-MLs do not look at issues the same way other teachers do, probably because of their roles. It could be that if you are an academic-ML, you are likely to be judged in your department by how many of your students lowered the school performance by not making the right progress to passing their GCSEs. But for the pastoral-MLs, most likely they do not have a mark to say this percentage of students have come through well-adjusted although obviously it is linked to the results because the better you do pastoral care, the better students are likely to do in the exams. But again, it is difficult to quantify that. And so, there is little data-related pressure coming out of that because a lot of pastoral stuff deals with students who are in the most difficult circumstances including home life or traumatic situations. For this reason, it has fewer criteria and norms for dealing with different situations which are very subjective. Every child is different which boils down to a lot of counselling (as indicated by the pastoral-ML in school 5). But more generally, it is very difficult to predict students' situations as a pastoral leader. It is not that simple to match to criteria or standards but rather complex.

However, it is interesting that most English teachers rely little on their prior knowledge and experiences to interpret data (see Table 4.3). This finding is interesting because it contradicts those in the USA (Ingram et al., 2004), Norway (Masauthegen et al., 2018), New Zealand, (Timperley & Parr,

2009) and the Netherlands (Schildkamp & Kuiper, 2010) which reported that teachers mostly the use of prior knowledge and experiences to interpret data. Schildkamp and Kuiper (2010), for example, reported of some Dutch teachers who argued that 'years of experience was enough'. Possibly, English teachers are reluctant to admit use of prior knowledge to interpret data. After all, the fact that teachers did not receive data use training (see section 4.7.7) suggests that they might be relying on their experiences and prior knowledge to interpret data. Alternatively, it could be that the English schooling context is too standardised to the extent that there is little room to use prior knowledge and experiences to interpret data. The pervasive use of SIMs technology to aid data interpretation in the English schools clearly demonstrates such standardisation. The danger with this is an increased detachment from human experiences (i.e., being more objective rather than subjective). Here, the danger arises from the fact that data and technology do not speak for themselves, and teachers may not see that.

But again, teachers who exclusively use prior knowledge and experiences to interpret data may miss the unexpected interpretations that data may offer (Omoso, 2019). Moreover, schools and students undergo changes at different points in time; some of these changes can be unexpected but a robust interpretation of data (e.g., triangulation) may reveal them. Therefore, I argue that although teachers' thinking and belief may still come into play, triangulation is necessary. Triangulation is about corroborating one data set with others in search for explanations or meaning. This is necessary because there are many factors to look at in other data in order to go beyond a superficial understanding of what data means.

There is superficial use of the DMs in English schools. These DMs are available within English schools consistent with previous research findings (Downey & Kelly, 2013; Perryman et al., 2011; Schildkamp et al., 2014). However, whilst the English school DMs are deputy headteachers appointed to administrate data in addition to having other responsibilities in the schools (Downey & Kelly, 2013), the Dutch ones were not (Schildkamp et al., 2014). According to Schildkamp et al. (2014), the equivalent of DMs in the Dutch schools only made occasional visits to support the Dutch school leaders' work with data. Thus, the DMs' function generally is administrating data. This adds to the theme of superficiality in their roles since they hardly support data use to improve classroom teaching but rather SLs. Possibly, teachers rarely consult DMs because they are not subject experts or simply because sometimes it is difficult to change what people think, or who they want to consult

about the meaning of data. Nevertheless, some teachers in school 2 utilised the DM to support data interpretation but at superficial levels to determine student performance compared to others.

There is need to reduce superficiality in data interpretation by English teachers. I argue that generally, teachers need to know more about how to interpret data than they do currently. For example, they need to know the distinction between norms and criteria interpretations. Also, teachers need to know that data interpretation by all standards is complex, relative and has gaps involved. It is complex because the problem with data is that data is data. It does not provide absolute truth but the picture behind it, is what is important. Therefore, there is a risk of teachers not seeing the whole picture when they only stop at criteria. For example, to say, 'this child is a 2 in Maths and not noticing that the same child may be a 4 in Geometry topic or in playing piano, is a reductive interpretation of data. My position is that there has to be some kind of interrogation by neutral parties alongside the use of criteria. In high-stakes accountability, dialogue on data is crucial because temptation can be high for teachers to say students are good in something when they are not. So, as a teacher one looks good because the scores are good. But then, that is where dialogue-based moderation via triangulation is needed to check on the inflation and deflation of data. This interrogation of data alongside the use of criteria is evident in schools 2 and 5 (see sections 4.32 and 4.62) and perhaps, makes these schools a bit human. Much as data interpretation in meetings is time-consuming, they enable teachers to dig out stories behind numbers and should be encouraged.

To support teachers' abilities to interpret data, perhaps the English government needs to prepare teachers with the skills needed to interpret data. There is also a need to consider reducing excessive data demands on teachers as this clearly leads to workload problems and superficial interpretations of data. Apart from interpretation and collection, there is also superficiality in the ways teachers in this study use data.

5.3.3.3 Superficiality in data use

Schools and teachers in this study are also superficial in the ways they use data. Data is merely used to formulate targets, set and quantify students, as well as to monitor and report progress.

As I mentioned earlier, data is used at superficial levels to diagnose issues such as monitoring and reporting progress rather than to adapt teachers' teaching methods and activities (Wieman, 2014). There is also sorting and use of numbers to represent many aspects of students' life. Moreover,

teachers (especially in state schools) are less reflexive of data (see sections 4.2.5, 4.3.4, 4.4.4 and 4.5.3). Rather, they used data to talk to students or to provide for some needs of the SEN students. For example, giving coloured papers or allocating front seats to short-sighted students. There is little evidence to suggest that they use data to do something sophisticated other than these. Similar findings have been reported in other countries (Omoso, 2013; Schildkamp et al., 2014; Vanhoof et al., 2013; Wayman & Jimerson, 2014). A study by Schildkamp et al. (2014) across five European states (including England), for example, found that teachers used data at a superficial level to monitor progress rather than to improve teaching. Wayman and Jimerson (2014) in the USA also reported about teachers who were ill-prepared to use data to inform teaching. A lack of training and accountability demands (Perryman et al., 2014; Robert-Holmes & Bradbury, 2016; Schildkamp et al., 2014) might be contributing to teachers' superficial use of data. A teacher lacking data use training, for example, might be unaware of how to utilise data to adapt their teaching. Obviously, using data to improve teaching can be challenging for many teachers because it requires a deeper understanding of data in relations to complex issues surrounding teaching and learning (e.g., student home situation) as compared to using data for progress monitoring. This is not to say that monitoring of progress is not useful. It can be useful (e.g., in early detection of problems) for interventions. However, this is just but the first step to using data for improvement. There are other steps such as implementing and evaluating the success of interventions through data (Poortman & Schilkamp, 2016). Therefore, monitoring of progress with little impact on teaching methods and activities presents a superficial use of data. This is in my opinion, where training becomes the missing link that if exploited, might increase teachers' reflexivity and use of data to improve teaching. This is reflected in the superficial use of sorting, use of sets and excessive use of numbers by the schools.

Categorising students into ability sets although superficial are traits of performativity. Teachers in this study use CATs data to set students by ability (see Table 4.4 and 4.5). Numerous research show that teaching in sets is a dominant practice in English schooling (Archer et al., 2018; Cahan et al., 1996; Dar Resh, 1994; Francis et al., 2017; Higgins et al., 2015; Ireson et al., 2005). The studies reveal that the majority of English schools set or group students for learning in the core subjects (Maths and English) according to some measure of prior attainment. In this study, CATs data are used to set students (see Table 4.4 and 4.5) consistent with (Francis et al., 2017; Wilkinson & Penny, 2014). The study also shows that all schools teach in sets particularly in Maths whereas school 2 also sets in English. Elsewhere, Farrell and Marsh (2016) found that common grade assessment data were most often used by teachers in the USA to set students. Various arguments have been advanced for use of

sets such as differentiated pedagogy, stretching the most 'able' and supporting struggling students (Slavin, 1990). The evidence from this study, however, shows a superficial use of sets.

First, schools use snap-shot data from CATs to set without realising that such data might not necessarily reflect the ability students (Dunne et al., 2007). Although setting by ability can stretch the most 'able' and permit support for struggling students (Slavin, 1990), there was little evidence that teachers did this. This depicts superficiality because in the same class, it can be challenging to stretch and challenge the more able without disappointing the less able students. Moreover, teachers associate sets mostly with differentiating students into low, middle or high ability and providing extra classes to 'low ability' students as previous research confirms (Cahan et al., 1996; Dar Resh, 1994) but not change of pedagogy. Another superficiality behind sets is evident in its use as a mere tool for activating competition. Second, some teachers assume that differentiating students by ability would automatically motivate them to compete and engage better in their own learning to improve performance. For example, rather than improve classroom teaching, a CT in school 5 reported that students who constantly underperformed were dropped a set, and those who consistently surpass targets got promoted to the next set. And if a statement by a ML in school 1 that underperformance by lower ability students is not a cause for worry is anything to go by, then sets might just be another fancy language for educational 'triage' (Gillborn & Youdell, 2001) in the schools. These are typical examples of performativity used to categorise students based on productivity while targeting for exile those who do not reform themselves in the image of the market (Ball & Olmedo, 2013). Finally, teachers superficially seem to assume that in sets, students' ability is fixed and that there is little or no variability of ability, which may not true.

Ball (2003) argues that in performativity, performance is everything. Schools in this study might be setting with the hope to maximise student attainment. But again, research evidence shows that setting has little if any in terms of students' outcomes (Higgins et al., 2015; Ireson eta l., 2005). Although this study did not focus on students, it is worth noting that studies (Archer et al., 2018; Higgins et al., 2015; Ireson eta l., 2005) show that setting is harmful to students. Higgins et al. (2015), for example, reported a small achievement gain for top sets but the reverse for students in the bottom sets. This means that sets harm and disadvantage students in the bottom sets. This is a pointer to class inequality mentioned by Ball (1998) and Archer et al. (2018) who argue that students in the bottom sets mostly come from the working-class families. Ireson and Hallam (1999) also associated

ability-setting with negative self-esteem, negative attitude towards school and a feeling of alienation among students.

Despite research evidence showing that sets carry negative effects and has little impact on student attainment, these schools continue using it. The reasons why English schools continue to implement sets contrary to research evidence are captured in the literature. Studies (Francis et al., 2017; Wilkinson & Penny, 2014) found that ability-setting in English schools is brought about by the pressure on schools from the government and parents to raise attainment in Maths and English. The pressure from parents is basically out of parentocracy (Davids, 1993). For example, it was found schools feared that parents would perceive schools that use mixed-sets as 'unconventional' and as a result avoid them (Archer et al., 2018; Francis et al., 2017). So, setting is directly linked to performativity agenda and these schools are not left out in utilising sets. This might further indicate that performativity indeed limits creativity and risk taking (Ball, 2017). Clearly, these teachers out of performativity fear to try something new for fear of failure or how others (e.g., parents) would react. Also, teachers (especially those in state schools) seem worried about being measured on progress 8 to the extent that they fear trying something new away from using SATs to set targets for students. My opinion here is that rather than set students, teachers could instead provide variety of activities during teaching to cater for both the slow and fast learners without appearing to marginalise others according to ability.

Out of the fear which undermines creativity, there are some interesting things going on in state and private schools in England. Unlike the state schools, the independent school 5 has some freedom on what it can do and teach. For example, it intends to abandon the use of sets and targets in order to cultivate Carol Dweck's growth mindset in students. Growth mindset (Dweck, 2006) is a strong belief that intelligence is not fixed, but dynamic, and can develop over time. Probably school 5 is turning to evidence-based practice guided by research evidence. An explanation for this is that the independent school has more freedom to choose what it does in terms of data than state schools. The school is accountable in a different way but not to the state since it is not inspected by Ofsted but by an independent body (see section 4.6.1). The school is more accountable to parents who pay fees and that gives it some level of freedom in terms of what it can do and teach which state schools cannot. Also, school 5 intends to abandon sets and targets and do that in the context which research suggest is a better way which children are going to learn (i.e., growth mindset). The school does not seem to worry about what comes in from KS2 SATs data (see section 4.1.1). State schools, however, lack such

freedom to choose because the accountability is heavily laid on them and they must have data that show continuous improvement. This finding is evidence that there are interesting things going on in the private sector that are not accessible to all children and there are equally interesting things going on in the state schools that are consumed with regulatory experience. This finding is fascinating considering that Stephen Ball's writing mainly discusses performativity in the public sector.

Expressing students' behaviour as behaviour points by schools also reveal some superficial use of data. Behaviour points are linked to certain standardised punishment e.g., detention. The practice implies that teachers have a superficial understanding of students. Numbers oversimplify complex issues such as behaviour to standards that in most cases fail to capture the reality. Also, numbers do not take into account the human factors and therefore overlooks the humanity and diversity of students. Furthermore, behaviour is about complex relationships and factors such as home situation, peer pressure, difficult content, poor teaching and others. Teachers' understanding of these in the study seems narrowed by the use of behaviour points. This is fascinating because it makes little sense to reduce a complex issue such as student behaviour to mere numbers. Performativity, however, makes these sensible and valued by the teachers. Ball (2003) notes, that performativity not only orient people to measure what they value but also come to value what they measure. Here, teachers measure what they value (i.e., behaviour) and value what they measure (i.e., behaviour points). It is possible that these schools assume that the more they measure students in different parameters, the more they change it and the more they impact on students' education.

There are other three elements of superficial use of data in the study. First, there is a possible assumption by SLs in the public schools that assigning targets from SATs long before students arrive is enough to incite students and teachers to learning and performance. Second, teachers seem to assume that poor behaviour is a barrier to performance, which is not entirely true. Probably the system encourages teachers to look at poor behaviour as a barrier to performance. Last, some teachers in school 1 and 2 seem to assume that students fail because they are not revising or adding effort at home.

All the above superficial uses of data may be attributed to the inadequate data use support in the schools. The schools struggled with similar data support challenges such as rare data use training especially for class teachers. Downey & Kelly (2013) reported similar findings which showed a low frequency of data use training for class teachers and middle leaders. Lack of training may hinder data

use by English teachers since training is essential for effective use of data (Lee et al., 2012; Levin & Datnow, 2012). Low funding due to austerity measures instituted in 2010 (West & Bailey, 2013), might be responsible for low training opportunities for teachers. Second, although almost all respondents indicated inadequate time to use data, the study found schools 5 and 2 creating some time for teachers to use data. The finding by Ikemoto (2007) suggests that schools that create time to use data pursue complex data use processes through which they take data-informed actions for school-wide improvement. This takes us to the next crucial finding.

5.3.4 Data collection as a form of surveillance

5.3.4.1 Monitoring and reporting

Schools collect data as a form of surveillance. Surveillance itself is one element of performativity employed through systems of monitoring and reporting of information (Ball, 2017: 2003; Courtney, 2014; Lyotard, 1984; Perryman, 2006). Thus, surveillance is a disciplinary policy with procedures and practices (Hope, 2005: 2010:2016) of control and dominion (Page, 2017; Perryman, 2009; Perryman et al., 2018; Piro, 2008). As OECD (1995) puts it, it is demonstrated by the changing roles of management in the environment of performativity which rests on 'monitoring systems' and production of information' (p. 75). This is what Ball (2003) refers to as the terrors of performativity.

This study shows that data is collected continuously, recorded and published as a way of monitoring performance of schools and individuals. Schools mostly collect data to monitor and report student progress at least every 6-7 weeks- a form of surveillance. Previous research (Bradbury, 2014; Courtney, 2014; Downey & Kelly, 2013; Perryman et al., 2011; Schildkamp et al., 2014; Robert-Holmes & Bradburry, 2016; Wrigley & Wormwell, 2016) confirms this. Downey and Kelly (2013), for example, found that English secondary schools mainly collected attainment and progress data for holding teachers accountable and for assessing teacher, student and school performance. The widespread monitoring of progress by English teachers can be attributed to a government accountability measure called progress 8 (DfE, 2016). Progress 8 measures the progress made by students in state schools with reference to their primary school test scores (DfE, 2018). These schools monitor progress to ensure no one falls behind in terms of progress (including the independent school which is not subject to progress 8). Also, SLs prepare traffic-like colour-coded spreadsheets to closely monitor student performance and to gauge teacher performance in class. Other forms of surveillance through data are depicted in classroom observations of teachers to check

on teaching, monitoring of student behaviour and attendance lesson by lesson or hour by hour. This means individuals are surveilled frequently through different data collection points. The study also shows that schools give equal importance to monitoring of students' Progress Attendance and Behaviour (PAB). This seems more sensible because if teachers focus on progress alone, then it is like saying that progress is important than behaviour and attendance, which should not be the case.

As evidenced in the study results (see chapter 4), data provides very sophisticated levels of monitoring and reporting of information in the schools. Although the information is used superficially, nevertheless it satisfies surveillance of teachers and students. For example, the monitoring systems indicate that teachers and schools are more interested in the results and what the data can show them where individuals are in terms of performance. Teachers appear to assume that by constantly collecting and tracking students' data, they are improving teaching and learning, which of course is not the case. I argue that tracking and teaching are two different things which should complement each other rather than work in isolation. That is, teacher should use tracking data to inform their classroom teaching methods and activities.

In this study, data collected facilitates external or internal surveillance (see figure 4.2). External surveillance is one from outside the school (e.g., by Ofsted), while internal surveillance is one conducted by actors within the schools (e.g., by SLs on MLs) as depicted in figure 4.2.

5.3.4.1 External surveillance

The availability of data such as inspection reports in each school demonstrates external surveillance. Occasionally, inspectors visit schools to collect data about school quality and compliance. This form of surveillance is grounded in the discourse of accountability. Results show that the schools are made accountable through inspections and assessment of students in standardised tests (e.g., GCSEs). The state schools in this study are inspected by Ofsted on different parameters including safeguarding, teaching quality, management and student behaviour whereas the independent school is inspected by an Independent Schools Inspectorate (ISI). Through inspections, schools are judged in different ways by different means. For example, school 5 was judged 'outstanding' and school 2 judged 'requires improvement'. The bottom line is both state and independent school are under external surveillance. But as teachers are surveilled by external, they in turn have put in place systems of surveilling colleagues and students at the school level. I call it 'devolved surveillance'. That is where

senior people surveil juniors who in turn surveil their juniors within the internal school environment (see figure 4.2). This results into internal surveillance.

5.3.4.3 Internal surveillance

Confirming the finding by Schildkamp et al. (2014), the main support English teachers receive is access to data and internal collaboration around data use both of which are aided by technology (i.e., SIMs). The reason why English schools make data access and collaboration within schools easy is to enable teachers track and report students' progress to SLs, parents and inspectors. Data access and internal collaboration around data in the schools is commendable because they enhance data usage (Datnow et al., 2013; Lee at l., 2012; Kerr et al., 2006; Van Gasse et al., 2017) with the potential to contribute to school improvement (Lee et al., 2012; Van Gasse et al., 2017). Teachers working in isolation can be a barrier to data use in schools.

Nevertheless, constant monitoring of students and teachers is surveillance. Ball (2003) argues that surveillance is an element of performativity. It is part of what we do rather than what we are as part of 'caring for the self' (Ball & Olmedo, 2013, p. 85). In caring of the self, we surveil ourselves and others thus becoming 'both the agent and the object' (McGushin, 2011, p. 129). For example, schools in this study employ data as a surveillance technology to monitor teachers and teachers in turn monitor students. Therefore, internal surveillance within schools in this study occurs at two levels: at teacher and student levels.

At teacher levels, teachers are surveilled by senior colleagues. The SLs not only surveil school functioning and students using surveys, but also individual teachers' performance according to students' achievement and staff appraisal data. Generally, staff attendance data, lesson observations, staff surveys and student progress data are collected in all schools and used by SLs and line managers to monitor teachers in different parameters. In this regard, schools use data and data systems (e.g., SIMs) as the 'school-based surveillance device' (Hope, 2016). But as Ball (2003) puts it, performativity implies accepting that 'these are things that we do to ourselves and to others' (p. 224). This might explain why this surveillance trickles down to teachers and students. In summary, it begins with external agents (e.g., Ofsted) and trickles down to SLs, MLs and students (see figure 4.2).

Surveillance of students is mainly done by teachers. The study shows that different data (e.g., progress, attendance and behaviour), and systems of monitoring (e.g., flight paths) are employed to continuously monitor underperforming students for conversations and interventions. The school leader also surveils students' feelings about the school using students' surveys while in school 1, students' interviews are also used. The continuous surveillance through data makes students and teachers more visible (e.g., through staff appraisal and testing systems). According to Perryman (2006) and Ball (2003), visibility of all subjects is a core trait of surveillance and performativity. Visibility is something these teachers aimed for in their data use pursuit and is evident in four data use areas: access, internal collaboration around data, pervasive testing and in the use of numbers.

First, Ball (2017) argues that performativity systems rests on 'databases and systems of recording and reporting' (p. 58). Schools have used these to increase surveillance through access and collaboration around data in schools (see section 4.7.7). Data systems and technology (e.g., SIMs) make this surveillance possible by the touch of a button. It permits continuous surveillance via tracking and reporting of students' performance by different teachers (e.g., MLs and CTS), in different parameters (e.g. behaviour) using different criteria (e.g., point system). By teachers accessing and collaborating around data via SIMs, students' surveillance and visibility are increased in terms of PAB data. Some SLs and MLs also rank students in spreadsheets and colour-coded traffic lights to constantly identify underperformers for intervention, hence, a visible surveillance without an end.

Second, it appears that progress or assessment data and reporting systems (see figure 4.1) work as surveillance tools. Tests are forms of measurements for monitoring progress and performance. A series of tests that feed to the reporting system to show teachers about students' progress via flight paths showed where individual students are in relation to where they should always be. Although assessment data are useful in enabling the student to know their progress (Young, 2006), they can also add unnecessary academic performance pressure or anxiety on students and teachers (Werler & Faerevaag, 2017). Performance pressure can be a 'system of terror' (Ball, 2017, p. 57) on students and teachers.

Finally, to enhance surveillance, schools have increased students' visibility (Perryman, 2006) using numbers. Numbers make students more legible (i.e., easy to be read and monitor). At the same time, numbers make students' outcome more predictable and accounted for in different ways (e.g., targets) through different means (e.g., flight paths). A CT in school 5 indicted that by scrutinising numbers

during MLs' meeting, there was no student who could slip through the net unnoticed'. Student behaviour is also tracked per lesson for students who misbehave and the teachers who log it are also monitored to establish who gives more behaviour points. Attendance is monitored lesson by lesson, managed and controlled. Monitoring of attendance is through electronic registration which is taken for every lesson to track who is and is not attending lessons. All these are systems of surveillance or to be specific, panoptic surveillance (Perryman, 2006) of children. Panoptic surveillance emanates from teachers' trying to use data to defend themselves when the need to do so presents itself. They do not know what inspectors will ask for when they arrive and therefore have to guard themselves with data.

But out of such panoptic performativity is another interesting aspect of what I call 'devolved performativity'. This is where the 'subject is governed by others and at the same time governor of him/herself and others' (Ball & Olmedo, 2013, p. 85). The same way teachers are policed via data, so they police the child. They use data to track children (e.g., their progress and behaviour). That is, as performative pressure increases on these teachers to perform, they trickle it down to students in almost the same way they experience it. For example, teachers in school 4 used similar judgment labels used on them such as 'outstanding', and 'requires improvement', to judge their students' engagement with homework (EWH). Whereas Marsh et al. (2016) calls this effect as 'trickle down accountability', I call it 'trickle-down' performativity. One example in this study is the formulation of performance targets for students by SLs.

Surveillance by SLs starts with the formulation of targets for students (figure 4.1). Simply put, targets seem to benefit surveillance. It appears that the data-driven targets are not about where students start to where they are getting, but rather about monitoring and surveillance. For example, targets seem to direct teachers' focus at producing the expected data from students as other data are used to identify underachieving students and teachers to target with 'interventions' to ensure everyone makes the right amount of progress. Although this appears a crude and simplistic use of data, it led to the summoning of teachers whose students do not achieve targets to explain the interventions they planned for them. Those whose students meet targets every 6-7 weeks, at least 'bought their freedom from surveillance for a particular time' (Robert-Holmes & Bradbury, 2016, p. 125). Teachers in turn surveilled surveillance students via data. Using SIMs, teachers quickly identified underperforming students in PAB data for interventions. Constant surveillance indicates that data is being used as a technology of 'indefinite discipline, an interrogation without end' (Foucault, 1977, p.

227) on students and teachers. But such surveillance might portend something going on beyond schools to the contemporary society.

The contemporary society is one of surveillance (Caluya, 2010; Hope, 2010; Piro, 2008). A surveillance society is one in which constant surveillance is becoming a norm that school find themselves in. Such is a society in which monitoring devices such as CCTVs, the internet (Hope, 2010) and data (Hope, 2016) are constantly used for surveillance of individuals and institutions. In such a society, schools increasingly become somewhat institutions of conformity, one whose built environment functions as a regulatory force for that conformity (Piro, 2008). To achieve that conformity, Hope (2010) talks of the 'hidden curriculum' or the 'surveillance curriculum' in schools. The 'hidden curricular' is one in which schools prepare students to live and conform in the present 'surveillance society' (Caluya, 2010; Piro, 2008).

The pervasive collection of data as a form of surveillance by these English schools tell us something about the 'hidden curriculum'. A curriculum which is silently preparing students to live under the 'surveillance society'. This finding confirms previous research indicating a normalised culture of surveillance in UK schools. For example, Hope (2010) reported that, 'the growth of surveillance in UK schools in the recent years has resulted in the development of what can be labelled as the surveillance curriculum' (p. 319). While describing the nature of students in a surveillance curriculum, Hope (2010) added that the 'hidden curricular' is an overt 'contemporary surveillance practice and technology that not only engage students in the discourse of control, but also increasingly socialise them into a 'culture of observation' in which they learn to watch and be watched, accepting and unremitting monitoring as a norm' (p. 319). Going by the use of data for constant monitoring of students, it can be argued that students from this system are ones being prepared 'to watch and be watched'.

Importantly, it should not be mistaken that I am against using data to monitor progress of students and teachers. In my opinion, tracking can be useful depending on how it is used. For example, it useful when done to inform teachers who are taking-over a class from their colleagues so that they know where the class and individual students are and to inform their teaching. Also, monitoring students' behaviour or attendance can help teachers to know if a child is moving towards exclusion. Such might be useful objectives of using data for monitoring. My argument here is that it is not helpful using data as a stick to hit underperformers neither should it lead to pressure or anxiety on students or teachers.

Teachers can know what is wrong with a child, not necessarily by a drop in the data. Moreover, certain things such as a change in the mood of a student may not be recorded and data monitoring may not confirm it so. Although this study shows that tracking in English schools is mostly for monitoring performance, I argue that there is a lot that contributes to performance than just tracking. There is a lot that teachers follow about children which may not get recognised by tracking. The question then becomes; how one can track the positive things that are happening that shape students' growth and learning such as motivation in addition to tracking the negative things that happen such as behaviour or a drop-in performance. Telling a student, 'I have seen you late in every lesson last month but this week you have been punctual, well done!' can be an example of tracking good things which should be encouraged because such are the kind of things which might change children.

5.3.5 Data use spreading through hierarchies

5.3.5.1 PISA influence

Datafication seems to spread through hierarchy, all the way from government to governing bodies, to SLs, MLs, CTs and students, and then all the way up again (See figure 4.2). Murray (2012) argues that 'the increase of performativity cultures is a global phenomenon which has impacted in some way on all who work in learning institutions' (p. 19). In this study datafication is influenced by external data from the OECD's international PISA comparisons which promote elevation of core subjects such as English and Maths as well as standardisation of education to focus on testing and outcomes (Gorur, 2016). This focus trickles down to the government where Maths, English and testing is emphasised at policy levels probably to promote competitiveness of English system at the world stage (Ball, 2017). For example, English and Maths subjects are double-weighted in the GCSE examinations (DfE, 2016), making them a representation of efficacy and quality of English school system.

5.3.5.2 Governance at school

Teachers in this study kept mentioning tests, English and Maths data. The schools have a strategic focus to ensure students pass the two subjects to maximise their schools' ranking in the league tables. This is not surprising considering that Maths and English are the most testable subjects in the PISA international comparisons. These teachers and schools are thus 'seeing like PISA' (Gorur, 2016, p. 600) in their use of data. Studies (Ball, 2017; Downey & Kelly, 2013; Perryman et al., 2011) have reported about this focus on Maths and English subjects in English schools as an attempt by

policymakers to align the system with other competitors at the world stage such as the Asian Tigers (Ball, 2017). The narrowing of focus to English and Maths subjects cannot go unchallenged. In my opinion, the focus might have future adverse effects on English education. The system, for example, might be pushing students to narrow career paths of English-related and Maths-related disciplines while marginalising other equally important disciplines such as history and arts. This means that in the future, certain professions like history might phase out unless reversed. Moving from PISA and the government, the next hierarchy of data use is within the schools themselves.

Data collection and access is also a hierarchical phenomenon in the schools spreading from SLs to MLs to CTs and back (see figure 4.2). Although data use by teachers has been reported elsewhere as a multi-level phenomenon (Coburn & Turner, 2012; Schildkamp & Kuiper, 2010), data collection and access has not. The possible explanations for this finding are found in section 5.1. However, the study shows that data collection and access is not only hierarchical but leads to governance via subjectivities.

5.3.5.3 Subjectivities

Studies (Ball, 2003; Ball & Olmedo, 2013) argue that performativity produces subjectivities. Subjectivities is technology of exercising control and dominion over the action and thinking of individuals. There is evidence that teachers' and SLs' thinking and action in this study is shaped by external data (see figure 4.2), hence, teacher subjectivities. Here, teacher subjectivity is being shaped by discourses of policy (e.g., double-weighting in English and Maths), as well as performativity and testing (e.g., league tables). Therefore, through data and data outcomes (figure 4.2), these teachers and students are constructed and produced rather than oppressed while at the same time they are animated rather than constrained (Ball & Olmedo, 2013). Quantitative data, of example, is used by schools to exercise control and dominion over students' autonomy. Ball (2015) calls it a 'system of governance by numbers' (p. 299) to imply that numbers enable the governing of individuals in different ways and parameters.

Governance by numbers is a common trait of performative regimes (Ball, 2003: 2015). In this study, teachers seem to use numbers to either knowingly or unknowingly change students in to governable subjects. Teachers increasingly demonstrate reverence and greater fixation to govern students' lives, worth and quality of performance through numbers (Ball, 2003: 2015; Ozga, 2008). The

representation of students as quantitative data makes it easy to govern them from an invisible point (Ball, 2003: 2015; Lyotard, 1984).

5.3.5.4 Governance by numbers

Governing by individuals or organisations through data (in this case numbers), makes it possible for teachers to govern students in sophisticated invisible ways through what I call 'devolved performativity'. Devolved performativity is where teachers under the pressure to perform, passes over that pressure to children in invisible ways. For example, numbers are used with an invisible aim of constructing and shaping students' thinking about who they are (e.g., high ability) and what they can do (e.g., meeting targets). This happens through sorting. In school 1, for example, students with a progress score of 1 are further finely ranked and differentiated as 1d (developing knowledge), 1e (extended knowledge) or 1s (secure knowledge). The use of numbers in this manner renders students rankable and comparable as a basis for improving, measuring change over time and identifying underperforming students to target with interventions. This way, competition is activated to promote performance from individuals. This confirms Ball's (2003; 2012) argument that performativity orients people to outcomes to the exclusion of everything else. These teachers are focused on pushing students to meet targets. Therefore, it can be argued that reducing students to numbers also makes them 'more politically and administratively convenient to govern' (Gorur, 2016, p. 600) from an invisible point. Such governance approach renders students more visible and auditable in different parameters (e.g., progress) by different means (e.g., use of color-codes traffic lights) by different people (e.g., MLs and CTs). For example, different teachers award behaviour points to govern students' behaviour. This way, numbers bring about a profound system of governance. For example, students with certain behaviour points knew the prescribed consequences and that every student is expected to behave well in class or else they get a detention over lunch hour. This is a case of performativity targeting for exile those who fail to reform themselves in the image of the markets and is further illustrated below.

Teachers also use data to imposed order on what sets students join depending on their abilities. Data is also used to decide which students receive mandatory intervention ranging from extra class (in school 1) to dropping down of sets (in school 5). This is governing of most aspects of students' life by numbers which can be dehumanising (Ball, 2003; 2015). This is because it not only defines the scope of teachers and students' actions according to rules made by others but also has the potential to limit

teachers' professional space and students' learning (see section on targetocracy). Numbers reduce individuals to objects recognisable as numerals such as a1, a2 and so on based on certain performance parameters which neglect traits such as creativity.

The governance by numbers is also obfuscated in testing systems the schools use every 6-7 weeks. According to Werler and Faerevaag (2017), the function of testing systems is to relay policy dominance over individuals' autonomy. For example, SLs in state schools assign targets to students based on the national SATs scores. Referring to Werler and Faerevaag's (2017) argument, targets in English schools are perhaps meant to shape students' and teachers' thinking about themselves and the expected performance. This imposes order and responsibility on teachers and students to develop ways and means for changing their performance data to meet the expected outcomes. Used in this manner, the targets from the national SATs data 'generates an illusion' (Ball, 2013, p. 66-68) to policymakers and SLs that it is possible for teachers and students to accomplish expectations demarcated by others. This means the teachers' and students' work is dominated and controlled by centralised decision-making organs (e.g., SLs). Werler and Faerevaag (2017) calls this, 'relative teacher professionalism' (p. 76) which undermines these teachers' autonomy.

5.3.6 Teachers' positive and negative responses to data use

Studies (Ball, 2012; Ball & Olmedo, 2013; Cain & Harris, 2013; Perryman et al., 2011) show that teachers respond differently to performativity. In a similar fashion, teachers in this study are responding to performative data use practices in three ways: majority comply, others comply but cynically, and a few refuse the focus on data as explained below.

5.3.6.1 Compliance

Most teachers comply with performative data use practices in their schools. They demonstrate compliance in their actions and thinking with regard to how they respond to performative requirements. As Peck and Tickell (2002) neatly puts it, neoliberalism and by extension performativity, is both 'out there and in here'. It is out there championed by external agencies like Ofsted but also in here in the soul and mind of teachers, realised and made apparent through mundane and immediate practices of everyday life (Ong, 2007).

Some teachers comply with external data use requirements as evident in their actions. Compliance here means accepting and owning practices as useful to the extent that you become to believe in them. As Perryman (2006) observes, compliance ensures that individuals perform the normal and practices reflect the expected performative discourse. Some teachers in this study demonstrate compliance by the manner in which they accept inspectors' recommendations and data collection demands for performances. For example, by using inspection reports to inform and focus on Areas for Improvement (AFI), all SLs demonstrate compliance to performative data use demands such as challenging the most able students through CTAGs. This is probably because they are the policy implementers at school levels. SL2, for example, indicated that they would prioritise good grades in Maths if and when recommended by inspectors (without question). Also, whilst SL 1 perceived his job to be that of generating targets for children (see section 4.2.4), most teachers across the schools perceive their role to be that of collecting data and tracking students' progress as inspectors recommend (see section 4.1.1).

Compliance to external data use demands is also evident in the thinking of some teachers. It is evident that these teachers are trying to please their superiors. They use the language of performativity (e.g., outstanding) and begin to believe in them. According to Ball and Olmedo (2013) performativity 'works best when we come to want for ourselves what is wanted from us, when our moral sense of desires and ourselves are aligned with its pleasures' (p. 89). Most teachers in this study use OfSted's regimes of truth like 'outstanding' to define their schools, their performance, and that of their students' productivity (e.g., see section 4.5.4, 4.6.3 and 4.76). Some like the ML in school 4 and 5 felt happy with achieving 'outstanding' with their students. Indeed, 'performativity is not in any simple sense a technology of oppression; it is also one of satisfaction and rewards, at least for some' (Ball, 2012, p. 31). Some teachers like the performance labels from data when good (see section 4.7.6). Most teachers felt that their role is to change students' data to look 'good' as the system requires. Indeed, performativity 'does us' (Ball, 2012). It speaks and acts through these teachers' language, purposes, decisions and social relations. These teachers' compliance has reached appoint where external pressure to collect and use data is no longer needed. Rather, they feel obligated to collect and use data as required by authorities and schools. These teachers are not alone in their actions and thinking. Studies (Ball & Olmedo., 2013; Perryman, 2006; Perryman et al., 2006; Robert-Holmes & Bradbury, 2016; Wrigley & Wormwell, 2016) also found some teachers complying with external data use requirements.

Ball (2012) states that 'performativity works best when it is 'inside our heads and souls' (p. 31). It seems teachers' compliance with some of the inspectors' data use recommendations no longer require external pressure or questioning. Rather, they have become a culture deeply rooted in these teachers' heads and souls' making it the 'the new common sense, something logical and desirable' (Ball & Olmedo, 2013, p. 87). That is, data use although incited by external agents (e.g., inspectors), it has become what most English teachers carry out willingly. Kilderry (2015) and Perryman (2006) describe this state of compliance as 'performativity normalised'. That is, teachers and schools have normalised data collection, tracking and reporting of students' progress into their everyday practice and thinking. But at the same time, this compliance opens new spaces for struggles and cynical compliance. As the study shows (section 4.7.6), some teachers are struggling with performativity as it works to define what they do and what they do not want to become (Ball & Olmedo, 2013, p. 88). This is challenging as these teachers cannot avoid the practices they do not believe in. As a result, some of them resort to cynical compliance over mundane data use demands.

5.3.6.2 Cynical compliance

Apart from complying, some teachers only comply cynically to the data use demands they do not believe in. Cynical compliance is doing what you do not believe in merely to impress or be seen (Bradbury, 2014; Perryman, 2006). It is basically a reaction when teachers as ethical subjects, 'find their values displaced or challenged by terrors of performativity' (Ball, 2003, p. 216). I see it as teachers' reaction to what they know is faulty in the manner data is used but are helpless to confront it because of powerful agents who drive it. Cynical compliance thus is mainly a reaction to data use requirements that are driven by external agents such as government, parents and inspectors (See figure, 4.2). Teachers' mistrust of SATs and inspections demonstrate this cynical compliance.

First, most teachers in state schools are cynical about the value and reliability of SATs data but still collect it because they are judged by it. These teachers are not alone. Marshall and Brindley (1998) had previously reported similar results while studying transition in English subject teaching between KS2 and 3 in England. The study showed that a majority of secondary teachers did not view SATs as 'useful information' (p. 127). Instead they preferred to use a portfolio of pupil's work as opposed to using SATs. Elsewhere (Werler & Faerevaag, 2017) found Norwegian teachers evaluating national tests as a professionally non-reliable source of information. Mistrust of national tests data such as SATs might mean teachers are sensitive to that which may undermine their professional power. It

may also mean the teachers value their experiences and beliefs as a source of reliable data as opposed to data generated by others. More generally, the teachers are voicing the fact that data never provides an absolute truth, is a simplistic representation of individuals and therefore, needs to be used with caution. But under pressure (Marsh, 2010; Marsh et al., 2006), state schools are forced to collect and use SATs data which they regard as unreliable and uninformative because the government judges them by it. The state school teachers like their Norwegian counterparts, 'had to use the test results to improve learning outcomes even if the test system itself is unable to deliver the necessary data' (Werler & Faerevaag, 2017, p. 67). Here, SATs data seems to replace what is important such as teaching with what is measurable (i.e., targets).

The mistrust of SATs might demonstrate a lack of cohesion and transition in the English system. The secondary teachers seem not to trust the system they are operating in. They are in the best position in the system to see what data use does and are articulating what is wrong with the collection and use of data from primary schools. They felt that SATs do not tell them the true ability of children because primary schools 'game the system' for production of 'good' test results rather than teaching the broader curriculum (see sections 4.1.1, 4.2.4, 4.7.1 and 4.7.6). Such simplistic reductions do not work (Ball, 2017), but interestingly, these secondary school teachers carry on doing it. They even quantify students' behaviour which suggest their belief that data tells them the truth even though they know it provides very limited information. This is an example of how performativity has had 'a reductive effect on the provision and schooling experiences…as curriculum width is reduced to ensure the enhancement of test scores' (Lingard et al., 2013, p. 553).

Last, cynical compliance is demonstrated by a CT in school 5 and a ML in school 1. The CT mentioned that although he did not believe in targets, he had to include it in students' reports because parents wanted it. A ML in school 1 also gave an analogy of 'holding the steering wheel perfectly' as a way of impressing inspectors after which they 'drive the way they want'. The teachers seem to have noticed some flaws with the target-setting and SATs data that they work with. But performativity does not provide room for caring or for debating such flaws. Here, the option performativity provides is only to follow its script in working with data (flaws notwithstanding). These teachers are clearly undergoing what Kilderry (2015) refers to as 'performativity consolidating' where the teachers are struggling to acquaint themselves with new forms of performativity they do not believe in. Consequently, they comply with its demands but cynically. Since cynical compliance goes against teachers' beliefs, it can undermine teachers' professional autonomy living them with little room to be

creative and think for themselves (see section 4.7.6). With time, performativity consolidating might or might not become normalised and embraced by these teachers. Apart from compliance and cynical compliance to certain data use practices, some teachers resisted it.

5.3.6.3 Teachers' resistance

Resistance is a form of struggle with the self from forms of performative control and subject to data measures (Ball, & Olmedo, 2013; Perryman, 2006; Perryman et al., 2011). As Ball (2003) notes, 'the ground for such struggles is often highly personalised' (p. 216). A ML in school 3 and a CT in school 5 struggled against the focus on data (see section 4.7.6). The ML indicated that she prioritises her teaching over production of data whereas the CT in school 5 questioned the logic of collecting some data that were of little use in the classroom. I call this resistance because it is a struggle with one self over what kind of self these two teachers want or do not want to become. The teachers are resisting to be that sort of person that is being rendered and produced within the regime of data. The two teachers have become a self-struggle, resisting against mundane practices which constantly incite them into the regime of data and to be people who respond to the demands of performance. Obviously, resistance to follow performative demands can bear risks upon teachers' existence in schools. In my opinion, such risks may include damaged relations (Ball, 1998), demotion or dismissal from the job. These two teachers are taking a huge risk to defend their belief and by extension, their professional autonomy although it is also possible that what they said to me is not what they say to their managers.

These teachers resist performative data use practices because of its negative impacts on teachers and students. Teachers indicated that some data use increases workload and undermines their professional ethics. Increased workload arises from collection and analysis of large amounts of data (see figure 4.2). Such increased workload as Lyotard (1984) noted, generates negative emotions such as stress similar one reported by some teachers in this study. The study shows that performative data use practices affect the well-being of some teachers due to stress particularly for the academic-MLs who crunch data every day. The stress occurs whenever teachers are required to input or prepare the data for reporting purposes (see section 4.7.6). The use of targets from SATs also generates anxiety, frustrations and depressions in some teachers due to the increased pressure to perform.

5.4 CONCLUSION

This study explored in-depth, how teachers interpret and use data within English secondary schools. The study shows that most student-related data are quantitative; that there is shifting of focus from teaching to datafication, and that data is collected as a form of surveillance. There is also superficiality in data collection, interpretation and use; that data collection and use is hierarchical with teachers responding both positively and negatively to data use. Results also show that sometimes, too much data is collected which might not be useful or even used for improving teaching and schools but adds to teachers' workload, induces anxiety and undermines teachers' professional ethics. In terms of data collection, the evidence suggests that the independent school is less constrained in data use than state schools. On data interpretation, teachers mainly rely on norm-referencing and criteria-referencing to interpret data. Without clear norm-referencing or criteria-referencing, English teachers struggle with interpretations. I argue that overreliance on norm-referencing and criteria-referencing might limit teachers' critical reflexivity when drawing meaning from data. Otherwise, the implications of the study findings for policy, practice and research are discussed.

5.4.1 Implications for Policy

Accountability regime such as Ofsted inspections seems to shape data collection, analysis and use in schools. There is 'datafication' in English schools with teachers spending a vast amount of time collecting, recording and analysing excessive attainment and progress data within the schools. Consequently, schools have invested heavily in data tracking systems, with Ofsted in mind. Going by this evidence, a 'thin data, thick use' policy (Mausethagen et al., 2018), might promote a more intelligent collection, analysis and use of data. This means collecting only the needed data and making use of it as opposed to collecting volumes of data which are sometimes not used but adds to teachers' workload and limits their time to prepare adequately for lessons. A 'thin data, thick use' strategy may be achieved by problematising data collection to make it more meaningful and targeted by, for example, re-thinking about which data needs to be collected, when and why. Thin data thick use strategy might help ease accountability demands. This might enable state schools to do as the independent school is already doing in terms of a more intelligent use of data to support growth mindset in students' learning (see sections 4.6.3 and 5.3.3.3). The strategy might also minimise a lack of collaboration among school around data use (see section 4.7.7). Borrowing from West et al. (2011), accountability should focus more broadly on a variety of processes and outcomes, not just

performance measures. The accountability regime in England, however, seems to emphasise on market and hierarchical accountability, and less of participative accountability where schools collaborate around data use. A greater focus on participative accountability might foster a less individualistic approach to data use and a greater collaboration around data use among schools.

Also, whilst Ofsted inspection gives weight to a school's internal data such as exam results and performance measures, a newly proposed Ofsted inspection draft framework of 2019 does not (Osfted, 2019). The draft considers internal school data unreliable and diverts teachers' time away from education. The new School Inspection Handbook draft for 2019 (Ofsted, 2019) thus focuses on curriculum and overall quality of education that a school provides and proposes that inspectors find as much evidence as possible from observing lessons, looking at children's work and speaking to teachers and pupils (Ofsted, 2019). The new school inspection handbook suggest that inspectors will ignore the tracking systems that schools have heavily invested in. As per the evidence from this study, it is possible that this intended shift of approach to inspection will hardly change schools' practices, particularly those to do with teachers' ability to use data to support teaching. Next, I address implications of the study findings to practice.

5.4.2 Implications for Practice

This study has found various legitimate reasons for collecting and analysing data but in general, data is not well handled. It seems that schools in this study do not take a research and development approach; for example, trialing innovations in a way that includes collecting data pre- and post-innovation. More training for all staff and access to trained statisticians might help schools identify genuine problems better.

Although teachers do not treat children as data, the study suggest that some SLs do. Representing students as quantitative data may be useful for comparisons but leads to superficial understanding of children. For example, the linear flight path progress model that the English schools use does not tell teachers what to do to improve but instead inhibits details on causes of poor data outcome and what should be done. Although outcomes really matter, I argue that practitioners need to use data with human touch that is, using data to give human answers, not data answers. Teachers ought to focus on the children rather than data because children are human beings who need psychological comfort and understanding for effective learning to occur. Using data with human touch might be a

more beneficial way to re-focus data use to improve teaching and understanding of children as opposed to the focus on data outcomes.

Regarding data interpretation, teachers mostly use norm-referencing and criteria-referencing to interpret data. Data interpretation is relative, complex and only gives a rough picture of what is going on. Therefore, there is a risk of teachers not seeing the whole picture when they only stop at norm-referencing and criteria-referencing interpretations. Defining a student quantitatively via criteria-referencing as a 2 in Maths without acknowledging that the same child may be a 4 in the topic of Geometry exam, for example, is a reductive interpretation of data. School leaders might need to consider encouraging teachers to use more robust data interpretation approaches. These include use of multiple sources of evidence and longitudinal analysis of trends to triangulate and interpret data as opposed to the current focus on snapshot interpretation techniques which ignore details. For this reason, I argue for some level of interrogation and dialogue alongside the use of norm-referencing and criteria-referencing interpretations, not necessarily by the teacher but by other neutral parties, for example, in data teams. With high-stakes accountability in England, dialogue and moderation of data (already evident in schools 2 and 5), might be crucial because temptation can be high for teachers to say students are good in something merely to look good when they are not. Here, triangulation, dialogue and moderation might help to check on the inflation and deflation of data interpretation. Although robust approaches can be time-consuming, they help provide a complete story behind the data teachers collect. To realise this, the government would need to equip teachers with the skills needed to interpret data and minimise excessive data demands which cause teacher workload problems and superficial interpretations of data.

5.4.3 Implications for research

Having established how English teachers use data via case study, more ethnographic studies might provide fine details about data use in English schools. Large-scale surveys might then help to explore the links between data use and pupil progress and more mid-range research might be useful to investigate some of the major issues in the study such as around surveillance and cynical compliance. Studies on the effects of data use on English students, for example, can improve the model in figure 4.2 to include students and effects of data use on them. Also, some practitioner research might show how teachers, or groups of teachers, improve their data use.

REFERENCES

Anderson, S., Leithwood, K, & Strauss, T. (2010). Leading Data use in Schools: Organizational Conditions and Practices at the School and District Levels. *Leadership and Policy in Schools*, 9(3), 292-327.

Apple, M. (2017). What is absent and present in critical analyses of neoliberal education. *Paebody Journal of Education*, 92(1), 148-153.

Appleton, J., & King, L. (2002). Journeying from the philosophical contemplation of constructivism to the methodological pragmatics of health services research. *Methodological Issues in Nursing Research*, 40(6), 641- 648.

Archer, E., Scherman, V., & Howie, S. (2013). Approaches to effective data use: Does size fit it all? In K. Schildkamp, M. Lai, & L. Earl, *Data-Based Decision Making in Education: Challenges and Opportunities* (pp. 81-102). Studies in Educational Leadership). Dordrecht, NL: Springer.

Archer, L., Francis,B., Miller,S., Taylor, B., Tereshchenko, A., Mazenod, A., Pepper, D., & Travers, M. (2018). The symbolic violence of setting: A bourdieusian analysis o mixed methods data on secondary student' views about setting. *British Educational Research Journal,* 44(1), 119-140.

Arksey, H., & Knight, P. T. (1999). *Interviewing for social scientists*. London: Sage.

Azigwe, J., Kyriakides, L., Panayiotou, A., & Greemers, B. (2016). The impact of effective teaching characteristics in promoting student achievement in Ghana. *International Journal of Educational Development*, 51(2016), 51-61.

Ball, S. (1994). *Educational reform: A critical and post-structural appraoch.* Buckingham: Open University Press.

Ball, J. S. (2003). The teacher's soul and the terrors of performativity. *Journal of Education Policy*, 18(2), 215-228.

Ball, S. (1997). Good/Bad school: The paradox and fabrication. *British Journal of the Sociology of Education*, 18(3), 317-336.

Ball, S. (1998). Performativity and fragmentation. In J. Carter, *Postmodernity and the fragmentation of wellfare.* Oxford: Routledge.

Ball, S. (2012). Performativity, Commodification and Commitment: An I-Spy Guide to the Neoliberal University. *British Journal of Educational Studies*, 60(1), 17-28.

Ball, S. (2012). *The making of a neoliberal academic.* Research in Secondary Education, 2(1), 29-31.

Ball, S. (2015). Education, governance and the tyranny of numbers. *Journal of Education Policy*, 30(3), 299-301.

Ball, S. (2016). Subjectivity as a site of struggle: refusing neoliberalism? *British Journal of Sociology*, 37(8), 1129-1146.

Ball, S. (2017). *The Education Debate, third edition.* Bristol, UK: Policy Press.

Ball, S., & Olmedo, A. (2013). Care of self, resistance and subjectivity under neoliberal governmentalities. *Critical Studies in Education*, 54(1), 85-96.

Ball, S., Bowe, R., & Gewirtz, S. (1994). Competitive Schooling: Values, Ethics and Cultural Engineering. *Journal of Curriculum and Supervision Summer*, 9(4), 350-367.

Bartlet, W. (1993). Quasi-markets and Educational reforms. In Le Grand, J., & Bartlet, W. *Quasi-Markets and Social Policy* (pp. 125-153). London: Palgrave Macmillan.

Bassey, M. (1999). *Case Study Research in Educational Settings.* Buckingham: Open University Press.

Baxter, P., & Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *Qualitative Report*, 13(4), 544- 559.

Bendassolli, P. (2013). Theory Building in Qualitative Research: Reconsidering the Problem. . *Forum Qualitative Sozialforschung / Forum: Qualitative Social*, 14 (1) 2013.

BERA. (2011). *Ethical Guidelines for Educational Research.* British Educational Research Association: 9-11 Endsleigh Street, London WC1H 0ED, ISBN: 978-0-946671-32-8.

Bertrand, M., & Marsh, J. (2015). Teachers' Sense-making of data and implications of inquiry. *American Educational Research Journal*, 52(2), 861-893.

Booher-Jennings, J. (2005). Below the bubble: " educational triage" and the Texasaccountability system. *American Educational Research Journal* , 42(2), 231-268.

Bradbury, A. (2014). Early Childhood assessment: observation, teacher 'knowledge' and the production of attainment data in early years setting. *Comparative Education*, 50(3), 322-339.

Braun, V., & Clarke, V. (2013). *Successful Qualitative Research: a practical guide for beginners.* London: SAGE Publications.

Breiter, A., & Light, D. (2006). . Data for School Improvement: Factors for designing effective information systems to support decision making in schools. *Educational Technology and Society*, 9(3), 206-217.

Bryman, A. (2012). *Social Research Methods, 4th Edition.* Oxford: Oxford University Press.

Cain, T., & Cursley, J. (2017). *Teaching Music Differently.* London: Routledge.

Cain, T., & Harris, R. (2013). Teachers' action research in a culture of performativity. *Educational Action Research,* 21(3), 343-358

Caluya, G. (2010). The post-panoptic society? Reassessing Foucault in surveillance studies, *Social Identities*, 16(5), 621-633.

Campbell, C., & Levin, B. (2009). Using data to support educational improvement Educational Assessment. *Evaluation and Accountability*, 21(1), 47-65.

Carlson, D., Borman, G., & Robinson, M. (2011). A multistate District-Level Cluster Randomized Trial of the Impact of Data-Driven Reform on Reading and Mathematics Achievement. Education. *Education and Evaluation and Policy Analysis*, 33(3), 378-398.

Carpenter, T. P., Fennema, E., Franke, M. L., Levi, L., & Empson, S. B. (1999). *Children's mathematics: Cognitively guided instruction*. Portsmouth, NH: Heinemann

Chitty, C. (2014). *Education Policy in Britain.* Palgrave: Macmillan.

Clough, P., & Nutbrown, C. (2006). *A student's guide to methodology: Justifying enquiry.* London: Sage Publication.

Coburn, C. E., & Turner, E. (2012). The Practice of Data Use: An Introduction. *American Journal of Education, Vol. 118 (2)*, 99- 111.

Coburn, C. E., & Turner, E. O. (2011). Research on Data use: A Framework and Analysis. *Measurement: Interdisciplinary Research & Perspective*, 9(4), 173-206.

Coburn, C. E., Toure, J., & Yamashita, M. (2009). Evidence, interpretation and persuation: Instructional decision making in the district central office. *Teachers College Record*, 111(4),1115-1161.

Codding, R. S., Skowron, J., & Pace, G. M. (2005). Back to basics: training teachers to interpret curriculum- based measurement data and create observable and measurable objectives. *Behavioural Interventions*, 20(3), 165-176.

Connell, R. (2013). The neoliberal cascades and education: an essay on the market agenda and its consequences. *Critcal Studies in Education*, 54(2), 99-112.

Courtney, S. J. (2014). Post-panopticism and school inspection in England. *British Journal of Sociology of Education*, 37(4), 623-642.

Creswell, J. (2014). *Research Design. Qaulitative, Quantitative and Mixed Method Approaches.* 4th ed. Los Angeles: SAGE Publications.

Creswell, J. W. (2007). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches.* Thousand Oaks, California: SAGE Publications.

Creswell, J. W. (2013). *Qualitative Inquiry and Research Design: Chossing among Five Approaches, 3rd Edition.* London: Sage.

Creswell, J., & Plano-Clark, V. L. (2011). *Designing and Conducting Mixed Methods Research.* 2nd ed. Thousand Oaks: SAGE Publications.

Crotty, M. (1998). *The Foundations of Social Research: Meaning and Perspectives in the Research Process.* London: Sage.

Crow, G., Wiles, R., Heath, S., & Charles, V. (2006). 'Research ethics and data quality: The implications of informed consent. *International Journal of Social Research Methodology*, 9(2), 83-95.

Dane, F. C. (1990). *Research Methods.* Brooks : Cole Publishing Company.

Datnow, A., Park, V., & Kennedy-Lewis, B. (2013). Affordances and Constraints in the context of teacher collaboration for the purpose of data use. *Journal of Educational Administration*, 51(3), 341-362.

Datnow, A., Park, V., & Wohlstetter, P. (2007). *Achieving with data: How high performing districts use data to improve instruction for elementary school students.* Los Angeles, CA: Centre on Educational Governance , USC Rossier School of Education.

Davenport, T., & Prusak, L. (1998). *Working knowledge.How organisations manage what they know.* Harvard: Business School Press.

David, M. (1993). *Parents, gender and educational reform .* Cambridge : Polity.

De Vault, M. J. (1990). Talking and listening from women's standpoint: feminist startegies for interviewing and analysis. *Social Problems*, 37, 96- 116.

De Vaus, D. (2002). *Surveys in Social Research, 5th edition.* London: George Allen & Unwin.

Denscombe, M. (2010). *Ground Rules for Social Research, 2nd edition.* Maidenhead: Open University Press.

Denscombe, M. (2014). *The Good Research Guide- for small-scale social research projects, 5th edition.* Berkshire, England: McGrawHill Education, Open University Press.

Department for Education. (2010). *The Importance of Teaching: The Schools White Paper 2010.* London: DfE.

DfE. (1997). *Excellence in schools.* White Paper, London: DfE.

DfE. (2016). *Participation of young people in education, employment or training*: Statutory guidance for local authorities. London: Department of Education.

DfE. (2016). *Progress 8 and Attainment 8: A guide for maintained secondary school, academies and free schools.* London: Department of Education- Crown Copyright.

DfE. (2018). *Secondary accountability measures: Guide for maintained secondary schools, academies and free schools*. London: Department of Education.

Diamond, J. B., & Spillane, J. P. (2004). High- stakes accountability in urban elementary schools: Challenging or reproducing inequality. *Teachers college record*, 106(6), 1145-1176.

Diefenbach, T. (2009). New Public Management in public sector organisations: The dark sides of managerialistic 'enlightenment'. *Public Administration*, 87(4), 892-909

Dillman, D. (2007). *Mail and Internet Surveys: The Tailored Design Method, 2nd edition.* Chichester: John Wiley.

Dooley, L. M. (2002). 'Case study research and theory building'. *Advances in Developing Human Resources*, 4(3), 335- 354.

Downey, C., & Kelly, A. (2013). Professional attitudes to the use of data in England. In K. Schildkamp, Lai, M. K, & Earl, L. (eds.), *Data-based Decision Making in Education: Challenges and Opportunities* (pp. 69-89). (Studies in Educational Leadership). Dordrecht, NL: Springer.

Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2009). New Public Management is dead- Long Live Digital-Era Governance. *Oxford University Press,* 16, 467-494

Dunn, R., Ben Jafaar, S., Earl, L., & Katz, S. (2013). Towards data informed decisions: From Ministry Policy to school practice. In K. Schildkamp, M. Lai, & L. Earl, *Data-Based Decision Making in Education: Challenges and Opportunities* (pp. 145-166). (Studies in Educational Leadership). Dordrecht, NL: Springer.

Dunne, M., Humphreys, S., Sebba, J., Dyson, A., Gallannaugh, F., & Muijs, D. (2007). Effective teaching and learning for pupils in low attaining groups, in: Efective provision for gifted and talented students in secondary education ((London, DCSF).

Earl, L., & Fullan, M. (2003). Using Data in Leadership for Learning. *Cambridge Journal of Education*, 33(3), 383-394.

Earl, L., & Katz, S. (2006). *Leading Schools in a Data- rich World. Harnessing Data for School Improvement.* Carlifornia: Thousand Oaks, Sage.

Ebbeler, J.,Poortman, C.L., Schildkamp, K., & Pieters, J.M. (2016). Effects of a data-use intervention on educators'use of knowledge and skills. *Studies in Educational Evaluation*, 48 (2016) 19-31.

Ehren, M., & Swanborn, M. (2012). Strategic data use of schools in accountability school systems. *School Effectiveness and School Improvement*, 23(2), 257-280.

Eisenhardt, K. (1989). Building Theories from Case study research. *Academy of Management Review* , 14(4), 532-550.

Eisenhardt, K., & Graebner, M. (2007). Theory Building from cases: Opportunities and challenges. *The Academy of Management Journal*, 50(1), 25- 32.

England, K. (1994). Getting personal: Reflexivity, positionality, and feminist research. *The Professional Geographer*, 46(1), 80- 89.

Erickson, F. (2007). Specifying 'usually' and 'some': Using simple descriptive statistics in qualitative inquiry. *Presented at the 2007 Congress on Qualitative Inquiry.* Urban: IL.

Etikan, I., Musa, S., & Alkassim, R. (2016). Comparision of Convinience Sampling and Purposive Sampling. *American Journal of Theoritical and Applied Statistics*, 5(1), 1-4.

Farrell, C., & Marsh, J. (2016). Metrics Matter: How Properties and Perceptions of Data Shape Teachers' Instructional Responses. *Educational Administration Quarterly*, 52(3), 423-462.

Fenech, M., Sumsio, J., & Shepherd, W. (2010). Promoting early childhood teacher professionalism in the Australian context: The place of resistance. *Contemporary Issues in Early Childhood*, 11(1), 89-105.

Flyvbjerg, B. (2006). Five Misunderstandings About Case-Stdy Research. *Qualitative Inquiry*, 12(2), 219- 245.

Foucault, M. (1977). *Discipline and Punish: The Birth of the prison.* 1991 first edition. London: Penguin Books.

Francis, B., Archer, L., Hodgen, J., Pepper, D., Taylor, B., & Travers, M. (2017) Exploring the relative lack of impact of research on 'ability grouping' in England: a discourse analytic account, *Cambridge Journal of Education*, 47(1), 1-17.

Fryer, C., Seaman, E., Clark, R., & Plano-Clark, V. (2017). Mixed methods research in tobacco control with youth and young adults: A methodological review of current strategies, *PLoS ONE*, 12(8): e0183471. https://doi.org/10.1371/journal.pone.0183471.

Fulcher, G., & Svalberg, A. (2013). Limited aspects of reality: Frames of reference in language assessment. *International Journal of English Studies,* 13(2), 1- 19

Fullan, M. (2001). *The new meaning of educational change (3rd ed.) .* New York: Teachers College Press.

Fullan, M. G. (1982). *The Meaning of Educational Change.* New York: Teachers College Press.

Gallimore, R., Ermeling, B., Saunders, B., & Goldenberg, C. (2009). Moving the learning of teaching closer to practice: Teacher Education implications of school-based inquiry teams. *Elementary School Journal*, 109(5), 537-553.

Gardner, H. (1994). Multiple intelligences: The theory in practice. *Teacher's College Record, 95*(4), 576-583.

Gelderblom, G., Schildkamp, K., Pieters, J., & Ehren, M. (2016). Data-based decsion making for instructional improvement in primary education. *International Journal of Educational Research*, 80(2016), 1-14.

Gergen, M., & Gergen, K. (2000). Qualitative Inquiry, Tensions and Transformations. In N. Denzin, & Y. Lincolin, *The Landscape of Qualitative Research: Theories and Issues.* Thousand Oaks: Sage.

Gillborn, D., & Youdell, D. (2001). *Rationing education: Policy, Practice, Reform and Equity.* Buckingham: Open University Press.

Gillies, D. (2011). 'Agile bodies: A new imperative in neoliberal governance'. *Journal of Education Policy*, 26(2), 207-223.

Gleeson, D., & Gunter, H. (2001). The performing school and the modernisation of teachers. In D. Gleeson, & C. Husbands, *The performing school : managing teaching and learning in a performance culture.* London: Routledge Falmer.

Goren, P. (2012). The Practice of Data Use: Data, Data, and More Data- What's an Educator to Do? *American Journal of Education*, *118(2), 233-237*.

Gorur, R. (2016). Seeing like PISA: A cautionary tale about the performativity of international assessments. *European Educational Research Journal,* 15 (5), 598-616.

Gray, E. D. (2014). *Doing Research in the Real World: Third Edition.* London: SAGE Publications.

Guba, E. (1990). The alternative paradigm dialog. In E. G. Guba, *The paradigm dialog* (pp. 17-30). Newsburry Park, CA: Sage.

Guba, E., & Lincolin, Y. (1989). *Fourth Genration Evaluation.* Newsburry Park, CA: Sage.

Guba, E., & Lincolin, Y. (1994). 'Competing Paradigms in Qualitative Research'. In N. Denzin., & Lincolin.S, *Handbook of Qualitative Research.* Thousand Oaks, CA: Sage.

Gustafsson, J. (2017). Single case studies vs. multiple case studies: A comparative study. *Academy of Business, Engineering and Science,* , Halmstad University, Sweden.

Hammersley, M. (1992). Reconstructing the qualitative-quantitative divide . In M. Hammersley, *What's wrong with Ethnography? Methodological Explorations* (pp. 159-173). London: Routledge.

Hammersley, M., & Atkinson, P. (1995). *Ethnography: Principles in Practice, 2nd Edition.* London: Routledge .

Harris, A. (2008). *Distrubuted Leadership: Developing tomorrow's leaders.* London and Newyork: Routledge- Taylor Francis & Group.

Harvey, D. (2005). *A brief History of Neolibralism.* Oxford: Oxford University Press.

Hazell, W. (2017, October 5). *Demand for data is 'overwhelming' teachers, report warns*. Retrieved 17 November 2018 from https://www.tes.com/news/exclusive-demand-data-overwhelming-teachers-report-warns

Hill, H. (2001). Policy is not enough: Language and the interpretation of state standards. *American Educational Research Journal*, 38(2), 289- 318.

Hitt, D., & Tucker, P. (2015). Systematic Review of Key Leadership Practices Found to Influence Student Achievement: A Unified Framework. *Review of Educational Research*, 20(10), 1-39.

Holland, C., Hughes, J., & Leitich, R. (2016). Neoliberalism and Education: Spotlight on Ireland. *Policy Features in Education*, 14(8), 1041-1045.

Honig, M. I., & Coburn, C. (2008). Evidence-based decision making in school district central offices: toward a policy and research agenda. *Educational Policy*, 22(4), 578-608.

Honing, M., & Venkateswaran, N. (2012). School-Central Office Relationships in Evidence Use: Understanding evidence Use as a Systems Problem. *American Journal of Education*, 118(2), 199-222.

Hood, C. (2012). Public Management by Numbers as a Performance-enhancing Drug: Tow hypotheses. *Public Administration Review,* 72(1), s85-s92

Hoogland, I., Schildkamp, K., van der Kleij, K., & Heitink, M. (2016). Pre-requisites of data-based decision making in the classroom: Research Evidence and Practical illustrations. *Teaching and Teacher Education*, 60(2016), 377-386.

Hope, A. (2005) Panopticism, play and the resistance of surveillance: case studies of the observation of student Internet use in UK schools, *British Journal of Sociology of Education,* 26(3), 359-373.

Hope, A. (2010). Student resistance to the surveillance curriculum, *International Studies in Sociology of Education*, 20(4), 319-334

Hope, A. (2016). Biopower and school surveillance technologies 2.0, *British Journal of Sociology of Education*, 37(7), 885-904

Horn, I. S., & Little, J. W. (2010). Attending to Problems of Practice: Routines and Resources for Professional Learning in Teachers' Workplace Interactions. *American Educational Research Journal*, 47(1), 187- 217.

Huffman, D., & Kalnin, J. (2003). Collaborative inquiry to make data based decisions in schools. *Teaching and Teacher Education*, 19(6), 569-580.

Ikemoto, G., & Marsh, J. (2007). Cutting through the 'data-driven' mantra: Different conceptions of data-driven decision making. In P.A Moss (Ed.). *Evidence and decision making*, (pp. 105-131). Malden, MA: National Sciety for the Study of Education.

Ingram, D., Louis, K., & Schroeder, R. (2004). Accountability policies and teacher decision making: Barriers to the use of data to improve practice. *Teachers College Record*, 106(6), 1258-1287.

Ireson, J., Hallam, S., & Hurley, C. (2005). What are the effects of ability grouping on GCSE attainment? *British Educational Research Journal,* 31(4), 443-458.

Jeffrey, B. (2002). Performativity and primary teacher relations. *Journal of Education Policy*, 17(5), 531-546.

Jensen, E. A., & Laurie, C. (2016). *Doing Real Research: A practitcal Guide to Social Research.* London: SAGE Publications.

Jimerson, J. (2014). Thinking about data: Exploring the development of mental models for 'data-use' among teachers and school leaders. *Studies in Educational Evaluation*, 42(2014), 5-14.

Jimmerson, J., Cho, V., & Wayman, J. (2016). Student-involved data use: Teacher practices and considerations for professional learning. *Teaching and Teacher Education*, 60(2016), 413-424.

Johannes, L., & Janelle, D.L. (2014). Performativity Pressures at Urban High schools in Sweden and the USA. *Ethnography and Education*, *9(3), 298- 312.*

Katz, S., & Dack, L. (2014). Towards a culture of inquiry for data use in schools: Breaking down professional learning barriers through intentional interruption. *Studies in Educational Evaluation*, 42(2014), 35-40.

Kerr, K., Marsh, J., Ikemoto, G., & Barney, H. (2006). Strategies to to promote data use for instructional improvement: Actions, outcomes, and lessons from three urban districts. *American Journal of Education*, 112(4), 496-520.

Kilderry, A. (2015). The intensification of performativity in early childhood education . *Journal of Curriculum Studies*, 47(5), 633-652.

Kumar, R. (2011). *Research Methodology- A step-by-step guide for beginners, 3rd edition.* London: SAGE Publications.

Lai, M. K., Mc Naughton, S., Timperley, H., & Hsiao, S. (2009). Sustaining continued acceleration in reading comprehension achievement following an intervention. *Educational Assessment, Evaluation and Accountability* , 21(1), 81-100.

Lee, M., Louis, K., & Anderson, S. (2012). Local education authorities and student learning: the effects of policies and practices. *School Effectiveness and School Impreovement*, 23(2), 133-158.

Levin, J., & Datnow, A. (2012). The principal role in data-driven decision making: using case-study data to develop muti-mediator models of educational reform. *School Effectiveness and School Improvement: An international Journal of Research, Policy and Practice*, 23(2), 179-201.

Lincolin, Y., & Guba, E. (1985). *Naturalistic Enquiry.* Newbury Park, CA: SAGE.

Lingard, B., Martino, W., & Rezai-Rashti, G. (2013). Testing regimes, accountabilities and education policy: Commensurate global and national development. *Journal of Education Policy*, 28(5), 539-556.

Little, J. W. (2007). Teachers' accounts of classroom experience as a resource for professional learning and instructional decision making. In P.A. Moss (Ed.). *Evidence in Decision Making*, (pp. 217-240). Malden, MA: National Society for the Study of Education.

Lok, B., McNaught, C., & Young, K. (2016). Criterion-referenced and norm referenced assessments: Compatibility and Complimetarity. *Assessment and Evaluation in Higher Education*, 41(3), 450-465

Long, R. (2018). *Independent Schools (England): Briefing paper number 07972.* London: House of Commons Library.

Lynch, D., Smith, R., Provost, S., & Madden, J. (2016). "Improving teaching capacity to increase student achievement". *Journal of Educational Administration*, 54(5), 575 - 592.

Lyotard, J. (1984). *The post modern condition: A report on Knowledge.* Manchester: Manchester University Press.

Mandinach, E. B., & Jimerson, B. (2016). Teachers learning how to use data: A synthesis of the issues and what is known. *Teaching and Teacher Education, ,* 60 (2016), 452- 457.

Mandinach, E., & Gummer, E. (2016). What does it mean for teachers to be data literate: Laying out the skills, knowledge, and dispositions. *Teaching and Teacher Education*, 60(2016), 366-376.

Mandinach, E., & Honey, M. (2008). *Data-driven School Improvement: Linking data and Learning.* New York: NY: Teachers College Press.

Marsh, J. (2012). Interventions promoting educators' use of data: Research insights and gaps. *Teachers College Record*, 114(11), 1- 48.

Marsh, J. A., Pane, J. F., & Hamilton, L. S. (2006). *Making Sense of Data-Driven Decision Making in Eduaction: Evidence from recent RAND Research.* Santa Monica, CA: Rand.

Marsh, J. A., & Farrell, C. (2015). How school leaders can support teachers with data-driven decision making: A framework for understanding capacity building. *Educational Management Administration and Leadership*, 43(2), 269-289.

Marsh, J. A., Farrell, C., & Bertrand, M. (2016). Trickle Down Accountability: How Middle School Teachers Engage Students in Data Use. *Education Policy*, 30(2), 243- 280.

Marshall, B., & Brindley, S. (1998). Cross-phase or Just a Lack of communication: Models of English at Keys Stages 2 and 3 and their possible effect on pupil transfer, *Changing English*, 5(2), 123-134.

Mason, J. (2006). 'Mixing Methods in a Qualitatively-Driven Way'. *Qualitative Research*, 6(1), 9- 26.

Massell, D. (2001). *The theory and practice of using data to build capacity: State and local strategies and their effects.In S.H Fuhrman(Eds), From the capitol to the classroom: Standard- based reform in the states(pp. 148-169).* Chicago: University of Chicago.

Mausethagen, S., Proitz, T., & Skedsmo, G. (2018). Teachers' use of knowledge sources in 'result mettings': Thin data and thick use. *Teachers and Teaching*, 1-13

McNaughton, S., Lai, M., & Hsaio, S. (2012). Testing the effectiveness of an intervention model based on data use: a replication series across clusters of schools.a replication series across clusters of schools. *School Effectiveness and School Improvement*, 23(2), 203- 228.

Means, B., Padilla, C., DeBarger, A., & Bakia, M. (2009). *Implementing data-informed decision-making in schools: Teacher access, support and use.* Report prepared for US Department of Education, Office of Planning, Evaluation and Policy Development: Prepared by SRI International, Menlo Park, CA.

Merriam, S. (1998). *Qualitative research and case study applications in education.* San Francisco: Joseey-Bass.

Merriam, S., & Tisdell, E. (2016). *Qualitative Research. Aguide to design and implementation. (4th Edition).* San Francisco: CA: Jossey-Bass.

Miles, M. B., & Hubberman, A. M. (1994). *Qualitative Data Analysis: A sourcebook of new methods (2nd edition).* Thousand Oaks: CA: SAGE.

Miller, P., & Rose, N. (2008). *Governing the present.* Cambridge: Polity Press.

Moreno, J. (1999). Ethics of research design. *Accountability in Research*, 7(2-4), 175-182.

Morse, J. (1991). Approaches to Qualitative-Quantitative Methodological Triangulation. *Nursing Research: Methodological Issues*, 40(2), 120-123.

Morse, J. (2000). Determining sample size. *Qualitative Health Research*, 10(1), 3-5.

Morse, J., Barret, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification Strategies for Establishing Reliability and Validity in Qualitative Research . *International Journal of Qualitative Methods*, 1(2), 13-22

Munn, P., & Drever, E. (2004). *Using Questionnaires in Small-scale Research.* London: The SCRE Center.

Murray, J. (2012). Performativity cultures and their effect on teacher educators' work. *Research in Teacher Education,* 2(2), 19-23.

Nachmias, D. (1996). *Research Methods in the Social Sciences.* London: Edwrad-Arnold.

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, 2(2), 175-220.

Nieveen, N. (1999). Prototyping to reach product quality. In R. J. van den Akker, K. G. Branch, N. Nieveen, & T. Plomp, *Design approaches and tools in education and training* (pp. 125-135). Dordrecht, the Netherlands: Kluwer Academic Publishers.

OECD. (2010). *Education at a glance 2010: OECD indicators.* Paris: Organisation for Econonmic Co-operation and Development (OECD).

OECD. (2013). Selecting and grouping students. PISA 2012 results: What makes schools successful? *Resources, policies and practice,* vol. 4, (Paris, OECD publishing), 71-92.

Ofsted. (2019). *The Education Inspection Framework 2019*: Draft for consultation-January 2019, No. 180039. Manchester: Ofsted.

Ofsted. (2019). *The School Inspection Handbook 2019*: Draft for consultation-January 2019, No. 180041. Manchester: Ofsted.

Omoso, E. (2019). Using School-generated data. In Tim Cain, *Becoming a Research-Informed Schoool: Why? What? How?* (pp. 77-94). New York: Routledge.

Omoso, E. (2013). *Data-Based Decision Making in the School Environment: An Assessment of Data Use by Teachers and School Leaders.* Germany: Lap Lambert Academic Publishing, ISBN 978-3-659-44167-7.

Ong, A. (2007). Neoliberalism as a mobile technology. *Transactions of the institute of British Geographers*, 32, 3-8.

Onwuegbuzie, A., & Leech, N. (2007). 'Sampling design in qualitative research: Making the sampling process more public'. *The Qualitative Report*, 12(2), 238- 254.

Oppenheim, A. (1992). *Questionnaire Design, Interviewing and Attitude Measurement. New Edition.* New York: Continuum.

Osborne, P.S. (2007). The New Public Governance? *Journal of Public Management Review,* 8(3), 377-387

Ozga, J. (2009). Governing education through data in England: From regulation to self-evaluation. *Journal of education Policy,* 24(2), 149-162.

Page, M. (2017). The surveillance of teachers and the simulation of teaching, *Journal of Education Policy*, 32(1), 1-13.

Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods, 3rd edition.* Newbury Park, CA: Sage.

Peck, J., & Tickell, A. (2002). Neolibralizing space. *Antipode*, 34(3), 380-404.

Perryman, J. (2006). Panoptic performativity and school inspection regimes: disciplinary mechanisms and life under special measures. *Journal of Education Policy*, 21(2), 147-161.

Perryman, J. (2009). Inspection and the fabrication of professional and performative processes, *Journal of Education Policy*, 24(5), 611-631.

Perryman, J., Ball, S., Maguire, M., & Braun, A. (2011). Life in the Pressure Cooker- School League Tables and English and Mathematics teachers' Responses to Accountability in a Results-Driven Era. *British Journal of Educational Studies*, 59(2), 179-195.

Perryman, J., Maguire, M., Braun, A., & Ball, S. (2018). Surveillance, Governmentality and moving the goalposts: The influence of Ofsted on the work of schools in a post-panoptic era, *British Journal of Educational Studies*, 66(2), 145-163.

Pintrich, P. (2003). A Motivational Science Perspective on the Role of Student Motivation in Learning and Teaching Contexts . *Journal of Educational Psychology*, 95, 667-686.

Piro, J. M. (2008). Foucault and the Architecture of Surveillance: Creating Regimes of Power in Schools, Shrines, and Society, *Educational Studies*, 44(1),30-46.

Plano Clark, V. L., & Ivankova, N. V. (2016). *Mixed methods research: A guide to the field .* Thousand Oaks, CA: Sage.

Plano-Clark, V. (2017). Mixed methods research. *The Journal of Positive Psychology*, 12(3), 305-306.

Poortman, C., & Schildkamp, K. (2016). Solving student achievement with data-use intervention for teachers. *Teaching and Teacher Education*, 60 (2016), 425-433.

Pope, D. (2010). Beyond "doing school": From "stressed-out" to "engaged in learning." *Education Canada*, 50(1), 4–8.

Potter, J. (1996). Discourse analysis and constructionist approaches: theoritical background. In J. R. (Ed.), *Handbook of qualitative research methods for Psychology and the social sciences* (pp. 125-140). Leicester, UK: BPS Books.

Punch, K. (2005). *Introduction to Social Research: Quantitative and Qualitative Approaches.* London: Sage Publications.

Punch, K. F. (2014). *Introduction to Social Research- Qualitative and Quantitative Approaches, 3rd edition.* London: Sage Publications.

Ranson, S. (2003). Public Accountability in the age of neo-liberal governance . *Journal of Education Policy* , 18(5), 459-480.

Rapley, T. (2008). *Doing Conversation, Discourse and Document Analysis.* London: SAGE.

Rees, C. (1996). Qualitative and Quantitative approaches to research. *British Journal of Midwifery,* 4(7), 374-377.

Richey, R. C., Klein, J. D., & Nelson, W. A. (2004). Developmental research: Studies of instructional design and development. In D. Jonassen, *Handbook of Research for Educational Communications and Technology* (pp. 2 ed., pp. 1099-1130). Mahwah, NJ: Lawrence Erlbaum Associates.

Robert-Holmes, G., & Bradbury, A. (2016). The datafication of early years education and its impact upon pedagogy. *Imprving Schools*, 19(2), 119- 128.

Roberts, A. (2005). 'Transposing a Culture: Reflections on the Leadership of a Closing School (R). *Improving Schools*, 8 (3), 237-253.

Rose, G. (1997). Situating Knowledges: Positionality, reflexivities and other tactics. *Progress in Human Geography, 21(3), 305- 320.*

Ross, B. (1987). This is like that: The use of earlier problems and the seperation of similarity effects. *Journal of Experimental Psychology ; Learning, Memory and Cognition*, 13(4), 629-639.

Rowley, J. (2012). 'Conducting Research Interviews'. *Management Research Review*, 35(3/4), 260-271.

Ryan, R., & Deci, E. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25(1), 55-67.

Sandelowski, M. (1994a). Notes on qualitative methods: notes on transcription. *Research in Nursing and Health*, 17(4), 311-314.

Sandelowski, M. (1995). Sample size in qualitative research. *Research in Nursing and Health*, 18, 179-183.

Schaffer, E., Reynolds, D., & Stringfield, S. (2012). Sustaining Turnaround at the School and District Levels: The High Reliability Schools Project at Sandfields Secondary School. *Journal of Education for Students Placed at Risk (JESPAR)*, 17(1-2), 108-127.

Schildkamp, K., & Kuiper, W. (2010). Data-informed curriculum reform: Which data, what purposes, and promoting and hindering factors. *Teaching and Teacher Education*, 26(2010): 482-496.

Schildkamp, K., & Teddlie, C. (2008). School performance feedback systems in the USA and in the Netherlands: a comparison . *Educational Research and Evaluation*, 14(3), 255-282.

Schildkamp, K., Ehren, M., & Lai, M.K. (2012). Editorial article for the special issue on data-based decision making around the world: from policy to practice and results. *School Effectiveness and School Improvement*, 23(2), 123-131.

Schildkamp, K., Karbautzki, L., & Vanhoof, J. (2014). Exploring Data Use Practices around Europe: Identifying enablers and barriers. *Studies in Educational Evauaton*, 42 (2014), 15-24.

Schildkamp, K., Rekers-Mombarg, L., & Harms, T. (2012). Student group differences in examination results and utilization for policy and school development. *School Effectiveness and School Improvement*, 23(2), 229- 256.

Schmidt, M., & Datnow, A. (2005). "Teachers' Sense Making about Comprehensive School Reform: The influence of Emotions". *Teaching and Teacher Education*, 21(8), 949-965.

Seidman, I. (2013). *Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences, 4th edition.* New York: Teachers College Press.

Sikes, P. (2004). *Methodology, procedures and ethical considerations. In C., Opie (Ed.), Doing educational research: A guide to first-time researchers.* London: Sage Publication: London.

Simons, H. (2009). *Case Study Research in Practice.* London: SAGE Publications .

Slavin, R. E. (1990). Achievement effects of ability grouping in secondary schools: A best-evidence synthesis, *Review of Educational Research,* 60(3), 471–499.

Spillane, J. P. (2012). Data in practice: Conceptualizing the Data- Based Decision Daking Phenomena . *American Journal of Educational*, 118(2), 113-141.

Spillane, J., & Miele, D. (2007). Evidence in Practice: A framing of the terrain. In P. A. Moss (Ed.). *Evidence and decision making*, (pp. 46-73). Malden, MA: National Society for the Study of Education.

Stake, R. (1995). *The art of case study research .* Thousand Oaks, CA: SAGE publication.

Stake, R. (2000). 'The case study method in social inquiry'. In R. Gomm, M. Hammersley, & P. Foster, *Case Study Method: Key Issues, Key Texts.* London: Sage.

Stake, R. E. (2005). *Multiple Case Study Analysis.* New York: The Guilford Press.

Stringfield, S., Reynolds , D., & Schaffer, E. C. (2008). Improving secondary students' academic achievement through a focus on reform reliability: 4- and 9-year findings from the high reliability schools. *School Effectiveness and School Improvement*, 19(4), 409-428.

Sudman, S. (1998). 'Survey research and ethics'. *Advances in Consumer Research,* , 25(1998), 69-71.

Supovitz, J. A., & Klein, V. (2003). *Mapping a course for improved student learning: How innovative schools use student performance data to guide improvement*, Philadelphia, PA: Consortium for Policy Reseach in Education.

Tashakkori, A., & Teddlie, C. (2010). *Handbook of Mixed Methods in Social and Behavioural Research, 3rd edition.* Thousand Oaks: CA: Sage.

The Times Investigation (2018, August 28). *Schools off-roll thousand to boost results.* Retrieved from http://www.tes.com/news/schools-roll-thousands-boost-results.

Thomas, G. (2009). *How to do your Research Project: A Guide for students of Education and Applied Social Sciences, 2nd Edition.* London: Sage.

Tilley, N. (2016). *Surveillance Schools: discipline and control in contemporary education.* United Kingdom: Macmillan Publishers.

Timperley, H., & Parr, J. (2009). Chain of influence from policy to practice in the New Zealand literacy strategy. *Research Papers in Education: Policy and Practice*, 24 (2), 135-154.

Tomlinson, S. (2001). *Education in a post-welfare society (2nd Edition).* Bukingham: Open University Prsess.

Trip, D. (1985). Case study generalization: an agenda for action. *British Educational Research Journal*, 11(1), 33- 43.

Troman, G., Jeffrey, B., & Raggi, A. (2007). Creativity and performativity policies in primary school cultures. *Journal of Education Policy*, 22(5), 549-572 .

Trunk, A., Trunk, A., & Lakota, A. (2018). Managers' opinion about recoganising neoliberalism in education in Slovenia. *Procedia-Social and behavioural Sciences*, 238(2018), 239-248.

Tuckman, B., & Monetti, D. (2011). *Educational Psychology.* Belmont, CA: Wadsworth.

van den Hurk, H., Houtven, A., & Van de Grift, W. (2016). Fostering effective teaching behaviour through the use of data-feedback. *Teaching and Teacher Education*, 60(2016), 444-451.

Van Gasse, R., Vanlommel, K., Vanhoof, J., & Van Petegem, P. (2016). The impact of collaboration on teachers' individual data use. *School Effectiveness and School Improvement*, 28(3), 489-504.

Vanhoof, J., Verhaeghe, G., van Petegem, P., & Valcke, M. (2013). Improving Data Literacy in Schools: Lessons from the school feedback project. In K. Schildkamp, M. K. Lai, & L. Earl, *Data-Based Decision Making in Education: Challenges and Opportunities* (pp. 103-124. (Studies in Educational Leadership). Dordrecht, NL: Springer.

Volacu, A. (2018). Justice, Efficiency, and New Public Management. *Australian Journal of Public Administration,* 77(3), 404- 414

Voss, C., Tsikriktsis, N., & Frohlich, M. (2002). Case Research in operations management. *International Journal of Operations & Production Management*, 22(2), 195- 219.

Wayman, J. C. (2005). Involving teachers in data-driven decision making: using computer data systems to support teacher inquiry and reflection . *Journal of Education for Students Placed at Risk*, 10(3), 295-308.

Wayman, J., & Jimmerson, B. (2014). Teacher needs for data-related professional learning. *Studies in Educational Evaluation*, 42(2014), 25-34.

Wayman, J., Cho, V., Jimmerson, J., & Spikes, D. (2012). District-wide effects on data use in the classroom. *Educational Policy Analysis*, 20(25), 1-31.

Wayman, J., Jimerson, J., & Cho, V. (2012). Organizational considerations in establishing the data-informed district. *School Effectiveness and School Improvement*, 23(2), 159–178.

Wayman, J.C., Shaw, S., & Cho, V . (2017). Longitudinal Effects of Teacher Use of a Computer Data System on Student Achievemnt. *Teaching and Teacher Education*, AERA Open. January- March 2017. 3(1), 1-18.

Wellington, J. (2000). *Educational research: contemporary issues and practical approaches.* London: Continuum.

Werler, T., & Faerevaag, M. (2017). National Testing in Norwegian classrooms: a tool to improve pupil performance? *Nordic Journal of Studies in Educational Policy*, 3(1),67-87.

West, A., & Bailey, E. (2013). The Development of the Academies Programme: 'Privatising' School-Based Education in England 1986–2013, *British Journal of Educational Studies*, 61(2), 137-159

West, A., Mattei, P., & Roberts, J. (2011). Accountability and Sanctions in English Schools. British Journal of Educational Studies, 59(1), 41- 62.

Whitty, G. (2008). 'Twenty Years of Progress? English Education Policy 1998 to the present'. *Educational Management Adminstration & Leadership*, 36(2), 165-184.

Wieman, R. (2014). Using Data to improve instruction: Different Approaches for Different Goals, *Action in Teacher Education,* 36(5-6), 546-558

Wilkins, C. (2011). Professionalism and the post-performative teacher: new teachers reflect on autonomy and accountability in the English school system. *Professional Development in Education*, 37(3), 389-409.

Wilkinson, S.D., & Penney, D. (2014) The effects of setting on classroom teaching and student learning in mainstream mathematics, English and science lessons: a critical review of the literature in England, *Educational Review*, 66(4), 411-427.

Williamson, B. (2014, May 16). Reassembling children as data doppelgangers: How databases are making education machine-readable. In *Powerful Knowledge Conference*, University of Bristol, UK.

Wohlstetter, P., Datnow, A., & Park, V. (2008). Creating a System for Data-driven Decision-Making: Applying the principal-agent framework. *School Effectiveness and School Improvement* , 19(3), 239-259.

Woodside, A. (2010). *Case Study Research: theory, methods and practice.* Bringley, UK: Emmerald group publishers ltd.

Wrigley, T., & Wormwell, L. (2016). Infantile accountability : When big data meet small children. *Improving Schools*, 19(2), 105- 118.

Yasmin, G. (2003). *Research 'Race' and Ethnicity: Methods, Knowledge and Power.* UK: SAGE Publications.

Yin, R. (2009). *Case study research: design and methods, (4thEds.).* California: SAGE.

Yin, R. (2014). *Case Study Research: Design and Methods.* 5th edition, Los Angeles, California: SAGE Publications.

Yin, R. K. (1994). *Case Study Research: Design and Methods.* Thosand Oaks, CA: Sage.

Yin, R. K. (2003). *Case Study Research: Design and methods (3rd ed.).* Thousand Oaks: Sage.

Young, V. M. (2006). Teachers' uses of data: Loose coupling, agenda setting and team norms. *American Journal of Education*, 112 (4), 521-548.

APPENDICES

Appendix A: Interview schedule for School Leaders (SLs)

I'm working on a PhD thesis concerning the use of data. Data-use is often narrowly defined to the use of assessment data. However, schools have a lot more data sources available both qualitative and quantitative) such as self-evaluation results, classroom observation, behaviour records, parents' survey etc. I would like to ask you questions concerning the use of data in your school. When I talk about data, I mean all data sources both quantitative and qualitative that is available on the functioning of the school. The goal of my study is to find out ways in which the school uses data. This interview will take approximately 50 minutes. Before we start, do you have any questions? Do you mind if I audiotape this interview? The results will be treated anonymously and confidential.

1. (a) Tell me, what kind of data do you have on students when they **arrive in school**? Who accesses these data and how are they used?

2. (b) What kind of data do you have about **students' progress, behaviour and attendance**? Who accesses these data and how are they used?

3. (c) What data do you collect **about staff**? Who accesses these data and how are they used?

   (d) What data do you collect about the **whole school**? Who accesses these data and how are they used?

   (e) I brought **a check list** of possible data collected and stored in schools. Is there anything that you would like to talk to me further about?
   [**Provide Appendix A: List of data to interviewee**]
   If yes, which ones, who accesses them and how are they used?

   (f) Is there any data **not in the list** that you or your colleagues use?
   If yes, which ones? Who accesses these data and how are they used?

   (c) Could I get **anonymised** samples of each data type that you use in your school to look at? (*One only for each type*)

2. After data is analysed, it is **interpreted to assign meaning to it** before being put to use**. How** does this happen in the school?

I*f the respondent is not able to answer this question, you may rephrase the question to:* **how do you come to conclusion about the meaning of each data that you work with?**
If yes, do you do it *individually or in a group?* Please tell me how this happens.

3. How do you **support** teachers to collect, analyse, interpret and use data? (I***n the entire process***)
If the respondent is not able to answer this question, you can give hints by asking: Do you encourage meetings to discuss data, provides professional development in the use of data etc.

4. Kindly indicate **whether or not you agree** with the following statement and why? *(please, be as brief as possible)*

a	Data helps me identify students who, if they achieve well, will improve my school's results
b	Data-use adds to my workload
c	The pressure to use data can sometimes undermine my professional ethics
d	Data-use practices impacts positively on my well-being
E	Data-use requirements takes me away from my teaching responsibilities
f	All data in my school are given correct interpretations before use
g	Sometimes I comply with data requirements that I do not agree with
h	Using data to compare schools, teachers and students can be depressing for me
i	The current data-use policies motivates me to improve on my job performance
j	Sometimes data is misrepresented to meet accountability requirements
k	Data is used more to control teachers than to improve other aspects of schools
l	I have access to all the relevant data I need in my work
m	Data can be withheld if perceived as unfavourable or damaging to schools
n	We collaborate a lot with colleagues in my schools to use data
o	My school has a clear vision and goals for using data.
p	I have the skills and knowledge needed to use data.
q	I have time available to use data in school.
r	We have a data manager who supports my data needs in school
s	We have a trained qualified statistician to support my data needs in school
t	We discuss about data with parents and students
u	We partner with other schools/ universities to use data
v	I have the technology I need to collect and analyse data in school
w	I get pressure from my seniors to use data in my work
x	Data-use responsibilities is devolved in my school

This was my last question. Thank you very much for your time. I will send a copy of the thesis to the school at the end of the project. Again, I want to stress that these results will be treated anonymously.

Appendix B: Interview schedule for MLs

I'm working on a PhD thesis concerning the use of data. Data-use is often narrowly defined to the use of assessment data. However, schools have a lot more data sources available both qualitative and quantitative) such as self-evaluation results, classroom observation, behaviour records, parents' survey etc. I would like to ask you questions concerning the use of data in your school. When I talk about data, I mean all data sources both quantitative and qualitative that is available on the

functioning of the school. The goal of my study is to find out ways in which the school uses data. This interview will take approximately 50 minutes. Before we start, do you have any questions? Do you mind if I audiotape this interview? The results will be treated anonymously and confidential.

1. (a) Tell me, what kind of data do you have on students when they **arrive in school**? Who accesses these data and how are they used?

   (b) What kind of data do you have about **students' progress, behaviour and attendance**? Who accesses these data and how are they used?

   (c) What data do you collect **about staff**? Who accesses these data and how are they used?

   (d) What data do you collect about the **whole school**? Who accesses these data and how are they used?

   (e) I brought **a check list** of possible data collected and stored in schools. Is there anything that you would like to talk to me further about?

   [**Provide Appendix A: List of data to interviewee**]
   If yes, which ones, who accesses them and how are they used?

   (f) I there any data **not in the list** that you or your colleagues use?
   If yes, which ones? Who accesses these data and how are they used?

2. After data is analysed, it is **interpreted to assign meaning to it** before being put to use**. How** do you do this in the school?

I*f the respondent is not able to answer this question, you may rephrase the question to:* **how do you come to conclusion about the meaning of each data that you work with?**

If yes, do you do it *individually or in a group?* Please tell me how this happens.

3. How are you **supported** to collect, analyse, interpret and use data? (I***n the entire process***)
If the respondent is not able to answer this question, you can give hints by asking: Do you get data-use training, adequate time to use data etc?

4. Kindly indicate **whether or not you agree** with the following statement and why? *(please, be as brief as possible)*

a	Data helps me identify students who, if they achieve well, will improve my school's results
b	Data-use adds to my workload
c	The pressure to use data can sometimes undermine my professional ethics
d	Data-use practices impacts positively on my well-being
e	Data-use requirements takes me away from my teaching responsibilities
f	All data in my school are given correct interpretations before use
g	Sometimes I comply with data requirements that I do not agree with
h	Using data to compare schools, teachers and students can be depressing for me

i	The current data-use policies motivates me to improve on my job performance
j	Sometimes data is misrepresented to meet accountability requirements
k	Data is used more to control teachers than to improve other aspects of schools
l	I have access to all the relevant data I need in my work
m	Data can be withheld if perceived as unfavourable or damaging to schools
n	We collaborate a lot with colleagues in my schools to use data
o	My school has a clear vision and goals for using data.
p	I have the skills and knowledge needed to use data.
q	I have time available to use data in school.
r	We have a data manager who supports my data needs in school
s	We have a trained qualified statistician to support my data needs in school
t	We discuss about data with parents and students
u	We partner with other schools/ universities to use data
v	I have the technology I need to collect and analyse data in school
w	I get pressure from my seniors to use data in my work
x	Data-use responsibilities is devolved in my school

This was my last question. Thank you very much for your time. I will send a copy of the thesis to the school at the end of the project. Again, I want to stress that these results will be treated anonymously.

Appendix C: Interview schedule for Class teachers (CTs)

I'm working on a PhD thesis concerning the use of data. Data-use is often narrowly defined to the use of assessment data. However, schools have a lot more data sources available both qualitative and quantitative) such as self-evaluation results, classroom observation, behaviour records, parents' survey etc. I would like to ask you questions concerning the use of data in your school. When I talk about data, I mean all data sources both quantitative and qualitative that is available on the functioning of the school. The goal of my study is to find out ways in which the school uses data. This interview will take approximately 50 minutes. Before we start, do you have any questions? Do you mind if I audiotape this interview? The results will be treated anonymously and confidential.

1. (a) Tell me, what kind of data do you have on students when they **arrive in school**? Who accesses these data and how are they used?

   (b) What kind of data do you have about **students' progress and attendance**? Who accesses these data and how are they used?

   (c) I brought **a check list** of possible data collected and stored in schools. Is there anything that you would like to talk to me further about?

[**Provide Appendix A: List of data to interviewee**]
If yes, which ones, who accesses them and how are they used?

(d) I there any data **not in the list** that you or your colleagues use?
If yes, which ones? Who accesses these data and how are they used?

2. After data is analysed, it is **interpreted to assign meaning to it** before being put to use**. How** do you do this? I*f the respondent is not able to answer this question, you may rephrase the question to:* **how do you come to conclusion about the meaning of each data that you work with?**

If yes, do you do it *individually or in a group?* Please tell me how this happens.

3. How are you **supported** to collect, analyse, interpret and use data? (I***n the entire process***)
If the respondent is not able to answer this question, you can give hints by asking: Do you get data-use training, adequate time to use data etc?

4. Kindly indicate **whether or not you agree** with the following statement and why? *(please, be as brief as possible)*

a	Data helps me identify students who, if they achieve well, will improve my school's results
b	Data-use adds to my workload
c	The pressure to use data can sometimes undermine my professional ethics
d	Data-use practices impacts positively on my well-being
e	Data-use requirements takes me away from my teaching responsibilities
f	All data in my school are given correct interpretations before use
g	Sometimes I comply with data requirements that I do not agree with
h	Using data to compare schools, teachers and students can be depressing for me
i	The current data-use policies motivates me to improve on my job performance
j	Sometimes data is misrepresented to meet accountability requirements
k	Data is used more to control teachers than to improve other aspects of schools
l	I have access to all the relevant data I need in my work
m	Data can be withheld if perceived as unfavourable or damaging to schools
n	We collaborate a lot with colleagues in my schools to use data
o	My school has a clear vision and goals for using data.
p	I have the skills and knowledge needed to use data.
q	I have time available to use data in school.
r	We have a data manager who supports my data needs in school
s	We have a trained qualified statistician to support my data needs in school

t	We discuss about data with parents and students
u	We partner with other schools/ universities to use data
v	I have the technology I need to collect and analyse data in school
w	I get pressure from my seniors to use data in my work
x	Data-use responsibilities is devolved in my school

This was my last question. Thank you very much for your time. I will send a copy of the thesis to the school at the end of the project. Again, I want to stress that these results will be treated anonymously.

Appendix D: A Checklist of possible data available in schools

	Data subtype	**Tick if available**	
1.	Student intake/ demographic data		
2.	Special needs data		
3.	General school performance results/ Final examinations/ achievement		
4.	Diagnostic entrance test		
5.	Student progress results		
6.	Primary school results/ transfer data		
7.	Lesson observations		
8.	Internal/ Self-evaluations		
9.	External evaluations		
10.	Teacher performance data		
11.	Staff data e.g. profile, attendance		
12.	Time table *		
13.	Student attendance/ register		
14.	Student behaviour/discipline		
15.	Class management		
16.	Exclusion rates		
17.	Pupil premium		
18.	Teenage pregnancy		
19.	School inspection report		
20.	School development plan		
21.	Student assessment/ progress		
22.	School leavers' data		
23.	Exit interviews		
24.	Graduate surveys		
25.	Staff surveys/ interviews		
26.	Student surveys/ interviews		
27.	Parents surveys/ interviews		
28.	RAISE online		
29.	Pupil Achievement Tracker (PAT)		
30.	Performance and Assessment (PANDA) data		

31.	Trends in Mathematics and Science Studies (TIMSS)		

Appendix E: Data-Use Questionnaire for teachers

Thank you in advance for completing this questionnaire. It should only take 3 minutes of your time. Please do not write your name or anything that may identify you on this document. **All information will be treated with the strictest confidentiality.**

Please tick the statement(s) that best describes your current teaching responsibilities *(mandatory)*

Senior leader	
Middle leader (subject/ academic)	
Middle leader (Pastoral)	
Teacher	
Teaching assistant	

1. How often did you get the following data-use support in the last 12 months? (*Please tick only one choice in each row)*

	Practice(s)	*often*	*Sometimes*	*Never*
a	Access to relevant data sources that you need in your work			
b	Provision of training on data-use			
c	Availability of data manager			
d	Availability of a trained qualified statistician to support your data needs			
e	Discussions about data with colleagues			
f	Pressure to use data from senior leaders			
g	Availability of clear school vision, goals and culture on data-use			
h	Devolved responsibilities to use data			
i	Partnering with universities and researchers to use data			
j	Partnering with other schools to use data			
k	Availability of technology tools for data collection and analysis			
l	Discussions about data with parents			
m	Discussions about data with students			
n	Structured time to use data			

After data has been analysed, it has to be interpreted to establish what it means (e.g. increased student achievement, decreased teenage pregnancy, student satisfaction or improved instruction etc).

2. What do you rely on to interpret data? *(Please tick only one choice in each row)*

	Data interpretation	*often*	*Sometimes*	*Never*
a	Own knowledge and experiences			
b	Own beliefs, values and norms			
c	Discussions with the pastoral team, subject team or the whole school			
d	Discussions with a trained qualified statistician employed in the school			
e	Discussions with external researchers/ statistician			
f	Discussions with a data manager in the school			

g	Discussions with a line manager/ head of department			

3.Below are possible ways in which data may be used in schools. As a teacher, how often do you use data in the following ways in your school? *(Please Tick only one choice in each row)*

	Data- use	*often*	*Sometimes*	*Never*
a	To improve my teaching			
b	To support my conversations with students and stakeholders			
c	To inform my teacher professional development needs and actions			
d	To monitor my students' progress			
e	To monitor my departmental and schools' progress			
f	To identify my areas of need			
g	To support me in planning			
h	To support me in developing my school policies			
i	For meeting my accountability requirements			
j	To justify my decisions			
k	To motivate staff			
l	To motivate my students			
m	To make personnel decisions about staff			
n	To support my own self-learning			

4. Please indicate to what extent you agree or disagree with these data-use statements. *(Please tick only one choice in each row).*

SA= Strongly **A**gree; **A= A**gree; **D= D**isagree; **SD= S**trongly **D**isagree

	Statement	SA (4)	A (3)	D (2)	SD (1)
a	Data helps me identify students who, if they achieve well, will improve my school's results				
b	Data-use adds to my workload				
c	The pressure to use data can sometimes undermine my professional ethics				
d	Data-use practices and policies impacts positively on my well-being				
e	Data-use demands takes me away from my teaching responsibilities				
f	Sometimes I comply with data requirements that I do not agree with				

g	Using data to compare schools, teachers and students can be depressing for me				
h	Sometimes data is misrepresented to meet accountability requirements in schools				
i	Data is used more to control teachers than to improve other aspects of schools				
j	Data can be withheld if perceived as unfavourable or damaging to schools				

THANK YOU

Appendix F: Survey results

F1: Survey results on how teachers interpret data

Data interpretation methods	SCH. 1		SCH. 2		SCH. 3		SCH. 4		SCH. 5	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Own knowledge and experiences	1.80*	0.42	2.00*	0.00	2.00*	0.00	1.84*	0.38	**1.56**	**0.53**
Own beliefs, values and norms	1.60	0.70	2.00*	0.00	2.00*	0.00	1.63	0.60	**0.78**	**0.44**
Discussion with pastoral/subject/whole sch. team	1.70	0.48	1.92	0.28	1.50	0.55	1.42	0.51	**1.33**	**0.71**
Discussion with qualified statistician in school	0.40	0.70	0.69	0.75	0.00	0.00	0.47	0.77	**0.56**	**0.88**
Discussion with external researchers/statisticians	0.10	0.32	0.62	0.88	0.17	0.41	0.32	0.48	**0.00**	**0.00**
Discussion with DMs in the school	0.70	0.78	1.85	0.38	0.17	0.41	0.89	0.66	**0.78**	**0.67**
Discussion with LM/ heads of departments	1.50	0.53	1.92	0.28	1.50	0.55	1.42	0.61	**1.56**	**0.73**

Note: 0=Never, 1=sometimes, 2=Often, M=Mean, SD= Standard Deviation

F2: Survey results- how teachers use data in the schools

Data use	SCH. 1 (N=10)		SCH. 2 (N=13)		SCH. 3 (N=06)		SCH. 4 (N=19)		SCH. 5 (N=09)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
To improve teaching	1.40	0.70	1.92	0.28	1.50	0.55	1.32	0.67	**1.22**	**0.44**
To support conversations with students etc	1.60*	0.52	2.00*	0.00	1.67	0.52	1.53	0.61	**1.56**	**0.53**
To inform my professional development needs	1.60*	0.52	2.00*	0.00	1.67	0.52	1.47	0.70	**1.33**	**0.71**
To monitor my students' progress	1.60*	0.52	2.00*	0.00	2.00*	0.00	1.95*	0.23	**2.00***	**0.00**
To monitor my departmental and sch. progress	1.50	0.53	2.00*	0.00	2.00*	0.00	1.53	0.70	**1.33**	**0.71**
To identify my areas of need	1.20	0.79	2.00*	0.00	1.17	0.75	1.47	0.61	**1.33**	**0.71**
To support me in planning	1.40	0.70	1.92	0.28	1.50	0.55	1.63	0.50	**1.22**	**0.44**
To support me in developing my sch. policies	0.60	0.84	1.85	0.38	1.33	0.52	1.06	0.73	**0.56**	**0.73**

For meeting my accountability requirements	1.40	0.52	2.00*	0.00	1.83	0.41	1.37	0.76	**1.11**	**0.78**
To justify decisions	1.50	0.53	1.92	0.28	1.83	0.41	1.42	0.51	**1.22**	**0.44**
To motivate staff	0.70	0.68	1.23	0.60	1.50	0.55	0.74	0.65	**0.67**	**0.71**
To motivate my students	1.40	0.52	1.69	0.48	1.33	0.52	1.26	0.65	**1.22**	**0.44**
To make personnel decisions about staff	0.50	0.85	1.46	0.78	1.17	0.75	0.47	0.61	**0.44**	**0.53**
To support my own self-learning	1.40	0.70	1.92	0.28	1.17	0.75	1.21	0.71	**1.00**	**0.50**

Note: 0=Never, 1=sometimes, 2=Often, M=Mean, SD= Standard Deviation

F3: Survey results- data use support

Data support	**SCH. 1 (N=10)**		**SCH. 2 (N=13)**		**SCH. 3 (N=06)**		**SCH. 4 (N=19)**		**SCH. 5 (N=09)**	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Access to relevant needed data	1.80*	0.42	1.92	0.28	2.00*	0.00	1.74	0.45	**1.56**	**0.53**
Provision of training	0.90	0.57	1.31	0.48	1.00	0.63	1.11	0.74	**0.78**	**0.67**
Availability of Data Manager	1.50	0.53	2.00*	0.00	0.00	0.00	1.47	0.61	**0.89**	**0.93**
Availability of trained statistician	0.60	0.84	0.62	0.87	0.00	0.00	0.63	0.89	**0.78**	**0.83**
Discussing data with colleagues	1.70	0.48	1.69	0.48	1.83	0.41	1.84*	0.38	**1.63**	**0.52**
Pressure from senior leaders	1.44	0.53	1.69	0.48	1.67	0.52	1.67	0.59	**1.22**	**0.44**
School has clear data-use goals & vision	1.00	0.71	1.77	0.44	1.33	0.82	1.37	0.60	**1.89***	**0.33**
Devolved data-use responsibilities	0.67	0.50	1.85	0.38	1.33	0.82	1.26	0.73	**1.00**	**0.5**
Partnering with universities & researchers	0.00	0.00	1.08	0.87	0.17	0.41	0.11	0.32	**0.00**	**0.00**
Partnering with other schools to use data	0.22	0.44	1.23	0.73	0.67	0.82	0.11	0.32	**0.00**	**0.00**
Availability of technology for using data	1.33	0.71	1.62	0.65	2.00*	0.00	1.22	0.55	**0.56**	**0.88**
Discussing about data with parents	1.50	0.71	1.69	0.48	1.67	0.52	1.37	0.68	**1.22**	**0.83**
Discussing about data with students	1.40	0.70	1.77	0.44	1.67	0.52	1.47	0.61	**1.11**	**0.78**
Structured time to use data	0.50	0.53	1.38	0.65	1.33	0.52	0.79	0.63	**0.78**	**0.44**

Note: 0=Never, 1=sometimes, 2=Often, M=Mean, SD= Standard Deviation; SCH= School

F4: Survey results- data-use statements

Statement	**SCH. 1 (N=10)**		**SCH. 2 (N=13)**		**SCH. 3 (N=06)**		**SCH. 4 (N=19)**		**SCH. 5 (N=09)**	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Data helps identify students' who, if they achieve well, will improve my school's results	3.60*	0.52	3.85*	0.38	3.67*	0.52	3.37*	0.60	**3.22**	**0.68**
Data adds to my workload	3.00	1.05	3.46	0.66	3.33	0.82	3.32	0.67	**3.11**	**0.60**
Pressure to use data can undermine my professional ethics	2.70	1.06	3.08	0.76	3.00	0.63	2.95	0.91	**2.33**	**0.71**

Data use practice and policies impact positively on my well-being	2.50	1.08	2.92	0.86	2.50	0.55	2.21	0.71	**2.11**	**0.60**
Data use demands takes me away from my teaching responsibilities	2.70	0.82	2.62	0.77	2.50	0.55	2.79	0.79	**2.33**	**0.71**
Sometimes I comply with data requirements that I do not agree with	2.50	0.85	2.46	0.66	2.83	0.41	2.95	0.71	**2.67**	**0.87**
Using data to compare schools, teachers and students can be depressing for me	2.10	1.10	2.54	0.78	2.83	0.75	2.89	0.99	**-**	**-**
Sometimes, data is misrepresented to meet accountability requirements in schools	2.50	0.70	2.85	0.69	2.83	0.98	2.68	1.06	**2.44**	**0.73**
Data is used more to control teachers than to improve other aspects of school	1.90	0.32	2.31	0.75	2.00	0.71	2.84	1.17	**2.56**	**0.73**
Data can be withheld if perceived as unfavourable or damaging to schools	2.11	0.60	3.00	1.00	1.83	0.75	2.89	0.68	**2.78**	**0.97**

Note: 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree, M=Mean, SD= Standard Deviation

Appendix G: Consent letter for head teachers

Edge Hill University

Lancashire, Ormskirk | [Telephone] | [Email]
Hollies, room 011
October 13, 2016
The Head teacher
X secondary school
England

Dear Sir/ Madam,

RE: RESEARCH PROJECT

I am a Graduate Teaching Assistant (GTA) at Edge Hill University, Ormskirk. As part of my PhD, I am doing a case study research on data-use in English secondary schools. This will be conducted in November 2016, and in May 2017.

It is a common knowledge that teachers use a variety of data (qualitative and quantitative) in their work. The aim of this study is to establish how these data is used by secondary school teachers in England, where data is particularly common. I hope this will contribute to our understanding of how data is interpreted and used and that the results may positively inform practice, research and policy in enabling schools to make better use of their data.

I would therefore like to request your permission to interview some teachers and yourself or your deputy for not more than 50 minutes each. I will also use a 3-minute questionnaire for teachers and request for anonymised sample of data used by teachers. Those that I intend to interview are:

1. Head teacher or deputy
2. Data manager (person responsible for managing data within the school)
3. Head of English, Mathematics or Science
4. Pastoral head
5. One class teacher/ tutor (any subject)

To do this, I would request to visit your school for a maximum of two occasions. I will not be sharing any data or personal information I gather with anyone and all digital data will be password protected. No names of individuals or schools will be recorded. Any information about individuals or the data samples gathered from participating schools will have their details and names of pupils removed and anonymised, including in the report. After my write-up, all information I collected will be destroyed and the anonymised summary of the report will be shared with participating schools on request. I will comply with the legal requirements in relation to the storage and use of personal data as set down in the Data Protection Act (1998) and any subsequent similar Acts.

If you are happy for me to undertake my project as outlined in this letter, please sign the slip below and sent it to me via email or using the above address, thank you. Your support is greatly appreciated.

Complaints

This project has been approved by the Research Ethics Board at Edge Hill University. If you wish to raise any queries or concerns about the ethical dimensions of this project with an independent person, please contact Joanne Morris, secretary to the University Research Ethics Committee (morrisjo@edgehill.ac.uk).

Many thanks.
Yours Sincerely,

Elisha O. Omoso
Faculty of Education, Department of Secondary Education
Hollies, room 011
Email: elisha.omoso@go.edgehill.ac.uk
Phone: 01695657744 Ext: 6744 Mobile: 07512879777

Appendix H: Consent form for head teachers and teachers

ITEM	DETAILS
Name of head teacher/ teachers	
Name of school	
School's address	

I have read and understood the conditions of the data-use research project to be undertaken by Elisha Omoso of Edge Hill University.

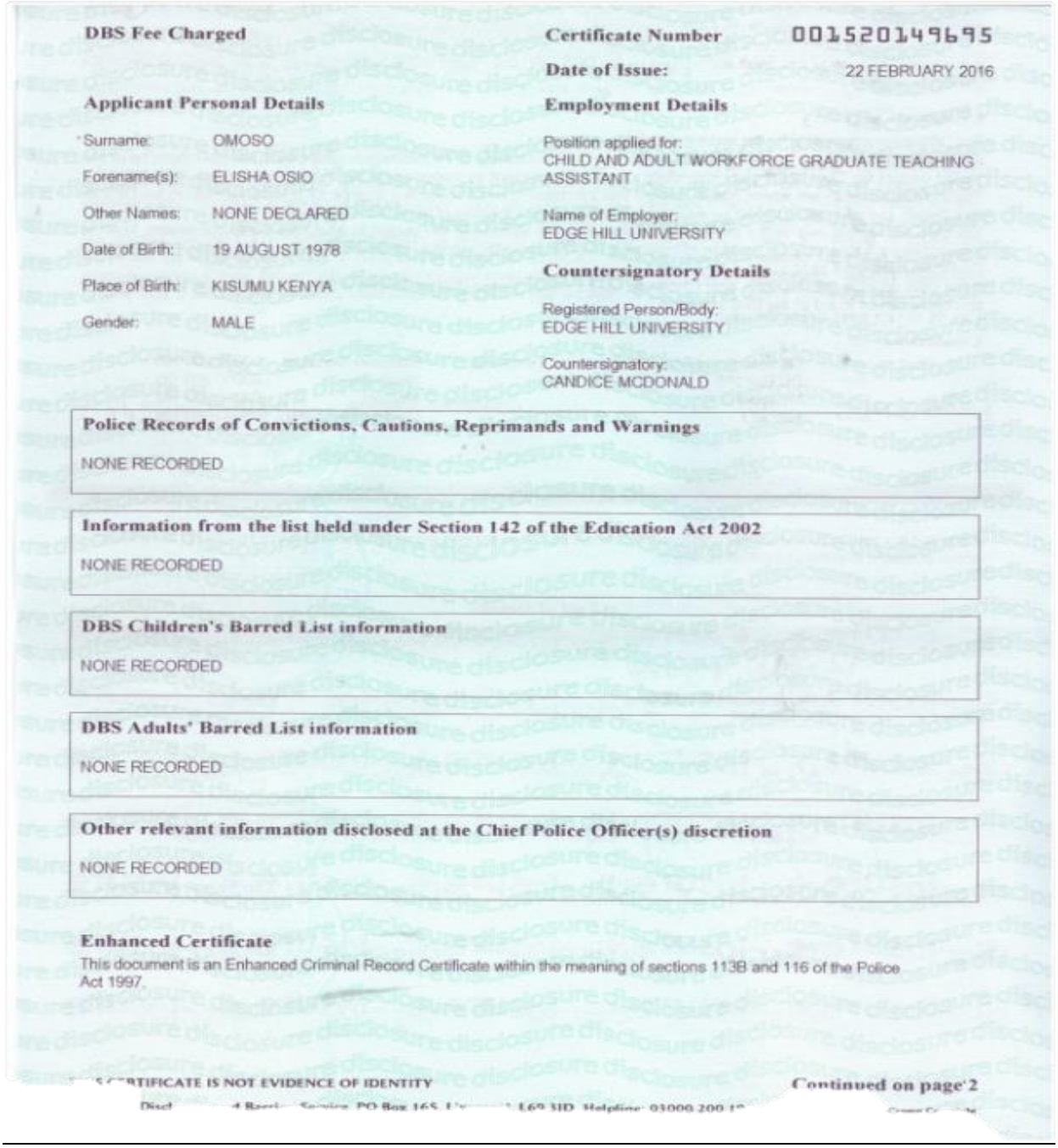
Please tick as appropriate:

I give consent for the school's participation in research project	
I do not give consent for the school's participation in the research project	

Signature: ……

Date: ……

Appendix 1: Disclosure and barring services (DBS) certificate



DBS Fee Charged

Certificate Number 001520149695

Date of Issue: 22 FEBRUARY 2016

Applicant Personal Details

Surname: OMOSO

Forename(s): ELISHA OSIO

Other Names: NONE DECLARED

Date of Birth: 19 AUGUST 1978

Place of Birth: KISUMU KENYA

Gender: MALE

Employment Details

Position applied for:
CHILD AND ADULT WORKFORCE GRADUATE TEACHING ASSISTANT

Name of Employer:
EDGE HILL UNIVERSITY

Countersignatory Details

Registered Person/Body:
EDGE HILL UNIVERSITY

Countersignatory:
CANDICE MCDONALD

Police Records of Convictions, Cautions, Reprimands and Warnings

NONE RECORDED

Information from the list held under Section 142 of the Education Act 2002

NONE RECORDED

DBS Children's Barred List information

NONE RECORDED

DBS Adults' Barred List information

NONE RECORDED

Other relevant information disclosed at the Chief Police Officer(s) discretion

NONE RECORDED

Enhanced Certificate

This document is an Enhanced Criminal Record Certificate within the meaning of sections 113B and 116 of the Police Act 1997.

...RTIFICATE IS NOT EVIDENCE OF IDENTITY

Continued on page 2

Appendix J: Summary Table of how school leaders (SLs) use data

School 1	School 2	School 3	School 4	School 5
▪ **Identifying needs and monitoring progress**: GCSE, RAISEonline, Ofsted reports, Pupil, staff and Parent surveys and student interviews data for identifying needs and school strengths/weakness (SL, ML). Staff attendance data for monitoring staff absenteeism; assessments data for monitoring general student progress; and NEET data for monitoring alumni placements (SL, MLs). Internal self-evaluation data for monitoring school performance against targets (MLs) ▪ **Targets, planning and policy development:** RAISEonline, GCSE, inspection reports, pupil, staff and parent surveys inform improvement policies such as challenge targets (MLs, SL). ▪ **For accountability:** Pupil premium (justify funding), SEN, attendance, behaviour and progress, GCSE, Ofsted reports, KS2 SATs, and pupil/ staff surveys used as Ofsted requirement (SL, MLs) ▪ **Evaluating teacher/ student performance:** GCSE, pupil progress, lesson observation for evaluating teacher performance in class (SL, MLs); CATs data for evaluating student abilities and KS2 SATs for setting targets for pupils and staff appraisal; staff for setting staff targets (SL, MLs, CT). ▪ **For conversations:** Lesson observation data informs dialogue between teachers and SLs (SL, MLs) ▪ **Motivating pupils:** Pupils with 100% attendance awarded certificates **(SL)** **Unintended use** ▪ **Misuse:** appraisal data for determining teachers' pay scale **(SL)** ▪ **Strategic focus** on KS2 Math and English (SL, MLs, CT)	▪ **Monitoring progress and identifying needs**: Pupil demographic data for identifying pupil socio-economic background; GCSE, RAISEonline, FFT, Ofsted reports, pupil/ staff/ parent surveys to identify areas for improvement (SL, ML). Staff attendance for monitoring staff absenteeism and NEET data for monitoring alumni placements (SL, MLs). Students' assessment data, School development plan and FFT for monitoring the general school progress (SL). ▪ **For accountability:** GCSE, Pupil premium, SEN, attendance, behaviour and progress, Ofsted reports, KS2 SATs, NEET, and pupil/staff surveys are public and used as Ofsted requirement (SL, MLs, CT) ▪ **Planning and policy development:** GCSE, RAISEonline, self-evaluation, NEET, Fisher Family Trust, Ofsted reports, Pupil, staff and Parent surveys to infrom planning and policy development (MLs, SL). ▪ **Evaluating student/ teacher performance:** Lesson observation, teacher appraisal (half-term reviews) and teacher information data for evaluating teacher strengths/ weaknesses for dialogue or support (SL); KS2 SATs for setting targets for students (SL, MLs). ▪ **Conversation:** Inspection report to talk with teachers and inspectors **Unintended use** ▪ **Strategic focus** on KS2 Math and English data (SL, MLs, CT)	▪ **Identifying needs and monitoring progress**: GCSE, RAISEonline FFT, Ofsted reports, pupil, staff and parent surveys for identifying school strengths/ weakness (SL, ML). Staff attendance and appraisal data for monitoring staff absenteeism and performance respectively (SL, MLs). Progress data for monitoring pupil progress and pupil surveys for monitoring pupil preceptions about the school (SL, MLs). ▪ **For accountability:** GCSE, pupil premium, SEN, attendance, behaviour and progress, Ofsted reports, KS2 SATs and pupil/ staff surveys used as Ofsted requirement (SL, MLs). ▪ **Targets and Planning:** Osted reports and self-evaluation data for school development planning (SL). Staff appraisal to set/plan targets for staff respectively (SL, MLs). Staff information data to plan internal professional development (SL). ▪ **Evaluating teacher or student performance:** Lesson observation, teacher appraisal and teacher information data for assessing teacher strengths/ weaknesses for **conversation** (SL). KS2 data for setting targets for pupils (SL). **Unintended use** ▪ **Strategic focus** on KS2 Math and English (SL, MLs) ▪ **Misuse:** appraisal data for progression through pay scale**s (SL)**	▪ **Targets, planning and policy development:** KS2 SATs to set (plan) targets for pupils. Pupil, staff and parents' surveys for strategic planning (SL). Inspection report informed the start of Engaged With Learning (EWL) and Engaged With Homework (EWH) teaching and learning policies (D, SL, ML). ▪ **Identifying needs and monitoring progress**: GCSE, Ofsted reports, pupil/staff /parent surveys for identifying school strengths/ weakness (SL, ML). Pupil progress data to monitor pupil progress during data catchment poinst (ML, SL). ▪ **Meeting accountability demands:** GCSE, pupil premium, SEN, attendance, behaviour and progress; Ofsted reports, KS2 SATs, and pupil/ staff surveys used as Ofsted requirement (SL, ML, CT)**;** NEET indicating alumni placement (website). ▪ **For conversations:** Lesson observation data informs dialogue with teachers (SLs) ▪ **Evaluating teacher or student performance:** Lesson observation and student attendance data, for example, 100% attendance is 'Gold', 98.5 to <100%= Silver, 97 to <98.5%= Bronze, and <97% =attendance concern (website). KS2 data for setting targets for pupils (SL). **Unintended use** ▪ **Strategic focus** on KS2 Math and English (SL, ML, CT)	▪ **Identifying needs and monitoring progress**: Pupil, teacher and parent surveys to identify and monitoring their concerns about the school (ML, SL). GCSE and lesson observations data for identifying areas for improvement (SL, MLs). Teacher appraisal and attendance data to monitor teacher progress and absenteeism respectively (SL, MLs). Internal self-evaluation (thrice a year) to track school progress (SL). ▪ **Targets, planning and policy development:** MidYIS data to generate targets for pupils (CT, MLs, SL). ALIS gives predictors for the A-level choices (SL). Inspection report, school development plan, pupil, staff and parents' surveys for strategic planning and policy development (e.g., pupil surveys instigated the development of anti-bullying and e-safety policies). ▪ **Meeting accountability demands:** Pupil achievement/progress data to make teachers accountable. Inspection report for accountability to the public (CT); NEET indicating alumni placement (website). ▪ **Self-reflections:** asking questions such as what is stopping that child from making progress in Maths. Is it the trend? Is it the teacher or just one-year group? (SL) ▪ **Evaluating teacher performance:** Lesson observation for evaluating teacher performance in class and to **justify** termination of teaching contract (SL, MLs). External evaluation data (from consultant) to evaluate teaching and management (SL). ▪ **For conversations:** Lesson observation/ appraisal data informs dialogue between teachers and SLs (SL) ▪ **Public relation (PR):** School development (ML), and inspection data for marketing the school to the public and to prospective students (ML, school's website)

Appendix K: summary Table of how teachers use data (MLs) and CTs

School 1	School 2	School 3	School 4	School 5
▪ **Identifying and monitoring progress**: GCSE, RAISEonline, Ofsted reports, staff attendance and internal self-evaluation data used by the academic MLs to identify department weakness/ strengths (MLs). KS2 (Pupil premium, SEN, behaviour, intake and attendance) data and CATs for identifying pupil background-profile and abilities by MLs (CT, MLs, SL). Pupil progress, assessment (3 exams + half-term tests per year), PP, SEN, data for tracking pupil performance against targets (CT, MLs, SL, D). Pupil/ teacher attendance for monitoring absenteeism (MLs, SL). behaviour data for tracking pupil behaviour (CT, MLs) ▪ **Planning:** Pupil progress and SEN data to plan lessons (SL, ML, CT). CATs, SEN, and PP data used by academic MLs to group (plan) pupils into ability sets (SL, MLs, CT). Ofsted inspection reports used by ML to inform department planning (SL, MLs) ▪ **Accountability:** Pupil behaviour, NEET, PP, progress, attendance, KS2 SATs used for accountability (CT, MLs, SL) ▪ **For conversations:** Pupil attendance, SEN, progress, behaviour, and lesson observation data inform dialogue between students, parents or teachers (CT, MLs) ▪ **Improve teaching:** Pupil progress and SEN to pitch lessons and to select teaching resources such as coloured worksheets or posters for SEN students (ML, CT). ▪ **Self-learning**: Pupil progress and GCSEs data for self-reflections (ML) **<u>Unintended use</u>** ▪ Pupil behaviour and attendance to punish/detain (SL, MLs, CT)	▪ **Identifying and monitoring progress**: KS2 (Pupil premium, SEN, behaviour, intake and attendance) data and CATs for identifying pupil background and for profiling student ability by MLs (CT, MLs, SL). Pupil progress, assessment (every 7 weeks), PP, SEN, data for tracking pupil performance against targets (CT, MLs, SL, D). Pupil/ teacher attendance for monitoring absenteeism (MLs, SL). behaviour data for tracking pupil behaviour (CT, MLs) ▪ **Targets and planning:** Pupil progress and SEN data to inform lesson planning (SL, ML, CT). CATs data used by academic MLs to group (plan) pupils into ability sets and to set them targets (SL, MLs, CT). Ofsted inspection reports used by ML to inform department planning (SL, MLs) ▪ **Accountability**: Pupil behaviour, PP, progress, attendance, SATs for accountability (CT, MLs, SL) ▪ **Improve teaching:** Pupil assessments and SEN to pitch lessons (ML, CT). Pupil behaviour data informs withdrawal of misbehaving pupils from distracting the rest during lesson (ML) ▪ **For conversations:** Pupil attendance, SEN, progress, behaviour, and lesson observation data inform talks between students, parents or teachers (CT, MLs) **<u>Unintended use</u>** ▪ Pupil behaviour to punish/detain (SL, MLs, CT)	▪ **Identifying and monitoring progress**: GCSE, Ofsted reports, staff attendance and internal self-evaluation data used by the academic MLs to identify department weakness/ strengths (MLs). KS2 (Pupil premium, SEN, behaviour, intake and attendance) data and CATs used by MLs to identify pupil background-profile and abilities for support (MLs, SL). Pupil progress, assessment (3 exams + half-term tests per year), PP, SEN, data for tracking pupil performance against targets (MLs, SL). Pupil/ teacher attendance for monitoring absenteeism (MLs, SL). behaviour data for tracking pupil behaviour (SL, MLs). Progress data to highlight underachieving students (ML). ▪ **Planning:** Pupil behaviour, progress and SEN data to plan lessons (SL, MLS). CATs data used by academic MLs to group (plan) pupils into ability sets (SL, MLs). Ofsted inspection reports used by ML to inform department improvement planning (MLs) ▪ **Accountability:** Pupil behaviour, PP, progress, attendance, SATs used for accountability (MLs, SL). ▪ **For conversations:** Pupil attendance, SEN, progress, behaviour, staff information and lesson observation data inform dialogue with students, parents or teachers e.g., in parents' evening (SL, MLs) ▪ **Motivating pupils:** pupils with the best attendance entered a draw competition for award (ML) **<u>Unintended use</u>** ▪ Pupil behaviour to punish/detain (SL, MLs)	▪ **Identifying and monitoring progress**: GCSE, Ofsted reports, staff attendance and internal self-evaluation data used by the academic MLs to identify department weakness/ strengths (MLs). KS2 (Pupil premium, SEN, behaviour, intake and attendance) data and CATs for identifying pupil background-profile and abilities by MLs (CT ML, SL). Pupil progress, assessment (every 6 weeks), PP, SEN, data for tracking pupil performance against targets (CT, ML, SL, D). Pupil/ teacher attendance for monitoring absenteeism (MLs, SL). behaviour data for tracking pupil behaviour (CT, ML) ▪ **Planning:** Pupil behaviour, progress and SEN data to plan lessons (SL, ML, CT). CATs data used by academic MLs to group (plan) pupils into ability sets (SL, ML, CT). Ofsted inspection reports used by ML to inform department planning (SL, ML). Teacher appraisal used by the ML to set targets for teachers (ML) ▪ **Accountability:** Pupil behaviour, PP, progress, attendance, KS2 SATs for accountability (CT, ML, SL). ▪ **For conversations:** Pupil attendance, SEN, progress, behaviour, and lesson observation data informs dialogue with students, parents or teachers (SL, ML) ▪ **Improve teaching:** Pupil progress and SEN to pitch lessons (ML, CT). SEN data to adapt teaching e.g., giving blue paper for children who prefer blue colour (ML). Lesson observation data to swop teachers to teach specific ability sets where they excel (ML). ▪ **Evaluate teacher performance:** GCSE, pupil progress, lesson observation to evaluate teacher performance (ML). **<u>Unintended use</u>** ▪ Pupil behaviour to punish/detain (SL, ML, CT)	▪ **Identifying and monitoring progress**: GCSE, staff attendance and internal self-evaluation data used by the academic MLs to identify department weakness/ strengths (MLs). Pupil intake/demographics, SEN, behaviour, intake and attendance data to profile pupil background traits for safeguarding (CT, MLs, SL). Pupil assessment (every 6 weeks) for tracking pupil performance against targets (CT, MLs, SL). Pupil attendance and behaviour data for monitoring pupil absenteeism and behaviour respectively for confinements (CT, MLs, CT). SEN data for monitoring SEN performance (SL). **Planning:** Pupil behaviour, progress and SEN data to plan lessons (ML, CT). Entrance exams/CATs data used by academic MLs to group pupils into ability sets (SL, MLs, CT). **Accountability:** Pupil behaviour, progress, attendance for accountability (CT, MLs, SL) ▪ **For conversations:** Pupil attendance, progress, behaviour, and lesson observation data informs talks between students, parents and teachers (CT, MLs) ▪ **Improve teaching:** Entrance exams data to pitch lessons (ML, CT). SEN and assessment inform lesson planning e.g., teaching resources for SEN group (CT) ▪ **Self-learning**: Pupil progress, attendance, behaviour and GCSE data used for critical reflections e.g., what caused good or bad results, is it the teacher, home environment etc.) and it can be improved (SL, MLs, CT). **<u>Unintended use</u>** ▪ Pupil behaviour to punish/detain (SL, MLs, CT)

Between the brackets the data sources from which the evidence originate can be found: SLs, MLs, CT, Data sample (D), and websites

Appendix L: Definitions and descriptions of the data schools collect

DATA TYPE	Definition and a brief description
Input data	
Pupils intake/ demographic	This is data on various characteristics of the pupils e.g., gender, religion, family background, income etc.
Special Educational Needs (SEN)	SEN data is about children with learning difficulty or disabilities (physical or mental) than many others in the same age
Pupil Premium (PP)	PP is data on disadvantaged pupils who get additional government funding to support their learning to close their achievement gap. Schools have the freedom to decide on how to use PP money but are accountable for its use.
Primary school KS2 SATs	Standards Assessment Tests (SATs) reflects the level a child is working at**.** Pupils sit for SATs at end of primary school in year 6.
School Development Plan	This is data bout the schools' future improvement plans
Cognitive Ability Tests (CATs)	CAT is Cognitive Ability Test. It assesses the abilities involved in thinking (e.g., reasoning, memory, verbal, mathematical ability and problem solving.
Diagnostic entrance exams	This is an exam given before learning to enable teachers identify prior knowledge, misconceptions, learning needs and thus inform planning
MidYIS	MidYIS stands for 'Middle Years Information System'. MidYIS is a computer-adaptive assessment for pupils aged 11-14. It helps teachers predict how an individual pupil is likely to perform in the GCSEs.
ALIS	ALIS stands for 'A-Level Indicator System'. ALIS is a target setting system for students aged 16-18. It is run by the Centre for Evaluation and Monitoring (CEM) of Durham University. ALIS data provides pupil's expected grade at A-Level based on their average GSCE point score. ALIS therefore, is not predictions from teachers but are expected grades based on nationally produced data. It helps teachers know the progress students are making.
Process data	
Lesson observations	This is data based on the observations made when a teacher is teaching.
Teacher attendance	It's data measuring staff's regular presence in school
Teacher personal information	This is data about teacher qualifications
Pupil behaviour	Pupil behaviour data is one about and aimed to regulate the conduct of pupils
Pupil attendance	This is data measuring pupil's regular presence in school
*Pastoral	This is a group of pupil management data. They are used to identify and remove barriers to pupil learning (academic, emotional and behaviour). These data include: Pupil Progress, Attendance and behaviour (PAB) data
Progress/assessment	These data indicate where a pupil is in terms of level of progress towards targets and their attitude to learning in each subject.
Fisher Family Trust (FFT)	FFT data provides estimates of what a child might be expected to achieve at later key stages, based on their past performance and the average achievements of children judged by the trust to have similar characteristics.
Output/outcome data	
School inspection/ISI report	Inspection data is external evaluation which reports on the effectiveness of individual schools based on certain accountability parameters
Achievement/GCSE/League tables	These are data showing what pupils have achieved at the end of a schooling.
RAISE online	RAISEOnline means Reporting and Analysis for Improvement through Self Evaluation. It's an online data system from the Department of Education (DfE). It gives analyses of a child's performance through to KS4.
School leavers (NEET)	Not in Education Employment or Training (NEET). This data shows students not in education, employment or training after secondary education
Self-evaluation	Self-evaluation data is one about the school's internal review
Teacher appraisal/performance	This data which rates the performance of individual teachers. The data also provides a measure of accountability to the public.
Context data	
Staff surveys	This is data about staff feeling in school
Pupils/ parents' surveys	This is data about pupils' or parents' feeling and attitude towards the school
Pupil interviews	