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Data-Based Decision Making in the School Environment: An Assessment of Data Use by Secondary School Teachers in Kisumu East District, Kenya

ELISHA OSIO OMOSO

SUPERVISORS

Dr. Kim Schildkamp

Prof. Dr. Jules Pieters

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Abstract

Schools have been collecting and consolidating data for decades. Teachers can use this data to improve the functioning of their teaching and their schools. However, studies on data use in schools are predominantly Western-based. The purpose of this study was therefore, to assess the extent of data availability, its use, as well as factors promoting and hindering its use by teachers and school leaders in Kisumu East district, Kenya. This explorative study has been based on a conceptual framework showing factors hypothesized to influence data use in organizations. The study used multiple case study design to explore data usage in three homogeneous schools using 21 purposively sampled respondents that included school leaders, Heads of Departments (HOD's) and class teachers (CT's). To answer the research questions, qualitative data were collected using interviews and document review. Instrument reliability was ascertained through piloting and expert review. Validity of data was realized by triangulation and audio recording of all interviews and then transcribing and writing reports that were then taken to respondents for member checks and validation. External validity was realized using specific and cross-case thick description of the cases. Qualitative data obtained from in-depth interviews and document analyses were analyzed on an ongoing process as themes and sub themes emerged. The interviews reports were analyzed using NVIVO software that allows for coding of themes and sub-themes in line with the research questions and the conceptual framework.

The study established that the schools studied have similar input, process and outcome data available. On the other hand, context data available in the schools had minimal variations. The factors promoting and hindering data use in the schools were also similar to a great extent. The study further reveals that school leaders mainly used school level data to monitor, plan and develop policies mostly aimed at school and curriculum improvement initiatives as opposed to teacher improvement initiatives. On their part, teachers mainly use classroom level data to plan their lessons and monitor their students' progress. The study recommended that schools should conduct training for staff on data use skills and invest in data systems and technology as a way to promote the quality of education. Future studies also need to include parents and students' cooperation as a factor that may promote and hinder data use in the context of schools in developing countries.

Key words: *Data, data use, school improvement, curriculum improvement, teacher improvement, promoting and hindering factors*

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LIST OF ABBREVIATIONS

BOG's Board of Governors
CBE Curriculum-Based Establishment
CT's Class Teachers
DC District Commissioner
DEO District Education Officer
DQASO Directorate of Quality Assurance and Standards Officer
EFA Education for All
HOD's Heads of Departments
KCPE Kenya Certificate of Primary Education
KCSE Kenya Certificate of Secondary Education
KIE Kenya Institute of Education
KNBS Kenya National Bureau of Statistics
KNEC Kenya National Examinations Council
MDG's Millennium Development Goals
MOE Ministry of Education
MOEST Ministry of Education, Science and Technology
SL School Leader /Principal/ Deputy Principal
SMC's School Management Committees
TIVET Technical Industrial Vocational and Entrepreneurship Training
TSC Teachers Service Commission
UN United Nations
USA United States of America

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CHAPTER ONE

1.0 DATA USE IN THE SCHOOL ENVIRONMENT

This chapter introduces data use in the school environment, defines data, data-based decision making, curriculum, school and teacher improvement. Next, it presents the background and, rationale for data use in schools. Towards the end of the chapter, the context of the problem is described and the problem stated followed by formulation of the study objective and research questions.

1.1 Introducing data use in the school environment

Decision making for improvement is important for institutions to remain relevant and competitive to their ever-changing environment. It is even essential for schools because with proper decision making, schools are able to know where to channel their limited resources, identify areas of need, improve students' achievement and respond to their most urgent needs. However, decision making without data may at times become very difficult, chaotic and in some cases not lead to positive results or may even lead to unintended results. Data therefore, are vital in the working of schools especially in providing adequate information to inform school, curriculum, and teacher improvement decisions. Having introduced data use in the school environment, we now shift our focus towards defining key terms that will be used in this study.

1.2 Definition of terms used in the study

i) Data

Data has been defined in different ways depending on the authors and the study involved. Davenport & Prusak (1998), for instance, defines data as "a set of discrete, objective facts about events" (p.2). Schildkamp & Kuiper (2010) concur but narrow down the definition to objective facts and figures used in the functioning of the school, such as learning and student achievements. One common thing about the two definitions is that data are facts that have not been analyzed and interpreted. On the other hand, Schildkamp, Ehren & Lai, (2012) define data as- "all the relevant information on students, schools, and teachers that the school's staff need for decision making (e.g. assessment results and teacher surveys) and can include both qualitative and quantitative data" . According to this definition, data is the same as information. It is this definition that we adopt and use throughout in this study.

ii) Data –based decision making

From data enters "data –based decision making" or data use in schools, - a topic under a lot of debate and research partly because linking data to decision making is complex and also because this area of study is also significant. In an attempt to distinguish between data and decision making, Cousins & Leithwood (1993) argue that data is useable only after analysis, interpretation and then action taken based on data. In other words, data is rarely used in the form in which it is presented. Similarly, Schildkamp & Kuiper (2010) argue that data-based decision-making is a systematic analysis of existing data sources and then applying outcomes of the analyses to innovate teaching, curricular, and school performance and then, evaluating those innovations. In the context of this study, data-based decision-making is used to refer to the purposeful use of information generated from data to inform or guide curriculum, teacher and school improvement actions (Schildkamp & Kuiper, 2010).

iii) Curriculum improvement

Improving the curriculum is complex and occurs at different levels. First, curriculum, defined as a plan of learning by Taba in 1962, has several components such as:- rationale, aims and objectives, content, learning activities, teacher role, materials and resources, grouping of students, time, location and assessment all of which relate to each other in the so- called curricular spider web (Van den Akker, 2003). Improving the curriculum therefore, implies bettering any or a combination of the curriculum components. Such an action may take place at different curriculum levels, for instance, at macro (national) or messo (school) levels and involves analysis, design, development, implementation and evaluation. Second, different curriculum levels emphasize on improving certain components of the curriculum more than others. At national level, for instance, improvement might focus on bettering the rationale, aims and content. At messo (school) level, teachers may have room to improve the

remaining curriculum components by, for example, choosing their own learning activities, teaching materials and resources, changing teacher roles, grouping students, decide on where to learn a topic, time to teach and modes of assessment. Similarly in the context of this study, curriculum improvement is confined to school level and it is used to refer to the ongoing process of analyzing the curriculum, instruction, and assessments to determine ways to improve student learning and test scores (e.g. using assessment data, to focus on certain topics, increase teaching hours, and early syllabus completion).

v) Teacher improvement

No matter how well-defined education may be, it is the quality of the teachers that matters. In the context of this study, teacher improvement refers to the process by which teachers acquire new knowledge, skills and values which will improve the service they provide to clients (Hoyle & John, 1998). For instance, supporting teachers to learn new ways of teaching topics they have taught for years. This might be visible in providing on- going in-service programs to help teachers update, improve and sharpen their skills and methods so that they are in a position to help student understand concepts.

iv) School improvement

School improvement is the sustained and systematic quest for enhancement of pupils learning, in which strategic planning, goal setting and the development of a learning culture enables the school to both absorb and react to the rapidity of change within the post modern world (Cromey-Hawke, 1998). From the definition, school improvement is viewed as a process whereby the school focuses on enhancing the quality of pupil's learning (Hollins, Gunter, & Thomson, 2006) . In the context of this study, school improvement refers to a sustainable promotion of pre-conditions of pupil's achievement through strategic planning, setting and evaluation of goals achievement, and building capacity of school to enhance quality of pupil's learning (e.g improvement in schools mean score index in final examinations).

In the actual school setting however, the curriculum, teacher and school improvement components overlap such that an effort to improve one component in most cases end up improving another component as well. For example, improving the teachers end up improving the conditions of learning in schools hence resulting into school improvement. Diagram 1 below provides a simplified representation of that overlap

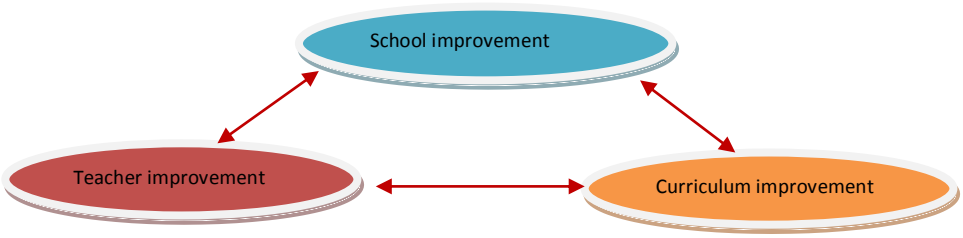

Diagram 1: The overlapping nature of the school, teacher and curriculum improvement

Having defined the terms used in this study, we now shift our focus to the background and rationale for using data in schools.

1.3 Background of data use in schools

First, we know from studies that schools have been collecting and consolidating data for decades (Messelt, 2004). We also know that, studies on data-based decision making in schools have also begun to receive much attention in education for three reasons. First, high stake pressure on schools to be more accountable for the education they provide(Macbeath, 2010). Second, the recent evidence implicating data use in improving student achievement (Carlson, Borman & Robinson, 2011) and third, the passing of the No Child Left Behind (NCLB) Policy in the Unites States of America (USA) in the year 2001 (Macbeath, 2010).

The policy, for instance, increased interest in inspection as a mechanism by which schools are held to account. As a result, schools' staff in the Western countries, especially those in the USA, began focusing on keeping and using data (Messelt, 2004; Schildkamp & Kuiper, 2010; Spillane, 2012). Consequently, other consumers of data from schools (e.g. policy makers, researchers, parents, and education administrators) have also started getting actively involved in the topic.

We also know that contextual differences or cultural bias highly influence data-based decision making in the school environment. Studies from different contexts, for example, USA (Booher-Jennings, 2005; Koretz, 2003; Wayman, 2005; Wohlstetter, Datnow, & Park, 2008), New Zealand (Lai, McNaughton, Amituanai-Toloa, Turner & Hsiao, 2009; Lai, McNaughton, Timperley & Hsiao, 2009), The Netherlands (Schildkamp, & Kuiper, 2010; Schildkamp et al., 2012), South Africa, Flanders, England and Canada (Schildkamp, Lai, & Earl, in press), continue to provide a strong picture that outcomes of data-based decision making in the school environment is highly influenced by contextual differences in schools or countries where the study is conducted. For example, high- stake accountability pressures from the schools' internal or external environment as in The USA and England, are likely to generate strategic responses from school's staff. This may include, schools focusing only on small range of accountability measures and the data used to evaluate the school performance. For instance, student achievement results or school inspection report may form a centre of focus for schools because of the high-stake context in which most data are generated. This also affects the types and quality of data that teachers and schools use to inform teaching and improvement.

Finally, despite data-based decision making continuing to gain attention, the idea still remains clouded by misinterpretations. For instance, Schildkamp, Ehren & Lai (2012), argue that data use in schools, is often misinterpreted by many to only mean the use of quantifiable student assessment and national tests scores. According to the authors, this view is cemented by some policy makers and researchers who mainly focus on test results as the primary source of data about schools and therefore, end up disregarding other forms of data available in schools. However, Schildkamp & Kuiper (2010) presents a different interpretation. The two authors argue that schools have different data available and should make use of these different data sources. It is this view that we hold and stick to throughout this study.

1.4 Rationale for data use in schools

There is a great potential for data to support and improve education. Several sources, for instance, provide explicit and implicit evidence implicating data use to school, curriculum, and teacher improvement in different ways (see for example: Breiter & Light, 2006; Campbell & Levin, 2009; Carlson, et al., 2011; Cawelti & Prethethore, 2001; Spillane, 2012; Young, 2006). Proper use of data, may support, for example, improvement of instruction (Young, 2006), identification of problems and areas of need (Schildkamp, Rekers-Mombarg & Harms, 2012; Schildkamp & Handezalts, 2011), conversations (Breiter & Light, 2006; Pretheroe, 2009), motivating students and staff (Diamond & Spillane, 2004) and, enhancement of individual self reflection and learning (Breiter & Light, 2006; Brunner et al., 2005; Young, 2006). Other sources also argue that data may also be used to inform decisions on teacher professional needs (Breiter & Light, 2006), meeting accountability demands (Coburn & Talbert, 2006; Douglas & Julie, 2002), planning and policy development (Breiter & Light, 2006; Coburn & Talbert, 2006), aiding personnel related decisions (Kerr, Marsh, Ikemoto, Darilek, & Barney, 2006) and, to legitimize staff's actions (Coburn & Talbert, 2006; Diamond & Spillane, 2004). All these efforts are expected to enhance school, curriculum and teacher improvement either directly or indirectly. For example, data may aid teacher improvement decisions (e.g. changing instructional strategy, and teachers professional development), curriculum improvement decisions (e.g. re-teaching certain topics) which should then lead to school improvement (e.g. improving students' test scores and school performance). Moreover, policy makers' support for data use is unwavering. Some even argue that the only way to increase student achievement levels is for school staff to base their decisions on data (e.g. assessment results and student data) since this removes politics and ideology from the decision making process and help focus on teaching and learning (Honig & Coburn, 2008). Spillane (2012) also concur that policy makers put a lot of faith in data to move practice in schools.

Below we now change focus to in-depth literature-backed discussions showing ways in which data may, or has been used by schools for curriculum, teacher and school improvement. However, prior to that discussion, we again re-emphasize that curriculum, teacher and school improvement actions do overlap (See Diagram 1). However, quite often, curriculum and teacher improvement actions result to the general school improvement. That reminder is important because such overlaps are likely to emerge in our next discussions on data use for curriculum, teacher and school improvement.

1.4.1 Data use for curriculum improvement

Curriculum improvement requires the support of data from different angles. First, data can support planning and policy development (Breiter & Light, 2006). Analysis of test results, for example, may present results that prompts schools to adjust policies touching on their timetable, testing, teaching hours, grouping academically weak students for more couching and, or the location to learn a topic(e.g. field excursion). Pretheroe (2009), also argues that the use of high quality assessment data in the hands of school staff trained to use it may improve ways in which teachers attend to the curriculum. Teachers for instance, were reported analyzing examinations results and basing certain curricular decisions on it including deciding which groups of students or topics need more attention in the next school year (Cawelti & Prethethore, 2001; Young, 2006). Research evidence (Robinson & Lai, 2006) also indicate that when schools base their decisions on data (especially assessment data), it can aid improvement planning and policy development in areas of learning and student achievement. Schildkamp et al.,(2012) also discovered that by analyzing final examinations data, schools' staff were can be able to learn and plan more about their schools. Furthermore, according to Schildkamp, Reckers-Mambarg & Harms, (2012), examination results data are good tools for policy development. Moreover, these authors studied group differences in examinations results from Dutch schools and established that final examinations and assessment scores, provided significant insight into the level of learning for each student. Based on school targets, the schools were then able to use the data to revise their policies to in order to improve and increase student achievement. Other studies (Breiter & Light, 2006; Coburn & Talbert, 2006), also report that, school leaders were using data to plan, develop policies, set school priorities, goals, plan test activities and make annual school calendars. A school leader who is not satisfied with dramatic change in students' behavior in the school, for example, may critically analyze students' survey responses. Based on the findings, he may come to a conclusion that he should change school policy (Breiter & Light, 2006) to allow, for instance, more recreational activities for students such as games. However, it does not stop there. The next data that he collects from students' survey responses can then enable him monitor and evaluate (Kerr, et al., 2006), whether the new policy impacts positively or negatively on his students' behaviour. This can provide a legitimate ground (Coburn & Talbert, 2006; Diamond & Spillane, 2004) to adjust the school policies accordingly and timely for the general improvement of the students and the school.

According to Streifer (2002), data aid school's staff in monitoring curricular growth over time, identify and evaluate the curriculum and to, share best curricular practices. The study argue that data helps to analyze the curriculum through all grade levels by systematically refining the curriculum to improve flow, continuity, rigor of instruction and, to manage the process for sustainability. Moreover, teachers and school leaders armed with proper data might also be able to influence changes in the curriculum. For example, data can enable staff to tell whether certain groups or individual students have been disproportionately tracked into lower levels classes or special education and therefore, put in place ways to close such achievement gaps (Messelt, 2004). For instance, teachers may gather data about their own students and practices and it use to identify and solve curricula problems.

Data can also act as a reference point for motivating students. A study by Diamond and Spillane (2004), that involved high performing urban elementary schools within high-stake accountability system did established that these high performing schools used data to praise past performance of the school's staff, and, to emphasize continuous improvement. In such schools, the individual student and staff performance were praised during team meetings and the same was also displayed within the school and communicated to parents thus motivating all students and staff to continue working hard.

Data may also support conversations with teachers, students or parents. For example, data from examination results can form a starting point for discussions with fellow teachers, administrators, parents, and students (Breiter & Light, 2006; Brunner, et al., 2005; Pretheroe, 2009). Furthermore, a study on data use by school leaders (Earl & Katz, 2002) found that school leaders involved in data use often consider themselves in charge of their own destiny and were increasingly able to use information from data to inform their discussions with teachers, parents or students

1.4.2 Data use for teacher improvement

A study finding by Cawelti and Pretheroe (2001), reveals that data help teachers to share evidence based- instructional techniques. Analysis of student test results, portfolios, homework, student conferences and classroom observations, for example, may provide teachers with different types of information such as discrepancies between student groups (Schildkamp et al., 2012). This may in turn, enable teachers to better understand student thinking and learning and therefore improve their classroom instruction (Cawelti & Prethethore, 2001; Honig & Coburn, 2008; Young, 2006) and, or support better conversation with their students (Brunner, et al., 2005; Pretheroe, 2009).Case studies and interviews further suggest that data use may have a positive effect on the people involved in the education process. Feldman & Tung (2001) for example, observed that schools using data often evolved towards a more professional culture. Educators in their study became more collaborative during the data-based decision making process, and the school business consequently became less "privatized". Likewise, Nicholas & Singer (2000), reported increased departmental collaboration. One teacher in their study remarked, "We saw a total picture verses just our department" (p.36). Another almost similar study by Symonds (2003) presented a variety of data showing that teachers involved in data inquiry were more collaborative. This in turn helped them to learn from each other, communicate effectively with stake holders and with their students. Furthermore, a study by Armstrong & Anthes (2001) also reveal that the introduction of data use heightened teacher expectations of at-risk students. The study reported positive changes in teacher attitudes with regard to the potential success of previously low-performing students.

Moreover, schools' staff also used data to reflect on their own functioning including establishing what went well and what did not (Breiter & Light, 2006; Brunner, et al., 2005; Young, 2006). In these studies, data use increased teachers' concern and sensitivity in their job. The studies also present the best grounds for considering data usage as central to teacher improvement in terms of improving the quality of instruction.

Data can guide teacher professional development decisions. Breiter & Light, (2006) while studying data use by school leaders, report that school leaders were using data such as final examination results to inform their staffs' professional development decisions. Furthermore, in a longitudinal case study that described a leadership team whose research role evolved into prominence over four years of study, Chrispeels (1992) found that the more the team learned about data; the more they used data to inform important decisions they made. The findings were regarded as an empowering process generated by data usage. Armstrong & Anthes (2001) and Massell (2001) also found that data was helpful in improving educator attitudes towards educational practice and their students. Administrators in Massell's study, for instance, viewed data use as stimulating search for new ideas and encouraged many to seek professional development.

1.4.3 Data use for School improvement

According to several sources, data use by teachers and school leaders can lead to school improvement in terms of increased student achievement (see for example: Campbell & Levin, 2009; Cawelti & Prethethore, 2001; Lai, et al.,2009).Furthermore, studies (Edmonds, 1979; Stringfield, 1994; Teddlie & Reynolds, 2000) also reveal that schools demonstrating unusual gains in academic measures have shown that the thoughtful use of student data (e.g. student profile data), positively correlates with a range of measures on student achievement. Further research on school improvement also asserts that data use is central to the school improvement process (Chrispeels, 1992; Earl & Katz, 2002). Moreover, there are case studies describing ways in which data supports decisions for school improvement (Feldman & Tung, 2001; Lachat, 2002; Symonds, 2003). Data from these studies show

that schools using data to guide their practices registered sustained improvement in student test scores. The studies also report that schools using data were also better in their running. Another study by Carlson, Borman & Robinson (2011) analyzed students' achievement in Mathematics and reading outcomes from a District –level random assignment study that fielded over 500 schools in the USA for a period of one year. The study found that the data-driven reform initiative caused statistically significant district-wide improvement in students' Mathematics achievement. The study also established that data- driven reform intervention had positive effect on students' reading achievement.

Data can also be used to monitor, identify and solve school problems. While working with, and studying data teams in Dutch schools, Schildkamp & Handezalts (2011), for instance, were able to show that schools can use collaborative data teams comprising of teachers working collaboratively to identify and solve a certain educational problem using a structured approach . In their study, the role of the data team was to define a problem, develop hypotheses about what causes the problem, collects data to either accept or reject the hypotheses, analyze and interprets the collected data, come up with conclusions and measures to solve the problem, and to evaluate the effectiveness of the measures. The results of the pilot study showed that data teams can be effective in two different ways: First, a data team uses data to solve a problem, hence improving education and second, data teams help team members learn how to use data to improve their work.. The study also report that the discussions and knowledge sharing sessions on school wide issues within the data teams, significantly helped reduce isolation in the profession. Moreover, Schildkamp, et al.,(2012) also found that by analyzing final examination results in Dutch schools, teachers were able to identify the factors that facilitate success or lead to failure. Also, Earl & Katz (2002) concur that data helps schools' staff to identify and pin-point areas of need. In another study involving schools that continued to improve in performance tests yet had students who were typically categorized as "at-risk", Cawelti & Pretheroe (2001) found that all schools which improved in that study, began their improvement efforts by carefully reviewing test data to identify where they were succeeding and where they needed to direct their efforts for improvement. Furthermore, in a study of Maryland elementary schools, Schafer et. al.,(Undated) report that in schools that were successful in terms of student achievement, their staff were continuously monitoring assessments data of students and then making improvement decisions based on those assessments

Studies from high stakes accountability systems also show that data may be used to legitimize school improvement actions taken by school's staff (Coburn & Talbert, 2006; Diamond & Spillane, 2004). A study by Diamond & Spillane (2004) for instance, report that school leaders used data to push teachers to change their practices (e.g. increasing teaching hours or re-teaching a topic) based on hard evidence. Coburn & Talbert (2006) further report that teachers and school leaders armed with data easily defended their actions before their fellow colleagues. Data-based arguments were thus found to enhance understanding and acceptance of the reasons advanced, for instance, in staff meetings. Moreover, Douglas and Julie (2002) also report that greater reliance on data enabled teachers to be more accountable to their colleagues through reflective practices and collaboration

1.4.4 Negative uses of data in the school environment

In addition to the potential benefits of data-based decision making, researchers have also highlighted some negative outcomes associated with data use, especially within the contexts of high stakes accountability systems. Examples of potential negative effects of data-based reform include abuse also referred to as attempts to game the system (Booher-Jennings, 2005; Koretz, 2003), a narrowing of the curriculum also known as strategic use of data (e. g teaching only what is likely to appear in the examinations) (Crocco & Costigan, 2007; Diamond & Cooper, 2007) and, shorter superficial changes in practice (Diamond & Cooper, 2007) or *misuse* of data (Schildkamp & Kuiper, 2010).

For example, studies by Booher-Jennings (2005) and Koretz (2003) present best examples of abuse of data by schools. The studies found that teachers used data to "teach to the test" due to high-stake test-based accountability system. A study by Booher-Jennings (2005) even report that teachers tried to

improve test scores using "educational triage" practices by dividing their students into three categories: "safe cases", "suitable cases for treatment", and "hopeless cases". They then focused their teaching and resources solely on the safe cases (bubble kids) that would increase the school's accountability rating while referring the "hopeless cases" that were likely to decrease the school's accountability rating for special education. As a result, of that data – driven decision- making within a new accountability requirements system, the number of referrals (i.e students asked to repeat class & those droping-out) doubled (Booher-Jennings, 2005). Moreover, Diamond and Spillane (2004) also report the same practices in probation schools within high-stake accountability system. The study showed that when the schools were under pressure with little support, they strategically used data by narrowing their focus on policy demands and on improving the achievement of only a few selected students.

According to Schildkamp and Kuiper (2010) misuse of data happens when schools misinterpret data and ends up focusing on improving aspects of their education which do not need improvement. As a result, the school again looses an opportunity to improve.The two also argue that strategic use of data occurs when schools only select data which is easy to use while ignoring that data which involves more complicated long term improvement trajectories. This approach is unintended or unwanted because it denies schools the opportunities to improve even when the chance is available to do so.

1.5 Factors influencing data use in the school environment

Despite data availability and use in schools, there have been barriers hindering its effective utilization. For example, teachers and school leaders are often faced with multiple decisions to make within limited time (Schildkamp & Ehren, 2012). As a result, not all school staff relies on data for decision-making. Studies on data use in Dutch schools (Schildkamp & Kuiper, 2010), USA (Ingram, Louis, & Schroeder, 2004), England(Downey & Kelly, submitted),South Africa(Archer, Scherman, & Howie, Submitted), and New Zealand (M.K. Lai, S. McNaughton, M. Amituanai-Toloa, R. Turner, & S Hsiao, 2009) also report similar challenges . The studies also highlight that teachers sometimes lacked relevant and readily available data to help them make informed decisions. The studies also report that many teachers lacked skills to analyze and interpret data. Experienced teachers on the other hand, felt that they did not need data. To such teachers, "experience was enough" (Ingram, et al., 2004; Schildkamp & Kuiper, 2010). Moreover, another study (Schaffer, Stringfield, & Reynolds, 2001) even report that schools perceived data analysis to entail a great deal of labour because data was always stored in ways that frustrate flexible analysis in schools. As a result, teachers were discouraged from using data.

Studies also report of teachers either not using data properly or not using data at all to inform their practices (Schildkamp & Teddlie, 2008; Wohlstetter, et al., 2008). Instead, a majority of their decisions are taken based on intuition and on limited observations (Ingram, et al., 2004). Schildkamp and Kuiper (2010), also found some teachers to perceive data as a thing for school leaders. In other studies, teachers even argued that their work was to teach and not to collect and use data (Earl & Katz, 2002; Ingram, et al., 2004; Schildkamp & Kuiper, 2010; Schildkamp & Ehren, 2012). Furthermore, Schildkamp and Kuiper (2010), also found in their study that there is inadequate collaboration between teachers and school leaders in matters to do with data. School leaders, for instance, mostly used school level data such as inspection reports to monitor, plan and develop school policies while teachers concentrated on classroom and student data such as assessment and final examination results to monitor and identify students' problems. Another factor influencing data use within institutions is ineffective data systems (Wohlstetter, et al., 2008) that make it hard to gather and analyze the needed data. As a result, teachers are not able to access, timely, accurate, relevant data that coincides with their needs(Schildkamp, 2007).

To sum up, most studies on data use in schools, either explicitly or implicitly indicate that many school leaders and teachers use data improperly or do not use data at all to inform their practices due varied factors. If at all Fullan (2007), claim that "educational change" depends on what teachers think and do is anything to go by, then findings of this magnitude present a worrying state of affairs regarding data use in schools. For, instance, factors such as teacher perceptions and reluctance to change may mean that schools might still be far from embracing data to inform practice.

1.6 Background and context of the problem

A majority of those studies on data use in schools are predominantly in western countries such as U.S.A. (see for example: Ingram, et al.,2004; Schildkamp & Teddlie, 2008; Wohlstetter, et al., 2008; Diamond & Spillane, 2004; Booher-Jennings, 2005; Crocco & Costigan, 2007; Cawelti & Prethethore, 2001), The Netherlands (See for example: Schildkamp & Kuiper, 2010; Schildkamp & Handezalts, 2011; Schildkamp, et al., 2012; Ehren & Swanborn, 2012),New Zealand (Lai, et al., 2009), England (Downey & Kelly, submitted), and Canada. As such, the kind of data available in schools, purposes, as well as factors promoting or hindering data use in schools from African contexts remain inadequate.

In the Kenyan context, for example, schools are faced with challenges that may need improvement strategies such as the proper use of data. Unfortunately, the possible contribution of data use has not been explored in Kenya. For instance, past studies have reported that Kenyan school leaders and teachers continue to face many challenges relating to accountability, decision making and poor student achievements (MOEST, 2005; Griffins, 1994; Dawo & Simatwa, 2010), which might have a direct or indirect link to inadequate or improper use of data available in the schools. Similar findings have been reported elsewhere (Ingram, et al., 2004; Schildkamp & Teddlie, 2008; Wohlstetter, et. at., 2008). Furthermore, a study by Ongiri & Abdi (2004) argue that the quality education as measured by student achievement in Kenya national examinations is below average standards due to possible compromise in teacher decisions. Atask force (Republic of Kenya, 2001) also reported that teachers do not adequately help students cope with test anxiety. The task force also report that teachers did not have adequate understanding of their students, leading to widespread student indiscipline and unrest in schools. These findings concurred with two other reports (Republic of Kenya, 1998; MOEST, 2005) both of which reported that majority of schools have fallen short of providing for the learning needs of their students, leading to poor academic performance and student unrest. Ongiri & Abdi, (2004), were even candid that many of the country's 4,000 secondary schools perennially post bad examinations results and that only about 600 schools continuously excel, and if a student is not in any of these schools he or she is not expected to get a good grade. The above concerns portends an implicit message that Kenyan school teachers might be using data improperly or are not using data at all to guide their practices as already reported by studies from other contexts such as the USA, Dutch, New Zealand, England and South Africa.

Due to the above problems, the priority of the Kenyan Government has always aimed to improve school leadership, teachers and student achievements (MOEST, 2005).To reach this goal, the government allocates huge resources of its budget every year to the education sector. It is in this back-drop that Kenya Education Sector Support Programme (2005 - 2010), also outlined lined strategies to tackle problems in schools. The strategies included: organizing seminars, workshops and in-service trainings to equip teachers and school leaders with various school and student improvement competencies. One good example in this effort is the in-service workshop on Strengthening Mathematics and Science Education (SMASSE) which began in 2004 to date with the aim to improve teachers' instructional strategies. Others are the regular school leadership, guidance and counselling courses delivered by the Kenya institute of Education (K.I.E), all of which target to improve school leadership and teaching. In addition, the latest Government's improvement effort in this regard was the review of Mathematics curriculum into alternative "A" and "B" and that of Science into "pure" and "general" science in a bid to respond to needs of different students and schools.

It is therefore evident, from the above literature that many of the strategies laid by the Government fail to recognize the potential benefits that proper use of data might bring in the realm of school, curriculum and teacher improvement. For instance, problems such as channeling limited schools' resources into non-priority projects by school leaders (MOEST,2005: Griffins,1994), student unrest (Republic of Kenya, 2001), poor student achievement (KNEC, 2010) could have a direct or indirect link to inadequate or improper use of data on the part of teachers such that they waste time and resources implementing curriculum areas and policies that mismatch their students' needs (Aduda, 2003; Changeiywo, 2000; Dawo & Simatwa, 2010; Earl & Katz, 2002).

On student unrest, Kenya teachers may, for example, combine student demographic data, student discipline data, assessment data and focus group data of specific students to monitor moods, identify student grievances early and to solve them or prevent a likely hood of student unrest. Similarly, to improve student achievement in Kenyan schools, teachers can analyze student assessment data, student demographic data and teacher management data to identify group differences and then group student for extra couching, or to change their instructional approach. This then provides a justification to assess data use in Kenyan schools. Moreover, it is argued that understanding how practitioners notice, interpret and use school data within different contexts is crucial (Schildkamp & Kuiper, 2010; Spillane, 2012). It is from this understanding that Spillane (2012) also argues that researching on school data should be partly about the study of practice in schools so that it is understood what data is used by school staff and for what purposes. Furthermore, researchers (Goren, 2012; Honig & Coburn, 2008) assert that apart from understanding data and how teachers and school leaders make sense of and use them, it is also important to establish what factors promote or hinder data use in schools.

1.7 Statement of the problem

In most countries there is a feeling that the rapid expansion of education has led to the deterioration of quality. Chapman and Carrier (1990) therefore, emphasized that particular attention should be given to issues concerning educational quality and improvement strategies in the developing world. Recent studies (Campbell & Levin, 2009; Carlson, et al., 2011; Lai, et al., 2009; Timperley & Parr, 2009; Wohlstetter, et al., 2008) provide evidence that data in the hands of well trained teachers and school leaders can lead to school improvement in terms of increased student achievement and, to an extent teacher and curriculum improvement. Yet, studies also report that many teachers do not use data properly, or do not use data at all to guide their practices (Ingram, et al., 2004; Schildkamp & Kuiper, 2010). In addition, studies on data use in schools are predominantly western-based and remain scarce in the context of developing countries like Kenya. Consequently, literature survey in Kenya also reveals that there have been no scientific studies to investigate data use in Kenyan schools. As such, data available, its use and promoting and hindering factors within Kenyan schools' context remains unclear. This study therefore, aimed to investigate data available, its use and, factors promoting and hindering data use in Kenyan secondary schools.

1.8 Research objective and questions

The objective of this study was to assess data use by secondary school leaders and teachers for curriculum, teacher and school improvement in Kisumu East District of Kenya. To achieve this objective, the study sought answers to the following specific research questions:-

1. What kinds of data are available for use by secondary school leaders and teachers in Kisumu East?
2. For what purpose are the data used by school leaders and teachers in Kenya?
3. What factors promote or hinder data use by school leaders and teachers in Kenya?

The study results are to help stakeholders understand the extent of data use in the selected schools. Also, the study can be a reference point for similar future studies in Kenya and might also aid in policy making, for instance, in developing ways to support schools' staff rely on data to inform practice.

CHAPTER TWO

2 .0 DATA USE IN SCHOOL: THE KENYAN CONTEXT

It is important to have context for data use. This chapter therefore, briefly describes the system of education in Kenya, its management, curriculum development, evaluation and school inspection. It finally lists the possible data available in Kenyan schools to provide a picture that may be used to contextualize the discussion of the study results and drawing of conclusions and, recommendations.

2.1 Introduction

Data- driven decision-making studies are highly context biased. Currently, many studies on data-driven decision-making are predominantly USA- based due to increased accountability demands from schools sanctioned by the passing of the No Child Left Behind (NCLB) Act of 2001(Macbeath, 2010). In the Kenyan context, the constitution provides for access to education as a human right, outlaws discrimination on the basis of gender and emphasizes social justice and equal opportunities with regard to education. The aim is to achieve Education For All (EFA) and Millennium Development Goals (MDGs) by 2015, in tandem with national and international conventions(Ministry of Education, 2008).As a result, the Kenyan context differs slightly in that it tends to focus more on providing education for everyone rather than piling excessive accountability and quality pressures. The Kenyan education is also different in three ways: management, curriculum development and evaluation. In the next paragraphs, we will describe the education system, management, curriculum development, evaluation, inspection and the data likely to be available in Kenyan schools based.

2.2 The location and education system in Kenya

The Republic of Kenya lies at the equator on the East Coast of Africa. It occupies an area of 582,646 square kilometers and has a population of 38 million with Kiswahili and English as the national and official languages respectively (Republic of Kenya,2009). Kenya was a British colony until 1963 when it attained independence. The Kenyan economy is mainly based on agriculture and tourism which contribute about a third of the GDP and employs more than two thirds of the labour force. At independence, Kenya inherited a racially segregated educational system. Several changes in the system followed and currently, Kenya follows the 8-4-4 system of education whose overall structure was similar to the U.S.A system (Education Info Center, 2006).The system was launched in January 1985, and was designed to provide eight years of primary education, four years of secondary, and four years of university education. Emphasis was placed on Mathematics, English, and vocational subjects. The focus on vocational education was to prepare students who would not continue to secondary education to be self-employed, or be employed in the non-formal sector (Ministry of Education, 2008).

2.3 Management and funding of education

According to (MOE, 2008), Education in Kenya is currently managed and administered by two ministries: the Ministry of Education (MOE) and the Ministry of Higher Education, Science & Technology. MOE is responsible for the provision of basic and secondary school education which comprises: - early childhood, primary, special needs, secondary, teacher, non-formal and adult education including Technical Industrial Vocational and Entrepreneurship Training (TIVET). University education falls under the Ministry of Higher Education Science and Technology. The main tasks of MOE include, funding for public schools under the free primary and secondary education programs. Other tasks include distribution of learning resources, formulation and implementation of educational policies. Employment, transfers and remuneration of teachers is the responsibility of the Teachers Service Commission (TSC) under MOE. Clearly designed management structures also exist at the provincial, district, divisional and zonal levels to coordinate education and training activities. At institutional levels, Boards of Governors (BOG) manage secondary schools and tertiary colleges, while School Management Committees (SMCs) manage primary schools. Respective university councils manage their universities. Major management reforms include the move from centralization to decentralization of functions. The functions at the Ministry, which have been cascaded to provincial and district levels are: monitoring and evaluation of programs, quality assurance and, capacity

building of officers. The provision of education training services by other providers is however regulated at the ministry level (MOE, 2008).

2.4 Types of secondary schools in Kenya

Secondary schools in Kenya are categorized into public and private (Education info centre, 2006). The public secondary schools are further divided into national, provincial and district schools. The most prestigious and well-funded public schools are the National schools which admit students with the highest Kenya Certificate of Primary Education (KCPE) scores across Kenya. Students with the next highest KCPE scores across their provinces are admitted into public provincial schools. The remaining students may attend the public district schools. Sometimes, students who qualify for the national or provincial schools attend district schools because they cannot afford the better schools. Private and parochial schools also accept students based on their KCPE scores, and they follow the national curriculum to prepare students for Kenya Certificate of Secondary Education (KCSE) examinations. Also co-educational and single sex schools exist among public, parochial and private secondary schools and may be day or boarding.

2.5 The school calendar

The Kenyan school year calendar runs from January to December with the exception of Universities and colleges which operate on variable term dates. The school year is divided into three terms of three months each, with a break at the end of each term (EducationInfoCenter, 2006).

2.6 School curriculum development and evaluation

Kenyan schools follow a centralized national curriculum in terms of content. Research in curriculum, development and renewal are conducted by the Kenya Institute of Education (K.I.E) which falls under MOE. However, schools are free to improve some aspects of the implemented curriculum such as, deciding when to teach a topic, choice of teaching materials and resources, learning activities, modes of internal assessments, grouping of students, and even choosing elective subjects to offer depending on resources available in the school (Education Info Center, 2006; Ministry of Education, 2008).

To evaluate the implemented curriculum in schools, both internal and external examinations are used. Results from the two examinations thus provide an important source of quality maker data in Kenyan schools (MinistryofEducationScienceandTechnology, 2004). At the end of the primary and secondary education, students have to pass a final examination which assesses a student's competence in a particular subject. The Kenya National Examinations Council (KNEC) is the national body which supervises and oversees all external final national examinations in Kenya with the exception of universities. KNEC issues KCPE certificates to students who have successfully completed the eight-year primary education and KCSE certificates to students who successfully complete the four-year secondary education course (EducationInfoCenter, 2006). Candidates taking KCSE examinations are graded based on seven subjects categorized into five groups as shown in Table 1 below (MOE, 2008).

Table 1: Secondary school subjects in Kenya

Group	Subjects
1(Compulsory)	English, Mathematics, and Kiswahili
2 (At least two)	Biology, Physics, Chemistry, Physical Sciences and, Biological Sciences
3	History and Government, Geography, Christian Religious Education, Islamic Religious Education, Social Studies and Ethics, Hindu and, Islamic Education
4	Home Science, Art and Design, Agriculture, Woodwork, Metalwork, Building Construction, Power Mechanics, Electricity, Drawing and Design, and, Aviation Technology;
5	French, German, Arabic, Music, Accounting, Commerce, Economics, Typewriting and, Office Practice.

Students must take all subjects in Group 1 and at least two subjects from Group 2. They are also required to select subjects in the other three remaining area. The selection of subjects is dependent upon what each individual schools offer. At the end of the fourth year in secondary school, students

take the standardized K.C.S.E. examinations. In this exam, the mandatory and elective subjects above are taken in preparation for tertiary education. The KCSE Grading System is given in Table 2 below:

Table 2: KCSE grading system

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Points	12	11	10	9	8	7	6	5	4	3	2	1

The average student grade is based on performance in seven subjects from which University admissions is also pegged. Individual students must attain a minimum grade of C+ in order to qualify for University admission and this also depends on the places available at the Universities (Education Info Center, 2006). The final external examinations by KNEC are therefore very competitive since their results determine students' promotion to the next level. KNEC is also responsible for developing examination curriculum for schools and for teacher training examinations for school teachers. On the other hand, internal examinations are school-based. They are developed by the schools themselves and differ per school. These examinations are developed and marked by the subject teachers of the students' own school. They come in various forms such as- continuous assessment tests (CAT's) and, end of term examinations which are organized either at the beginning, mid or at end of the term. At times, these examinations are prepared at the zonal, divisional or district level for evaluation of the schools performance and for comparison purposes. Schools thus have considerable freedom in developing school-based examinations, including their quality and norm for grading even though they do not contribute to the final grading of the student at the end of their secondary education cycle. (MinistryofEducation, 2008).

2.7 Inspection of schools in Kenya

School inspections enhance the availability of various forms of data relating to the quality of education in Kenyan schools. However, like in most countries in Africa, there is a feeling that the rapid expansion of education has led to the deterioration of quality. It is for this reason, that Chapman and Carrier (1990) recommended and emphasized that particular attention should be given to the issues concerning educational quality and improvement strategies in the developing world. Consequently, MOE decided to improve its inspection wing by restructuring and changing its name from The Inspectorate to the Directorate of Quality Assurance and Standards in 2004(MOEST, 2004). In the restructuring, there was the creation of the Directorate of Quality Assurance and Standards Office (DQASO) at the National, provincial, district and divisional levels. At school level, principals (school leaders) and deputy principals are the designated internal quality assurance officers and at departmental level the heads of departments (HOD's) are the designated quality assurance and standards officers (Ministry of Education Science and Technology, 2004). School prefects also assist school administrators in the supervision of curricular activities such as preps and co- curricular activities such as drama, music and subject based clubs that enhance quality of education in Kenya (MinistryofEducation, 1979).

The functions of Quality Assurance and Standards Officers (Inspectors) include having regular school visits that lead to reporting on the general quality of education, identifying school's needs for improvement, ensuring that quality teaching is taking place in the institutions. Their job also involves monitoring the performance of teachers and educational institutions in accordance with all round standard performance indicators, ensuring equitable distribution of teachers by working out the Curriculum Based Establishment (CBE), carrying out regular assessment of all educational institutions, advising on the provision of proper and adequate facilities in educational institutions, ensuring appropriate curriculum implementation in educational institutions, encouraging a collaborative and corporate approach to educational institutional management among the various stakeholders, and organizing and administering co-curricular activities with a view to developing all round learners (RepublicofKenya, 1980; Wasanga, 2004).

However, school inspections face many challenges. First, Productive feedback and follow-up initiatives relative to inspection are lacking in the Kenyan inspection system (Olembo, Wanga, & Karagu, 1992). In other words, schools are visited, reports are written and less follow-up are made. Therefore, there does not seem to be a sure mechanism for ensuring that improvement initiatives will,

be undertaken. Another problem is inadequate collaboration. As Masara (1987) noted, currently teachers do not understand and never participate in designing instruments that are used by inspectors to evaluate them and therefore might not view inspection positively. Commenting about the inadequacy of school inspection, Daily Nation Editor (2001) reported that, in general, Kenya schools are rarely ever inspected. Also, Achayo & Githagui (2001) noted a lack of inspection of schools by the Inspectorate department of the Ministry of Education. Further to this, the amount of observation of classroom teaching by inspectors is uneven and disturbingly small due to: (a) understaffing of inspectors; (b) heavy workloads; and (c) time constraint (Olembo, et al., 1992).Again, accessibility of the inspection report is also a major challenge. As explained by Republic of Kenya MOEST (1999), school inspectors are expected to prepare inspection reports with detailed recommendations and to avail the reports to the school authorities, the Permanent Secretary, MOE, and the Secretary, TSC, to take any necessary action. However, there is no clear indication regarding accessibility of the reports by teachers, parents, and any other interested parties. As a result, Olembo, et al., (1992) recommended the need to facilitate appropriate follow-up after inspection of schools to ensure that schools implement suggested changes for improvement. Conclusions of the follow-up should be published and copies of the final inspection report should also include a summary of the findings which should be made public and availed especially to parents and to other stakeholders, such as Parents Teachers Associations (PTAs), Parents Associations (PAs), BOGs, SMC's, sponsors, and the area education officers (Daily Nation Editor, 2001; Republic of Kenya MOEST, 1999). Moreover, Information from the reports is only useful if it is accessible when it is needed.

As discussed in the previous chapter, high stake accountability force schools to keep and use some forms of data. Likewise in Kenya, the data sources used by the quality assurance officers (school inspectors) to check accountability issues coupled with a competitive exam-oriented system makes the data available in Kenyan schools predictable (Olembo, et al., 1992). It is therefore assumed in this study that the data sources below are the main ones that are used by MOE, DQASO, KIE, KNEC, TSC and schools, when talking about various improvement aspects in Kenyan schools. For example, TSC may use teacher returns data to manage and deploy or promote teachers, MOE uses intake data to decide on the amount of funding for the school while, DQASO, KNEC and K.I.E may use inspection reports and final examination results to demand for changes at different levels such as the curriculum, teacher and school improvement needs (Republic of Kenya, 2009). These data sources include:

i) *School inspection reports:* the inspection assesses the school's educational processes such as preparation of professional documents like schemes of work, records of work covered, syllabus coverage, teaching approaches and the general school performance in the final examinations.
ii) *Final examination results:* at the end of secondary education, students take the external standardized KCSE examinations. These KCSE examinations are very competitive since their results determine students' promotion to the next level of tertiary education.
iii) *Data on intake/ enrolment and school leavers:* Intake data are records on the number of students admitted while school leavers are records of students who have left after sitting for KCSE.
iv) *Assessment or progress reports data:* Are records on students' performance in school-based tests.
v) *Fees payment data:* For monitoring fees paid by parents to supplement government funding.
vi) *Schemes of work and lesson plans:* Teachers use schemes to plan for resources and topics to cover. Lesson plans on the other hand, indicates time and activities to be done during a lesson.
vii) *Records of work covered:* It is a teacher's record of topics and subtopics taught in a class.
viii) *Student and teacher daily attendance data:* for monitoring absenteeism students and staff attendance respectively.
ix) *Teacher management/ TSC returns data:* for monitoring qualification, experience and deployment of teachers in line with the Curriculum Based Establishment (CBE).

This chapter, not only lay foundation for understanding data that might be available in Kenyan schools, but also enhance the contextual understating of the study which will in turn, aid in the discussion of the study results, drawing of conclusions and recommendations. Having described data use in the Kenyan context, we now shift focus to conceptual framework that will guide the study.

CHAPTER THREE

3.0 CONCEPTUAL FRAMEWORK

This chapter introduces the conceptual framework to guide the study. The framework summarizes the relationships between data sources, purposes and variables influencing data use in organizations and operationalize it. The remaining parts of the chapter describe various components of the framework.

3.1 Introduction

To guide the study, there is need for conceptual framework outlining ways in which data may be used in schools. Unfortunately there lacks a generally accepted framework for studying data use in the school environment. For this study however, the conceptual framework developed by Schildkamp & Kuiper (2010) will be used to study data use by teachers and school leaders in Kenya. Only a few modifications regarding the data sources that might be available in the school environment will be added to it (part A). The conceptual framework is based on factors hypothesized to influence data use in organizations (see figure 1). The framework was used by Schildkamp and Kuiper (2010) to study data use in Dutch schools and found as a basic guide for such studies. Although the framework may not be exhaustive in different contexts, it is adequate to guide the study and will also guide data coding. The study results may then be used to further improve the framework for future studies in the context of African countries. The discussions that follow are based on it.

Conceptual framework for the study

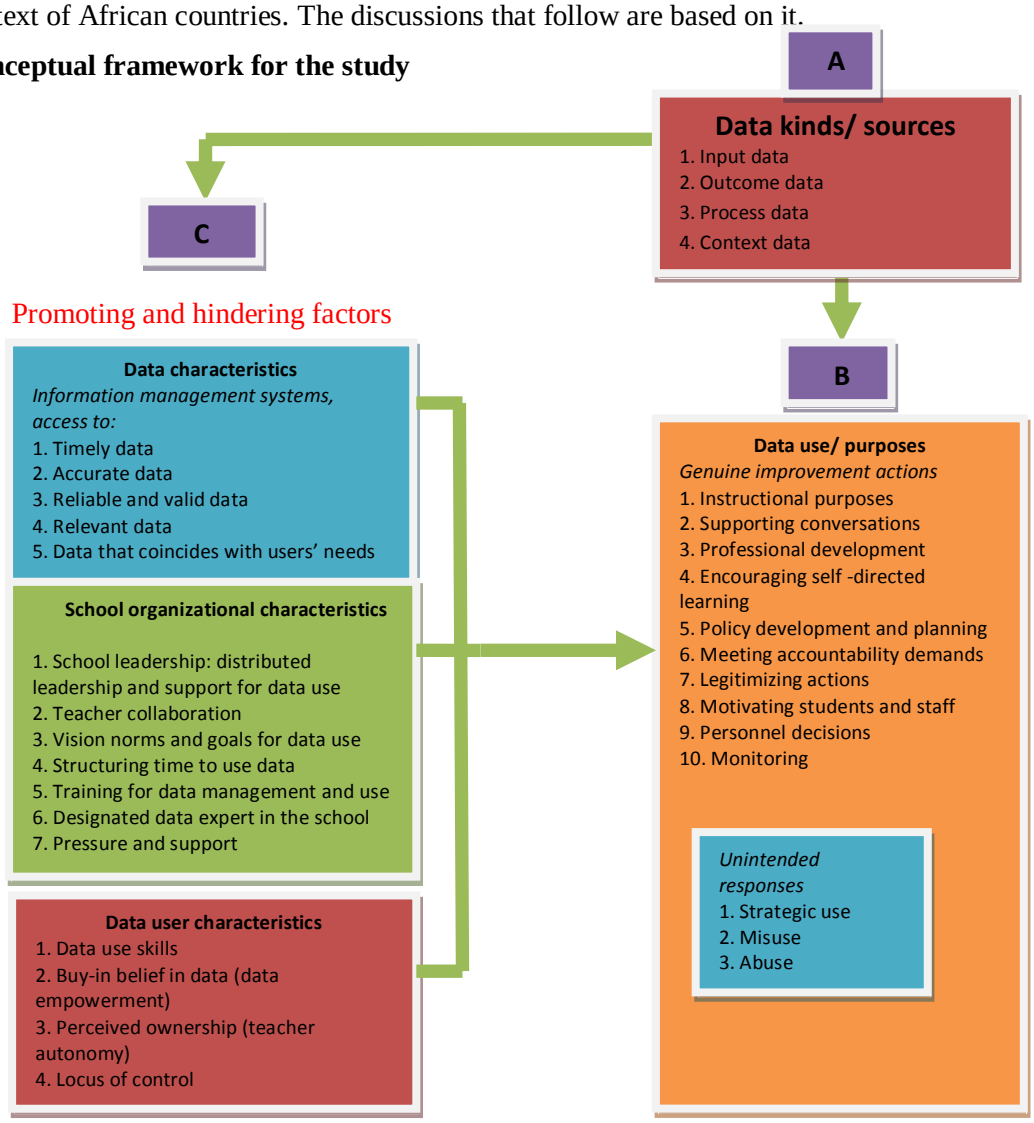

Figure 1: Factors hypothesized to influence data kinds and use(Schildkamp & Kuiper, 2010).

The conceptual framework suggests that the kinds of data available in any organization (part A) and the purpose for which they are used (part B), depends on three main factors: data characteristics,

school organizational characteristics and, data user characteristics (part C). For example, an input data such as student demographic data (Part A) can be used to support conversations with stakeholders of the school (Part B) and the choice to use that demographic data will in turn depend on single or a combination of factors such as data characteristics, school organizational or user characteristics (Part C). Characteristics of the demographic data itself, include for example: its accessibility, accuracy, relevance and reliability while the school organizational traits include: visions, goals and norms for the school to use such data (Kerr, et al., 2006; Wohlstetter, et al., 2008; Young, 2006).The information management systems that a school has put in place to enhance access to timely, valid and relevant data (Kerr, et al., 2006; Schildkamp, 2007)that coincides with the needs of the user (Schildkamp, 2007) can also be an influencing factor under the data characteristics. For example, poor information management systems can make it hard to gather and analyze that student demographic data might discourage the school staff from using it. Finally, the user characteristics such as the teacher data analysis skills can promote or become a barrier to data use in the school (Goren, 2012; Kerr, et al., 2006; Mingchu, 2008). In short, staffs unskilled in data use and analysis can be a serious barrier to data use and on the other hand, skilled staff can be a big promoting factor.

3.2 Sources /kinds of school data

Relevant school, curriculum and, teacher improvement data can be identified, collected, and analyzed within four broad sources that include: Input, process, outcome and context data (Ikemoto & Marsh, 2007; Schildkamp & Ehren, 2012) as depicted in part A of our conceptual framework. Each data source or kind further has sub-categories or data types under them. A study of data use in Dutch schools (Schildkamp & Kuiper, 2010), for example, found seven types of data including: school inspection, school self evaluation, intake, transfer, school leavers, final examinations, assessment, student questionnaire and focus group, parent questionnaire and focus group data. Below are further descriptions of different data sources and their likely sub-categories in schools.

i) **Input data** are those dealing with finances, material and human resources of a particular school. Examples include- fee payment data, teacher qualification and experience, truancy, intake, school leavers and student demographic data (home, language, ethnicity and social economic status).

ii) **Process data** are those dealing with malleable conditions of schooling and instruction (i.e. conditions that are under the control of the school's management and staff). Examples are data touching on school policy, mission, targets, timetables, and statistics on absenteeism. Others are student and staff discipline, student turnover, content covered, teacher and student satisfaction, documents on instruction and learning strategies, instruction time, and organization of instruction, classroom management, and organization of assessment.

iii) **Outcome data** are ones that give performance indicators measured at the end of the study period of schooling (i.e. results achieved). They include data on student achievement results, data on student well being, drop-out rates and student admitted to the university.

iv) **Context data** are the data from the school environment that are expected to stimulate school performance. Examples include data on parents, student and teacher involvement. Others are data on school culture such as survey or focus group results on the opinions of students and teachers, data on the curriculum such as subject descriptions, rosters, year guides, special programs and data on building and materials such as data on how many times certain rooms and equipment are used, and the availability of computers.

The framework therefore, clearly summarizes the four main sources of data in the school environment. These sources will be important in guiding this study to classify the many types of data that will be collected during and after the study.

3.3 Purposes / uses of school data

Part B of the study framework highlights two ways in which data may be used in schools: either for genuine improvement or negative (unintended) use (Schildkamp & Kuiper, 2010). Since this study focuses on data use in the school environment, the framework is discussed with emphasis on the way school leaders and teachers use data for curriculum, teacher and school improvement. In this regard, it is also important to emphasize that curriculum, teacher and school improvement actions overlap. Similarly, data use for curriculum, teacher and school improvement also overlap.

To start with, data may be used to improve the curriculum in many ways. For example, to monitor and identify areas of needs, plan and develop policies, support conversations, motivate staff and students, enhance self-directed reflection and, to meet accountability demands. On the other hand, data may also support teacher improvement decisions, for instance, to improve instruction, and professional development. However, due to overlaps, all data use for curriculum and teacher improvement mentioned in this paragraph, would also lead to school improvement either directly or indirectly. In addition, other data uses for school improvement include: aiding personnel related decisions and, to legitimize actions taken. Below are brief discussions of each purpose/ use for which school's data may be put to use beginning with the genuine improvement actions followed by the negative uses as depicted in the conceptual framework.

3.3.1 Data for curriculum improvement

3.3.1.1 Monitoring and identifying areas of need

Teachers and school leaders need the support of data to monitor their constantly changing environment and to identify area of need to channel resources. For instance, they need to know what has changed or to establish the extent to which curriculum aims and students needs are being met (Schildkamp et al., 2012). They also need to know whether students' achievement gaps have been narrowed or not. Data may also help to monitor teacher and, curriculum quality, find root causes of problems and to share best practices based on hard evidence (Schildkamp & Kuiper, 2010). Therefore, by assessing students' progress towards specific learning targets and sharing that data in real time, school's staff are able to track changes overtime and supply students and parents with timely information necessary to initiative improvement actions towards learning (Young, 2006).

3.3.1.2 Policy development and planning

Data aids in policy development and planning (Breiter & Light, 2006; Coburn & Talbert, 2006). For example, student achievement and student behavior data can provide critical feedback for school's staff to plan and develop new policies to govern their school.

3.3.1.3 Supporting conversations

Data can form a starting point for conversations with students, parents, teachers or administrators (Breiter & Light, 2006; Brunner, et al., 2005; Pretheroe, 2009). Pretheroe (2009), for example, claims that data can support conversations with school's stakeholders and among teachers themselves. Teachers may, for instance, use assessment results to openly discuss what needs to be done to improve students' and schools' performance during staff, team or departmental meetings. In such meetings, data may also be used to challenge untested assumptions and beliefs about some students' inherent abilities (Hibbard & Yakimowski, 1997). In the two author's view, *"purposeful conversations ... about improving student performance*" (67-68), can lubricates effective communication with stake holders, motivate students and increase parental involvement.

3.3.1.4 Motivating students and staff

Another purpose for which data may be used is to motivate students and staff (Diamond & Spillane, 2004; Kerr, et al., 2006). Students and staff who, for instance, attain good or improved examination results through hard work, can be decided upon based on analysis of assessment results data. They

may then be motivated through praises, giving of prizes or even taking them out on tour**.** The aim of motivation is to promote spirit of hard work and competition in the school.

3.3.1.5 Enhancing self directed learning or reflection

According to (Breiter & Light, 2006; Brunner, et al., 2005; Young, 2006) data can be used to enhance self directed learning. Data can give teachers and students an opportunity to deeply reflect on their own functioning by, for instance, tracking their work, that of colleagues and asking questions such as- what went well and, what did not go well. A teacher may also intentionally give feedback to their students who then reflect on their own progress so that they take ownership of their learning. By deriving the meaning from the data such as a test score of 20% in English, for example, the student may as well find it necessary to put more effort in English during their own private studies. Data may also help stakeholders to learn more about the school and, to know school wide standards and goals (Breiter & Light, 2006).

3.3.1.6 Meeting accountability demands

Data can help schools meet accountability demands, for example, the demand to comply with regulations from school administration, parents, the government or school inspectors can force teachers and school leaders to keep and maintain some types of data such as- student progress records or student test scores (Coburn & Talbert, 2006; Douglas & Julie, 2002).

3.3.2 Data for teacher improvement

3.3.2.1 Improving instruction

Study findings link data usage to the improvement of instruction (Cawelti & Prethethore, 2001; Coburn & Talbert, 2006; Honig & Coburn, 2008; Young, 2006). Through analysis of test scores, classroom ,homework and student assessment data, for instance, teachers can establish which topic needs re-teaching or which learners need more attention (Cawelti & Prethethore, 2001; Young, 2006). Young (2006) also concurs that teachers use assessment data to enhance instruction and specifically in the improvement of teaching and learning. In other studies, school leaders have been reported to use data to support revised instructional practices towards improving student performance (Breiter & Light, 2006; Brunner, et al., 2005).

3.3.2.2 Shape professional development

Research findings suggest that professional development is very effective in improving student learning (Timberley , Wilson, Barrar, & Fung, 2007). School leaders can as well use data to shape professional development needs such as- to inform teacher preparation, training and staffing needs (Breiter & Light, 2006) (Brunner, et al., 2005). Schildkamp, Ehren and Lai (2012) further considers data use in itself as an aspect which shapes professional development for teachers and school leaders.

3.3.3 Data for school improvement

In addition to legitimizing actions taken and, to aid personnel related decisions discussed below, all the above data uses for curriculum and teacher and improvement would also result to school improvement.

3.3.3.1 To aid personnel related decisions

Similarly, according to Kerr et al., (2006), data can aid personnel related decisions such as evaluating a team or individual performance and then deciding on topics for professional development. This means that from data, it is possible to establish what areas are deficient or poorly performing so that more staff is taken in for professional development to remedy the poor performance. For example, schools may study final exam data to determine the poorly performed subject. Teachers teaching the subject may then be taken for a refresher course.

3.3.3.2 Legitimize actions

School leaders and teachers may use data to legitimize their actions (Coburn & Talbert, 2006; Diamond & Spillane, 2004). For example, on policy decisions and enacted programs, data enables teachers and school leaders to bid for or justify their chosen decisions and actions.

3.3.4 Unintended responses/ negative use of data

Part B of the framework, indicates that data may not only be used to achieve positive ends but can also be used negatively (i.e. unintended ways). Schildkamp and Kuiper (2010), explains that unintended responses occur when teachers and school leaders use data in three undesirable ways: strategic use, misuse or abuse. The discussion below briefly describes the negative uses of data.

3.3.4.1 Strategic use

According to Schildkamp and Kuiper (2010), strategic use of data occurs when schools only select data which is easy to use while ignoring that data which involves more complicated long term improvement trajectories. This approach is unintended or unwanted because it denies schools the opportunities to improve even when the chance is available to do so.

3.3.4.2 Misuse

Schildkamp and Kuiper (2010) explains that misuse of data happens when schools misinterpret data and ends up focusing on improving aspects of their education which do not need improvement. As a result, the school again looses an opportunity to improve.

3.3.4.3 Abuse

Lastly, school teachers can abuse data (Booher-Jennings, 2005; Diamond & Spillane, 2004). This happens when they use data to focus only on students having the high chance of passing the test or the so–called "bubble kids"(Booher-Jennings, 2005). From the above discussions, it is evident that part B of the study frame work presented ten possible genuine improvement actions and three possible unintended uses to which data may be put. Since data use for improvement purposes out way the negative ones, then it can be concluded that data plays a vital role in the life of schools.

3.4 Factors promoting or hindering data use

Another crucial part of the study framework is Part C. It recognizes three broad variables or factors that may promote or hinder data usage in organizations: data, school organizational and user characteristics. Below are brief descriptions of the variables.

3.4.1 Data characteristics

First, characteristics of the data itself such as:- access to accurate and timely data (Kerr, et al., 2006), reliable and valid data, (Kerr, et al., 2006; Mingchu, 2008; Schildkamp, 2007; Visscher, 2002), relevant data, (Schildkamp, 2007; Visscher, 2002), and data that coincides with the needs of the user (Schildkamp, 2007; Visscher, 2002).may promote or hinder data usage in organizations including schools. It is in this backdrop that (Breiter & Light, 2006; Kerr, et al., 2006; Wohlstetter, et al., 2008) advocates for investing in information systems and technology within institutions so as to enhance accurate, timely, reliable and relevant data that coincides with user's needs. It can then be concluded that ineffective data systems make it difficult for schools to gather and analyze the needed data. This might in turn hinder the school from improvement opportunities based on data.

3.4.2 School organization characteristics

The second variable that promotes or hinders usage of data is the characteristics of the organization. In a school set-up, for example, data might be used or ignored by staff depending on the traits exhibited by the schools that are discussed below.

3.4.2.1 Distributed leadership

Studies indicate that distributed leadership can be the best way to remove barriers to data usage in schools (Kerr, et al., 2006; Wohlstetter, et al., 2008; Young, 2006). For example, this involves spreading the decision making authority over several levels and groups such as data teams and departmental heads enables many staff to act on and use data (Schmidt & Datnow, 2005). Young (2006) also, argues that school leaders should model data use, plan and support teachers in learning how to use data. Furthermore, research on data use suggests that the negotiation of different meanings and actions in organizations is influenced by power relations within an organization.

3.4.2.2 Teacher collaboration

Collaboration among teachers is another way to increase data use. According to Young (2006) and Wohlstetter, et al.,(2008), schools should slot more time to frequently review data and plan accordingly as a team. It is claimed that attempts to focus on what data are noticed and what they are noticed for, are negotiated in the interactions among people (Spillane, 2012). This means that what individuals notice and how they interpret it, is not just a function of their prior knowledge and beliefs but also a function of their interactions with others, with whom they negotiate what information is worth noticing and how it should be framed. Therefore, it is assumed that teachers working in isolation can be a great barrier to the use of data in schools as opposed to teachers working as a team. The teams should then use data to identify various strengths and weaknesses of the school.

3.4.2.3 School's vision, norms and goals for data use

The presence of school's clear vision, norms and goals for data use or lack of it, may promote or hinder data use in schools respectively (Kerr, et al., 2006; Wohlstetter, et al., 2008; Young, 2006). School leaders therefore, need to create an environment of shared vision, norms and goals for data use by focusing on continuous improvement based on data and not using data as a tool for blame games. Better discussions on data also need to be done openly without fear of witch hunt or repercussions and, clear goals needs to be set at each stage. For example, on students' progress (the goal can be that 60% of students should be proficient in English language). Goals may also be set that the staff's professional development activities such as attending workshops should be guided by data.

3.4.2.4 Structuring time to use data

Structuring time to use data enhances data use in organizations. Studies indicate that schools which structure time with clear objectives to discuss data are more inclined to use data as opposed to those that are not (Wohlstetter, et al., 2008; Young, 2006). According to Young (2006) the time set aside by schools should not only focus on the collection, analysis and interpretation of data but also for teachers to meet, discuss and learn more from colleagues about data through regular grade meetings, morning rounds report card reviews and lesson plan reviews just to mention a few.

3.4.2.5 Training on data use and management

Staff training on data management and use can increase data use in organizations (Breiter & Light, 2006; Kerr, et al., 2006; Wohlstetter, et al., 2008). This approach is widely accepted and was evident when Codding, Skowron and Pace (Codding, Skowron, & Pace, 2005), developed a training to help teachers interpret curriculum based measurement data and to translate the data into observable and measurable objectives for students. The study results revealed that after the training, teachers were able to successfully use data to formulate instructional goals and objectives for their students based on hard evidence (data). As such training is crucial in improving staffs' ability to rely on and use data to inform practice.

3.4.2.6 Designated data expert

In schools, the process of data collection, analysis, interpretation, storage and retrieval may sometimes be cumbersome and technical for many teachers and school leaders (Schaffer, et al., 2001). Many teachers might therefore, shy away from using data especially when they lack adequate time and knowledge to spare in data collection, and analysis. As a result, some studies advocate for the need to hire data expert in schools to facilitate and support teachers and school leaders in processing and use of data use (Kerr, et al., 2006; Young, 2006) especially in the area of data analysis and interpretation.

3.4.2.7 Pressure and support

Schildkamp and Kuiper (2010) argue that both pressure and support may promote data use. There is evidence, for example, to suggest that teachers and school leaders may disregard data they perceive as invalid and lacking quality (Kerr, et al., 2006) although under pressure they may use such data (Marsh, Pane, & Hamilton, 2006). However, Fullan (2001) warns that pressure without support leads to resistance and alienation while support without pressure leads to drift and waste of resources. Therefore, there is need to establish equilibrium between pressure and support in helping teachers to use data.

It is therefore clear in the framework that staff's use of data can be promoted or barred by the characteristics of the school itself. The structure of how schools are managed and, the aspect of financing o and provision of information technology facilities may thus be an important road map towards encouraging reliance and use of data by school's staff.

3.4.3 Data user characteristics

According to the study part C of the study framework, user characteristics such as: data use and analysis skills, buy-in belief (data empowerment), perceived ownership (teacher autonomy) and locus of control is another factor that may facilitate or bar the use of data in organizations (Kluger & DeNisi, 1996; Mingchu, 2008).

3.4.3.1 Data analysis and user skills

The skills possessed by the person in using data is an important variable that can promote or hinder data usage (Kerr, et al., 2006; Mingchu, 2008; Wohlstetter, et al., 2008; Young, 2006). Goren (2012) for example, highlights the role of content knowledge with regard to user skills. He argues that the meaning that teachers make of data and, especially the implications that they draw for instructional change are influenced by teacher "working knowledge" regarding their ability to collect, analyze and interpret data.

3.4.3.2 Buy-in belief or data empowerment

Teachers' belief and acceptance to use data is what is referred to as buy in belief (Kerr, et al., 2006; Mingchu, 2008; Wohlstetter, et al., 2008). When teachers believe that data is important to drive practice (Schildkamp, 2007) then, data usage can be promoted. On the other hand, when they do not believe in data and think that "experience is enough" (Ingram, et al., 2004) then use of data in schools can be greatly hampered. After all, "educational change depends on what teachers think and do-it is as simple and as complex as that"(Fullan, 2007).

3.4.3.3 Ownership or teacher autonomy

Ownership or teacher autonomy (Kerr, et al., 2006; Wohlstetter, et al., 2008; Young, 2006) is another user characteristic that may promote or hinder data use. How data and evidence is delivered to people especially in schools contexts highly influences what aspects of data practitioners will notice and attend to. For instance, when individuals or a group of people feel that the data being discussed lacked their blessing or participation during its formulation, they tend to be less concerned about it. At times they view such data as that which belongs to another person and not their own responsibility. Therefore, when the staff collect their own data, they take more ownership of issues as opposed to just looking at the data collected by other people such as researchers (Huffman & Kalnin, 2003). Schools where teachers are involved and given room to take ownership by collecting their own data help to alleviate the suspicions of manipulating findings from the data.

3.4.3.4 Locus of control

The final factor is locus of control. Tokar, Fischer, & Subich, (1998) established that people who attribute success or failure to themselves (having high internal locus of control) do better in the process that relate to change. In other words, schools having teachers with high internal locus of control (i.e. teachers who accept that they contributed to what caused, for instance, students' failure as opposed to trying to find other factors to blame such as difficult examinations) tend to perform better in educational change and may willingly and easily use data as a tool for improving the quality of education as opposed to schools having teachers with high external locus of control (i.e. teachers always seeking other factors to blame for their students' failure rather than themselves) (Kerr, et al., 2006; Schildkamp, 2007).

To sum up, the above study framework may not be exhaustive but adequate to guide this study. Factors that may influence data and the promoting and hindering factors may also act independently or as a combination of factors as shown in the framework. Also worth noting is that school organizational characteristic carry the lion's share of the promoting and hindering factors. This may imply that how the school operates is central to promoting or barring data use by teachers and school leaders.

CHAPTER FOUR

4 .0 METHODOLOGY

4.1 Introduction

This chapter presents the methodology and procedures used to conduct the study. It describes the research design, study location, target respondents, sample and sampling procedures, study approach, research instruments, data collection, data analysis, reliability, validity and ethical issues.

4.2 Research Design

The study employed multiple case study research design to explore data use by school leaders and teachers for improvement of the curriculum, the school and the teacher. The researcher used the same research questions and instruments to collect data from three schools. The units of analysis were: - input, process, outcome and context data sources. Although data from three schools only, do not permit generalization, the design was deemed appropriate by the researcher as it provides in-depth evidence of a phenomena (data use) and permits replication of findings thus making the findings more compelling and robust (Herriot & Firestone, 1983).

4.3 Study Location and site

The study was carried out in the top three provincial secondary schools in KCSE 2011 within Kisumu East district, Nyanza Province, Kenya. All the schools were located at the heart of Kisumu city, the third largest city in Kenya after Nairobi and Mombasa, respectively and with an estimated population of 473,649 (Republic of Kenya, 2009). The city is located in western Kenya on the shores of Lake Victoria, the second largest fresh water lake in the world. The challenges facing the city include: informal settlements, high poverty and unemployment levels, high HIV/AIDS prevalence rates and a rapidly growing urban population (UN-HABITAT, 2006)

The site was selected due to its accessibility to many government offices and the high concentration of "best cases" provincial schools that were targeted by the study, thus reducing study cost and the time required to collect data. In addition, the site was familiar and reachable to the researcher because the researcher lives and works in the district. Singleton (1993) argues that the ideal setting for any study should be easily accessible to the researcher and should also permit rapport with the informants.

4.4 Sampling Procedures and Sample Size

The study employed non-probability purposive sampling technique since this research process was one of "discovery" rather than testing of hypotheses. It is a strategy (Lincoln & Guba, 1985) described as 'emergent and sequential'. Almost like a detective, the researcher follows a trail of clues, which leads the researcher in a particular direction until the questions have been answered and things can be explained(Robson, 1993). In this sense the technique was not only economical but also informative in a way that conventional probability sampling cannot be (Descombe, 1998).With a non-probability sampling method the researcher felt that it was not feasible to include a sufficiently large number of samples in the study. This is in line with qualitative research whose aim is to explore the quality of the data and not the quantity (Nachmias, 1996).

4.4.1 Sampling of schools

The top three public provincial secondary schools in Kisumu East considered as "best cases'' were purposefully sampled for the study based on the final examinations results (KCSE 2011). In terms of school mean score, they held the first three positions in the district and were also perceived as better equipped compared to other schools in the district. The researcher therefore, felt that if data is anything to go by, then it should be more evident in these best case schools. This homogeneous sampling of schools was aimed at permitting replication across cases thus increasing in-depth understanding of data use in the schools (Patton, 1990).

Schools were also purposefully sampled to reflect different sex composition of the students and the "day" or "boarding" nature of schools in the district. This was considered to increase context dependability of the findings. The researcher, for instance, assumed that the differences might mean schools using an additional unique set of data to suit their nature which the study targeted to capture as

well. For instance mixed schools may have data on boy-girl relationship that might affect student learning as opposed to a pure boys' school. The sampling approach is illustrated in table 3 below.

Table 3: School sampling

School	**Student composition**	**Nature**
1	Pure boys	Day & boarding
2	Pure Girls	Boarding
3	Mixed sex	Day school

4.4.2 Respondents sampling

Respondents in the study were purposively sampled and were seven per school. This consisted of one school leader/ deputy school leader, four heads of departments: (i.e. academic, examinations, games and guidance and counseling) and then two class teachers per school. Therefore, the total number of respondents in the entire study was twenty-one. Dane (1990) argues that purposive sampling allows researchers to select people or events, which have good grounds in what the researcher believe, will be critical for answering the research questions. This study therefore, selected participants who mostly dealt with and handled data within the selected schools. Furthermore, based on the Kenyan context, these participants are appointed based on experience and qualification and this made them a preferred source of information needed to answer the research questions within the Kenyan context. Table 4 below shows the respondents for the study.

Table 4: Respondents sampling

SCHOOL 1				SHOOL 2				SCHOOL 3			
Designation		Sex	Subject	Designation		Sex	Subject	Designation		Sex	Subject
1	SL	M	--------	1	SL	F	--------	1	SL	F	--------
2	Games(HOD)	M	Chem.	2	Games (HOD)	M	I.R.E	2	Games (HOD)	M	Agr.
3	G & C. " "	F	Eng.	3	G& C " "	M	Music	3	G & C " "	F	Geo
4	Exam " "	M	Mat.	4	Exam " "	M	Geo.	4	Exam " "	M	Eng.
5	English " "	M	Eng.	5	SCIE. (HOD)	M	Mat.	5	SCIE. (HOD)	M	Chem.
6	CT 1	M	Chem.	6	CT 1	M	Mat.	6	CT 1	F	Mat.
7	CT 2	M	Eng.	7	CT 2	M	Chem.	7	CT 2	F	Mat.
Total= 21; 15 Males & 6 Females											
Key: SL= School leader; HOD=head of department; G& C=Guidance and counseling; CT=Class teacher											

4.5 Study Approach

Qualitative data collection techniques namely document analysis and interviews were used in- line with the research questions. Qualitative approach was used because rather than presenting the results in the form of statistics, Rees (1996) asserts that qualitative techniques produces words in the form of comments and statements aiming at finding out respondents' feelings, attitudes and experiences (with data use) from their own point of view rather than from that of the researcher. This not only ensures that the explorative nature of the study is upheld but also that an in-depth understanding of data use by respondents is revealed

4.6 Research Instruments

The main tools of data collection for this study were document analysis and interviews.

4.6.1 Interviews

Semi-structured interviews were conducted using interview schedules to collect data from school leaders and teachers. The interview guides contained items covering all the objectives of the study. The interview schedules were used to gather data on the kinds of data available, purposes for which the data is used by school leaders and teachers and also, promoting and hindering variables to data use

in the respective schools. Robson (1993) argues that interviews offer the possibility of modifying one's line of enquiry, following up interesting responses and investigating the underlying motives which in-turn enhances reliability of the data. Furthermore, phenomenologist often favour the intimacy that in-depth interviewing can create in an attempt to little known phenomena such as data use in Kenyan schools hence the choice of this method to collect the data.

4.6.2 Documentary analysis

Document analysis is a form of qualitative analysis that requires the readers to locate, interpret, analyze and draw conclusions about the evidence presented (Fizgerald, 2007). Since the study was explorative in nature, samples of documents depicting data available and their use by teachers and school leaders were collected and analyzed as an on- going process as themes and sub-themes emerged from in-depth interviews. These documents served two purposes: first, to provide other data to corroborate information collected during the interviews and vice versa. In addition, the information collected from the documents also provided some information which was used for more clarification of issues during the interviews with school leaders and teachers. Second, more inferences were made which inquired more areas of investigation. For instance, data generated from interviews prompted the researcher to conduct deeper analysis of the school target data, staff minutes and final examination results for the years 2010 and 2011 from the three schools to establish any systematic attempt to use data towards curriculum and school improvement. Similarly in school 1, class minutes and demographic data of a few specific students were analyzed further to verify existence and actions to assist vulnerable students as learnt by the researcher from the interviews. In summary, the entire documentary analysis process broadened the researcher's knowledge which in turn facilitated the overall research work to be fruitful. Table 5 below shows the research questions and the instruments employed in collecting data to answer each question.

Table 5: Research questions and instruments employed

Research question	**Respondents**	**Instrument**
1. What data? 2. What purpose?	*SL, 4 HOD's and 2 CT's per school*	Interview schedule and document analysis
3. What factors hinder or promote data use?	*SL, 4 HOD's and 2 CT's per school*	Interview schedule

4.6.3 Piloting instruments

Pilot study helped refine the data collection plan. According to Yin (1994), the pilot case is used more formatively, assisting the investigator develop relevant lines of questions –possibly providing conceptual definition of the research and therefore, the pilot case should be selected in more geographical proximity of the area of study.

Before the actual data was collected, the researcher conducted a pilot study on the interview instruments in Bishop Abiero Secondary School in Kisumu city. The total participants in the pilot study were five: one school leader, two heads of departments and two class teachers. The purpose of the pilot study was two- fold: first, to enable the researcher to ascertain context reliability and validity of the instruments, and to familiarize him with the administration of the interviews thus improving the instruments and procedures. The interview schedules were evaluated and found reliable to greater extent except for re-phrasing of a few statements (e.g. the statement "school policy plan" was changed to "policy plan of the school") to ensure context reliability. Second, doing pilot study in the geographical location of the study enabled the researcher to be on the sites and do other arrangements with other contact persons and set appointments with the expected respondents for the actual study.

4.7 Data analysis

Mills (1994)asserts that it is better to begin data analysis immediately after collection in a qualitative research so that it acts as a guide to further data collection. Therefore, in each school, samples of documents kept by respondents were briefly reviewed before proceeding to interview sessions. The aim was to establish trends of data use before visiting the next school. All interviews were audio taped, transcribed and analyzed using NVIVO software program that allows for coding key themes of

each interview based on the conceptual framework and in line with the research questions. For example, an interview theme touching on data available in the school was coded under either: input, process, outcome or context data sub-themes. Similar interview themes touching on data use was coded under sub-themes such as instructional use, meeting accountability demands, supporting conversations, monitoring and identifying areas of need just to mention a few. Finally, themes on promoting and hindering factors were coded under sub-themes of data, school organization or user characteristics with other minor sub-themes under each category. After the coding, summarized tables of data available, data use by school leaders and teachers and, the promoting or hindering factors were prepared for each school. The tables were then used to compare the study results across cases.

4.8 Reliability and validity

Mugenda and Mugenda (1999) define reliability as a measure of the degree to which a research instrument yields consistent results or data after repeated trial. The pilot study was used to establish reliability of interview schedule. It enabled the researcher to assess the clarity of the interview items so that those items found to be inadequate or vague were modified to improve quality and context reliability of the research instrument. Moreover, interview schedules adapted from a similar study in the Dutch context (Schildkamp & Kuiper, 2010) and based on similar research questions and conceptual framework were used to investigate answers to the research questions.

Validity is the extent to which a measurement measures what it is supposed to measure. It is used to judge whether the research accurately describes the phenomena it is intended to describe. First, internal validity was fostered by establishing major similarities and differences between respondent's experiences and beliefs. Furthermore, misrepresentations and interpretations were avoided using member –checks (Beck, 1994; Lincoln & Guba, 1985). All members agreed with the interview transcripts thus increasing trust worthiness of the findings.

Construct validity was realized using three approaches: triangulation, member checks and audio-taping of all interviews. Triangulation was used to compare multiple sources of evidence from respondents such as-school leaders; HOD's and class teachers in order to determine the accuracy of the gathered information (Denzin, 1970; Yin, 1994). Moreover, all interviews were audio taped and transcribed to allow in-depth analyses of the data within and across cases (Solomon, 1997). Finally, external validity was enhanced using an explorative multiple case studies design (Yin, 1994), from which case – specific and cross-case thick descriptions including citation from respondents in line with the conceptual framework and research questions were provided.

4.9 Ethical issues

According to Krathwohl (1997), scientific knowledge is as a result of a collaborative social enterprise with rules the participants are expected to follow. The letter requesting permission to conduct research in Kenya was submitted to the National Council for Science and Technology (NCST) of the republic of Kenya who then approved and issued research authorization and permit. Thereafter, NCST copied the research authorization letter to Kisumu East District Commissioner (DC) and the District Education Officer (DEO) to guide the researcher during the research period. To maintain respect with respondents, they were contacted through school leaders and appointments set in advance with participants from the selected schools. They were then informed about the interview length and procedures so that they made arrangements. Always, respondents were requested permission to participate in each task including authorization to audio tape the interviews. Their ideas were handled with respect and confidentiality

CHAPTER FIVE

5 .0 RESULTS

This chapter presents the study findings beginning with data available, purposes for which data is used in each school followed by brief illustrations and case-comparisons. It also presents variables (factors) promoting and hindering data use in the schools and case-comparisons as well.

5.1 Question 1: Data available in schools

Samples of the latest data available in each school for curriculum, teacher and school improvement were collected, analyzed and confirmed by interviews after which they were categorized into four data sources: input, process, outcome and context data (See Table 6). Results indicate three key findings. First, data types under input, process and outcome data were similar in the schools studied and only context data types had slight variations from one school to the next. Secondly, input data is mostly kept and used by school leaders and lastly, outcome data (e.g. assessment and final examinations data) are very accessible and used in almost equal measure by teachers and school leaders.

Table 6: Data available in schools

Data Source	Data types	Data available		
		School	*School 2*	*School 3*
INPUT	i. Student population/ admission/ intake	✓	✓	✓
	ii. Student demographic	✓	✓	✓
	iii. Teacher management/return data (TSC)	✓	✓	✓
	iv. Fees payment	✓	✓	✓
	v. Data on orphan students	✓	✓	✓
PROCESS	i. Schemes of work	✓	✓	✓
	ii. Records of work covered	✓	✓	✓
	iii. Lesson plans	TA	TA	TA
	iv. Teacher's lesson notes	✓	✓	✓
	v. Student notes	✓	✓	✓
	vi. Annual policy plan of the school	TA	TA	X
	vii. Staff daily attendance	✓	✓	✓
	viii. Teacher lesson attendance	✓	✓	✓
	ix. Student daily attendance	✓	✓	✓
	x. Student discipline	✓	✓	✓
	xi. Student transfers/ turn over	TA	TA	TA
	xii. School inspection reports	TA	TA	TA
OUTCOME	i. Final exam results & Analysis (KCSE)	✓	✓	✓
	ii. Student Assessment / progress results	✓	✓	✓
	iii. Student drop-outs data	TA	TA	TA
	iv. School leavers' data (after KCSE)	✓	✓	✓
CONTEXT	i. Student questionnaires	X	X	TA
	ii. Student class minutes	✓	TA	✓
	iii. Student contact card (for weak students)	✓	X	X
	iv. Teacher management questionnaires	X	X	X
	v. Staff minutes	✓	✓	✓
	vi. Examination calendars	✓	✓	✓
	vii. School programme of events	✓	✓	✓
	viii. Parent questionnaires	X	X	X
	ix. Parent minutes	✓	TA	✓
	x. Data on vulnerable (needy)students	✓	X	X
	xi. Foster parenting (for guidance& counseling.)	X	X	✓
KEY:	✓ *=Available plus sample;* **X**= *Reported not available ;* **TA** = *Talked about but sample not available*			

Below one can find a brief summary of the findings for each data sources.

i) Input data

Available samples of data types under this category were collected from the schools, analyzed and, three striking results were evident. First, the input data were similar in the schools studied. Second, most of these data sources were kept and used by school leaders. Last, all samples in this data source were available and provided for analysis.

ii) Process data

Data types in this category were also similar in all the schools studied. Three findings again became evident. First, it had the most different types of data available. Second, even though teachers talked about lesson plans data and student transfers/ turn over data; latest samples could not be provided by teachers for analysis. In school 1 and 2, for example, school leaders mentioned the availability of annual policy plan of their schools but failed to provide a latest sample. Teachers and HOD's interviews however, cast doubt on the availability and use of that data in their schools. Only school 3 acknowledge that it did not have the data. Also, samples of school inspection report were not provided for analysis. However, teachers and school leaders interviewed did acknowledge its availability and few respondents roughly were able to mention some recommendations of previous inspection report.
Finally, many data types in this category are used by both teachers' school leaders. With the exception of lesson plans, annual policy plans and student transfers, the latest samples of the remaining types were available for analysis.

iii) Outcome data

The data types available in the schools under this category are basically final examinations and assessment results. Besides being used by both teachers and school leaders in an almost equal measure, the study findings reveal that these data type are the most accessible to all staff, students and parents and were pinned everywhere in the school notice boards. It also had the leading functions in the schools after fee payment data. However, student drop out data was only talked about by respondents and no sample could be provided by respondents for analysis.

iv) Context data

Even though there were many similarities in the different data types available, a few context data types were notably different between schools. In schools 1 and 3 for instance, class minutes are available and used to gauge students' opinions and well being in the school. In addition, school 3 also had foster parenting data for monitoring well being of groups of 8 to10 students. On the other hand, school 1 had another unique data type called "student contact card". The data is kept by academically weak students and it helps teachers to monitor the extent to which weak students visit teachers to consult on various subjects. School 1 also keep data on vulnerable or needy students which it uses to source for donor funding towards feeding and keeping them in school. Strikingly, school 2 did not have any of the above fore-mentioned unique sets of data. Finally, the use of student, teacher and parents' questionnaires to gauge their opinions is evidently lacking in the three schools.

5.2 Question 2: Data use by school leaders

The study results indicate three main findings. First, there are good examples of data use for genuine improvement actions in the three schools. Also, data was mainly used for school and curriculum improvement initiatives as opposed to teacher improvement. Second, data use by the school leaders was average and almost similar. Third, school leaders mainly used school level data such as fee payment and inspection reports to monitor progress and identify areas of need, carry out planning and policy development and to legitimize their actions. One of the school leaders stated in this regard: "*We use assessment and final examination analyses to evaluate, account, compare classes, set target and a forum to air views on what needs to be done".* Other minor uses of data by school leaders include supporting conversations with teachers, parents and students, evaluating teacher performance based on student achievement results, motivating students and staff and meeting accountability demands. School leader 3 for instance, argue, *"I check lesson attendance records, to know which teacher attends her lessons*". The results for data use by school leaders in each school are displayed in Table 7 below.

Table 7: Results on data use by school leaders

Data use	School 1	School 2	School 3
Data use by school leaders: purposes	▪ *Monitoring progress and identifying areas of need:* assessment and final examinations results (e.g. for benchmarking with other schools), staff daily attendance data, discipline data, teacher lesson attendance records, staff minutes and student demographic data (e.g. to find more about specific indiscipline students), fees payment, intake, school program of events, transfers, teacher management / returns data ,class minutes, teachers' records of work covered , student notes (e.g. to check syllabus coverage and identify areas of need). ▪ *Policy development/ planning:* Assessment and final examinations results, staff &parents minutes (e.g. increasing teaching time), annual policy plan of the school, Intake (e.g. to build a laboratory) , and discipline data (e.g. to start fellowship for parents whose children are indiscipline). Student demographic data and class minutes e.g. to start feeding programme for needy students ▪ *Legitimize actions taken:* final examinations, assessment results (e.g. for inviting best performers to help teach and to act as role models), teacher management/ returns data (e.g. to allocate lessons). ▪ *Supporting conversations with teachers, students and parents:* final exam and assessment results, class minutes, discipline, fees payment, staff minutes to form basis to guide discussions with stakeholders. ▪ *Evaluating teacher performance*: final examination results to determine which teacher is performing in the classroom. ▪ *Motivating students and staff*: final examination and assessment results (e.g. to award top 20 students and teachers of best performed subjects). ▪ *Meeting accountability demands*: Fees payment, teacher management, intake and staff daily attendance data are kept to comply with government and quality assurance regulations.	▪ *Policy development/ planning:* Assessment and final examinations results (e.g. for dedicating Saturdays for teaching Mathematics and sciences while Sundays for Kiswahili), staff &parents minutes, intake (e.g. to determine number and size of buildings such as a laboratory. ▪ *Evaluate teacher performance*: final examination results are used to judge teacher performance in the classroom. ▪ *Supporting conversations with teachers, students and parents:* final exam and assessment results, discipline, fees payment, staff minutes are used as reference point for discussion with stakeholders. ▪ *Motivating students and staff*: final examination and assessment results (e.g. awarding top students and taking all teachers on holiday tours) ▪ *Legitimize actions taken:* final examinations, Assessment results (e.g. using student performance to justify changing the school into full boarding school), teacher management (e.g. for lesson allocation), Intake, fees payment parent & staff minutes (e.g. to determine the amount items to purchases or make requisitions). ▪ *Meeting accountability demands*: Fees payment, teacher management, intake and staff daily attendance data are kept to comply with government and quality assurance regulations. ▪ *Monitoring progress and identifying areas of need:* assessment and final examinations results (e.g.), staff daily attendance data, discipline data, teacher lesson attendance records, staff minutes, student demographic data, fees payment, intake, school program of events, transfers, teacher management (TSC), teachers' records of work covered , school inspection reports. ***Unintended/ negative use*** ▪ *Abuse:* e.g. assessment results being used to identify weak students for "detention" in school.	▪ *Monitoring progress and identifying areas of need:* assessment and final examinations results (e.g. for benchmarking with other schools), staff daily attendance data, discipline data, teacher lesson attendance records, staff minutes are for monitoring teacher and student activities in the school. student demographic data (e.g. to find parents contacts and orphans), fees payment, intake, school, teacher management (TSC),class minutes, teachers' records of work covered , student notes (e.g. to check syllabus coverage), school inspection reports ▪ *Policy development/ planning:* Assessment and final examinations results, staff &parents minutes (e.g. for dedicating Saturdays for science practical and increasing teaching time), intake (e.g. to make requisitions). ▪ *Legitimize actions taken:* final examinations, assessment results (e.g. for choosing schools for bench marking), fees payment, teacher management (e.g. for lesson allocation), and Intake, parent & staff minutes. ▪ *Supporting conversations with teachers, students and parents:* final exam and assessment results, discipline, fees payment, staff minutes are used to facilitate conversations with stakeholders ▪ *Motivating students and staff*: final examination and assessment results (e.g. awarding top students and taking staff for holiday tour). ▪ *Evaluating teacher performance*: final examinations are tools for evaluating teacher performance in class. ▪ *Meeting accountability demand*: Fee payment, teacher management, intake and staff attendance data are kept to comply with government and quality assurance regulations.

KEY: TSC=Teachers Service Commission; **SL**= School leader; **HOD's**= Heads of departments; **CT's**= class teachers

Table 8: Results on data use by teachers

Data use	School 1	School 2	School 3
Data use by teachers: purposes	▪ *Monitoring progress and identifying areas of need :* assessment and final examinations results, , schemes of work, intake, student transfers, teachers' records of work covered ,student contact cards (HOD's & CT's), student daily attendance(CT's), student demographic data (G&C), Vulnerable (needy) students data(HOD's& CT's) ▪ *Instructional changes:* final examinations, assessments result and records of work covered e.g. increasing contact hours for weak students (HOD's &CT'S). ▪ *Meeting accountability demands:* Schemes of work, records of work covered, student assessment results, lesson notes, (HOD's and CT's), student daily attendance data (CT's) ▪ *Support conversations with students and parents:* final exam and assessment results(HOD's & CT's) student daily attendance and class minutes (CT's) ***Unintended /negative use*** ▪ *Misuse:* e.g. Some teachers were using class minutes information to victimize students who air their views about them to the school administration (HOD)	▪ *Monitoring progress and identifying areas of need :* assessment and final examinations results, , schemes of work, intake, teachers' records of work covered , (HOD's & CT's), student daily attendance(CT's), students transfers ▪ *Meeting accountability demands:* Schemes of work, records of work covered, student assessment results (HOD's and CT's), student daily attendance data (CT's) ▪ *Support conversations with students and parents:* final exam and assessment results(HOD's & CT's) student daily attendance (CT's) ▪ *Instructional changes:* final examinations, assessments result and records of work covered e.g. increasing contact hours for weak students (HOD's &CT's).	▪ *Monitoring progress and identifying areas of need :* assessment and final examinations results, , schemes of work, intake e.g. need for more student desk and chairs), teachers' records of work covered , (HOD's & CT's), student daily attendance(CT's), students transfers, class minutes, foster parenting (HOD's & CT's) ▪ *Meeting accountability demands:* Schemes of work, records of work covered, student assessment results (HOD's and CT's), student daily attendance data (CT's) ▪ *Support conversations with students and parents:* final exam and assessment results(HOD's & CT's) student daily attendance (CT's) ▪ *Instructional changes:* final examinations, assessments result and records of work covered e.g. increasing contact hours for students up to including evening after classes (HOD's &CT's). ***Unintended /negative use*** ▪ *Strategic use of inspection report:* e.g. Teachers ignored recommendation to teacher while students confirm what they teach form text book. Instead they choose only to improve on a recommendation to improve on students' progress reports. ▪ *Abuse of assessment results:* Teachers used assessment results to identify and warn weak students to improve, failure to which they are asked to repeat class as opposed to changing instruction to help such students.

KEY: TSC=Teachers Service Commission; **SL**= School leader; **HOD's**= Heads of departments; **CT's**= class teachers

5.2.1 Genuine improvement actions

There are good examples in which data was used in the schools studied. In this section, we describe these examples. Also in this section and the entire study, the term school leader 1, 2 and 3 is used to refer to those teachers heading schools 1, 2 and 3 respectively.

Study findings show that school leaders mostly used data to improve the school and the curriculum as opposed to teacher improvement. Results further indicate that the school leader of school 1 used data in more innovative ways to improve the school, curriculum and to some extent the teacher compared to school leaders 2 and 3. A description of data use by school leaders and teachers is illustrated below.

School 1

School leader 1 used data mostly to improve the school, curriculum and the teacher respectively. In this school, data appeared not only used to monitor but also to improve the academic, social and psychological well being of students in the school as is illustrated below.

i) *School improvement initiatives*

One effort to improve school 1 was evident in the comparison of final examinations and assessment results of students residing in school and those who do not. Results of the comparison revealed that the former were performing better in mean score index than the later. As a result, the school has started building dormitories to increase the number of students residing in school so as to further improve students' performance in examinations. Second, the school leader uses the school's final examinations results to identify and invite top students in each subject to assist in teaching and guiding their younger colleagues who are yet to sit for their final examinations. These top students are invited to act as role models, instill pride and, to motivate students who are yet to sit their final examinations to work hard and improve on the results. Again, final examinations and assessments results are used to award teachers and students with leading results in the school. For instance, the top 20 students are awarded money as gifts upon the release of KCSE results each year. Teachers are also given gift vouchers. Proofs of pictures for such past events were available for analysis.

Another unique school improvement initiative in this school based on data is the feeding program known as *"Kulisha"* for the vulnerable students. Class minutes, for instance, reported that some students were always unable to afford lunch thus gravely affecting their concentration in class. Names of the affected students were then taken and their demographic data consulted from the guidance and counselling department where it is kept. The data confirmed their poor backgrounds thus prompting the school leader to initiate "*Kulisha program"* not only to cater for their feeding, but also to accommodate some of them in the school so that they get conducive environment for studies and, to maximize their performance in examinations (i.e. school improvement initiative). Teachers also confirmed that the school leader sourced for, and got a donor and is still seeking for more donors to fund and sustain the feeding programme.

Finally, the school leader innovatively used discipline and student demographic data to reduce indiscipline cases among students. From the data, he discovered that most indiscipline students came from single parents. He then solved the problem by inviting all single parents together under what they call *"widows fellowship"* where they shared how to bring up their sons in the absence of one parent. According to teachers interviewed, that step significantly reduced indiscipline cases in the school hence conducive academic environment. Moreover, minor indiscipline cases were always noted and referred to the guidance and counselling department.

ii) *Curriculum improvement initiatives*

School leader 1 also used final examinations and assessment results for curriculum improvement. For example the data was used to set school target with teachers and to initiate Holiday Remedial Tuition (HRT), which increased teaching hours beyond normal school dates and working hours. Another curriculum improvement effort is also evident in assessment policy of least three tests per term. Also, the school has a policy requiring that all teachers must clear the form 4 syllabuses by April each year instead of October so as to allow more time for revision with the candidates before they sit for their final KCSE examinations. Assessment results are also used to increase contact hours for academically

weak students. Student contact cards are used in this regard to aid monitoring and consultations between teachers and the weak students.

iii) *Teacher improvement initiative*
Only one example of teacher improvement attempt was identified in school 1. This involved using final examination analyses data to identify a poorly performed subject. Teachers teaching that subject are then taken out for "bench marking" where they learn approaches used by their colleagues from schools that post better results in the same subject. For instance, the school's 2011 KCSE results showed that Chemistry was dismally performed. All Chemistry teachers were then taken out for "bench marking" with Chemistry teachers from Maranda high school that lead nationally in KCSE 2011.One teacher reports: *"We went there to learn and borrow improvement techniques they use so that we also use some of those techniques to improve Chemistry in this school".*

iv) *Use of data by teachers in school 1*
Results show that teachers' use of data in school 1 is limited to monitoring, meeting accountability demands and for supporting conversations with students and parents. In few instances, teachers used data to make instructional changes mainly due to pressure and policy changes initiated by the school leader. For instance, teachers in school 1 closely monitored weak students using contact card initiated by the school leader..

School 2
School leader 2 also applied outcomes from data analyses to innovate curriculum and school improvement but lacked teacher improvement efforts. Data was also used in less innovative ways in this school and the focus appeared more towards improving examinations results.

i) *School and curriculum improvement initiatives*
Data was used for both curriculum and school improvement initiatives. For example, analysis of final examinations and assessment results revealed that student performed better in humanities subjects as opposed to Mathematics, sciences and Kiswahili language. The school leader in consultation with teachers then resolved to create extra time on Saturdays for teaching Mathematics and Sciences subjects while reserving Sundays for teaching Kiswahili language (i.e. curriculum improvement). Holiday lessons were also incorporated to expose the students more in these subjects. Going by the analysis of the latest final examination results for the years 2010 and 2011, this policy shift paid off. As a matter of fact, the school emerged the leading in Kiswahili nationally with a mean score of 11.185 out of 12 point while at the same time managing to tremendously improve the mean score in Mathematics from 7.0 to 7.7 and Sciences (Physic from 7.3 to 8.5, Biology from 7.8 to 8.4 and Chemistry from 6.9 to 7.6) in the 2011, KCSE results. No student from the school scored the weakest E grades in Kiswahili and Sciences and, only two students scored E grades in Mathematics out of 233 students who sat for the KCSE examinations in the school in the year 2011(i.e. school improvement). The school has also adopted regular testing policy whereby three examinations are done per term so as to always monitor students' progress. A policy to complete the syllabus similar to that of school 1 is also in place. One teacher argues: "*We are required to finish form 4 syllabus by April so that we have enough time to revise with the candidates before they sit for their final examinations in October each year".*

Another innovative attempt to improve the school based on data is also visible in assessment results. The results are used to identify academically weak students for "detention". However, it later emerged that perpetual detainees were day scholars (i.e. those not residing in school) and consequently, a resolution was made that turned the school into a full boarding. Currently the entire student populations are accommodated in the school. The school leader also uses the same data to award top performing students and teachers in the school. For instance, the entire staff was taken out on holiday vacation in Tanzania to motivate them after confirming that the school improved in KCSE 2011. Strikingly, there lacked any visible evidence of teacher improvement initiative that could be mentioned by respondents in this school. On the other hand, teachers use of data in this school was also limited and similar to that of school 1.

School 3

Use of data by school leader 3 was mainly for curriculum, school and little teacher improvement initiatives respectively. Data use was also limited to monitoring progress of students' learning, planning and policy development. The dominantly used data are fees payment, assessment and final examinations results. Three data use examples for genuine improvement actions were evident.

i) *Curriculum, teacher and school improvement initiatives*

First, to achieve school targets in the final examinations, the school leader implemented policy shift to create more teaching hours beyond the normal working hours in what respondents called holiday tuition and remedial lessons. The leader also targeted early syllabus completion and increased the number of internal tests to three so as to closely for monitor students' progress. (i.e. curriculum improvement). Second, teachers and students are awarded based on the assessment and final examinations results they produce. Third, when assessment data revealed poor performance in sciences and teachers attributed it to students' inability to conduct science practical, the leader sent teachers to learn from science teachers in Karima high school (i.e teacher improvement). The findings lead to a resolution to avail apparatus to facilitate conducting science practical every weekend (i.e. curriculum improvement) so as to improve students' performance in sciences (i.e. school improvement initiative). Unfortunately, going by the analyses of the school's final examination results, this effort is yet to bear fruits in terms of students' achievement in science-based examination results.

iii) *Data use by teachers in school 3*

Similarly, teachers' use of data for genuine improvement initiatives in this school was also limited. Data was mainly used for monitoring, identifying areas of need, meeting accountability demands and supporting conversation with parents and student. Teachers' use of data did not lead to concrete instructional changes like finding alternative ways to help the academically weak students

In summary, the results of the analyses show that the use of data by school leaders was average in the three schools but limited for teachers. Detailed results of each school can be found in Table 7 and 8. The general results are further elaborated in the sections below.

5.2.2 Purposes/ uses of data: School leaders

School leaders also used different data sources for the following purposes:

i) Monitoring progress and identifying areas of need

School leaders used assessment results, final examination results, intake/enrolment, daily attendance and lesson attendance records, fees payment, staff, parents and student minutes, student notes, school programme of events and the school inspection reports to monitor students' progress and the functioning of their schools. For instance, assessments and final examination analyses were used to identify which students or subjects required assistance and what strategies they need to put in place to improve. The school leader for instance, compares the results to monitor deviations each year and as a result know which subjects need more attention. For example, school leader 2 argues that- "*We must have some direction as to where we are moving. Are we improving on the past results, static or are we dropping? Data enables us to know that".* Moreover, schools set subject and school mean targets based on final examination results. Student discipline and assessment results are also used to identify and monitor deviant students in the school for either punishment or guidance and counseling. The school leader 1, for instance, says- *"whenever we have student indiscipline cases we consult student's assessment results. Somehow the student's results will show always show dropping trend"*.

ii) Planning and policy development

All school leaders in the study used fees payment data, staff minutes, parents' minutes, analyses of assessment and final examinations data for planning and policy development such as, implementing increased teaching hours through remedial teaching and holiday tuition and, to put in place regular testing policy that constantly diagnoses and reveals students problems and challenges for action.

School leaders also used fee payment and student intake data to plan. For example, school leader 3 argues:

"*Student intake and fees payment data are very important when we are drawing the budget. We have roughly 900 students and I have to calculate to know how much to charge each parent in case we want to purchase equipment or run a construction project*".

iii) Support conversations with teachers, students and parents

School leaders, for example, reported using assessment and final examination analyses results to invite teachers, students and parents for discussion meant to improve school and student performance. School leader 3 reports: "*Normally after we have analyzed examination results, I invite parents, teacher and students to discuss and see how to improve the results*". School leaders 1 and 2 also reported using student discipline data to support conversation with parents and students. School leader 1, for instance reported:

"*Two years ago we had many indiscipline issues. On checking student demographic data, I realized that most indiscipline students came from single parent families. We solved the problem by bringing all single parents together under "widow's fellowship" where they talk and learn from each other how to bring up their sons. It helped reduce indiscipline cases from their sons*"

For proof, the school's notice boards had photographs of the "widows' fellowship" events.

iv) Motivating students and staff

All school leaders and teachers stated that assessment and final examination results was used to award top performing students, staff and, to emphasize continuous improvement. The school leader in school 2, for example, explained that:" *We have just arrived from a tour of Tanzania because the school performed well in KCSE, 2011. We will also have the parent's day cum annual prize giving day".* A teacher from school 2 also confirmed the same saying, "*On such a day, even students who have improved are appreciated and awarded*". Moreover, school leader 3 also report that:

"*To improve, teachers here are motivated in monetary form. Immediately we get our results, we give 1,500/= Kenya shillings. It's called "instant". Everybody gets it whether the results have gone up or down. We sometimes take them out for dinner. Although recently the results were good, and we had a 4 day trip to the coastal city of Mombasa*".

In school 1, there was even an additional unique approach to student motivation whereby top three students per class had their photographs, plus their academic background, hobbies and carrier ambitions displayed on the school's notice boards for public viewing. School leader 1 explains: "*Students would compete just to have their photographs appear on the notice boards".*

v) Evaluate teacher performance

School leaders 1 and 3 indicated using final examination results, assessment results, teachers' lesson attendance data, teachers' records of work covered and staff daily attendance data to evaluate teacher's commitment and performance. School leader 2 explains that- "*I evaluate a teacher's commitment by checking the class attendance records to know which teacher attends his/ her lessons as required.*" Also reported was that school leaders to some extent linked students' performance to teacher's performance in class. This was evident in a statement by one teacher in school 3 who said, "*The moment the results are analyzed, we sit and every teacher is held to account for his/her students' performance. Each department also reports why they did or did not perform*."

vi) Meeting accountability demands and legitimizes actions

It appears that some data are kept by school leaders for accountability purposes. For example, on issues to do with school finances, one school leader openly declared: "*Things dealing with finance, I have to account for the money spent and provide BOG minutes that authorized the expenditure*".

Data is also used to legitimize actions taken. School leader 1,for instance argues that," *we must keep students' discipline data. That data is crucial when we want to take a student before BOG for disciplinary action. We must have first hand information with us for the case to hold".*

vii) Negative use of data

Not all data are used positively. First, interview results indicate that school leaders might be having strategic use of the inspection reports. During the interviews, for example, school leaders found it

difficult to provide a sample of the latest report for analysis, yet interview evidence from respondents indicated that the reports were available in the schools. One school leaders argued, "*Inspection report is a school document under lock and key",* while another one said, "*that is a document that cannot just be given to anybody except the BOG. I can only tell you some of its contents and that is all*". Second, one school leader abused students' assessment data at some point by using it to identify weak students for "detention" in school during holiday vacation without indicating, for instance, a programme for teachers to couch them. The school leader states," *the assessment results helped us identify the weak students for detention."*. However, this abuse did not last long. The school leader later turned this finding into an improvement opportunity for the school by changing the school into a boarding school so that all students have more coaching in school.

5.2.3 Purposes/ uses of data: teachers

In the presentation of results in this section, responses from both class teachers and HOD's are treated as "teachers' responses" for two reasons. First, these categories of respondents are also classroom teachers and second, in the Kenyan school context, the two are also referred to as teachers. Detailed results on data use by teachers can be found on Table 8.

First, the study results generally showed that the use of data by teachers was limited. Many sources of data were also not used by teachers. Instead many teachers mainly showed interest in syllabus coverage by attending their lessons and trying to improve their subject mean scores. One teacher in school 3 argues that- "*I ensure that I attend my lessons and I use schemes of work to see how far I have covered the syllabus"*. The same teacher continues:"*When we analyze exam results, we consider the very potential students and those who are not. I then consider focusing on them to establish how much contact hours they need.*" Unfortunately, beyond this there lacked evidence of genuine improvement action that could be mentioned by the teacher. Another striking finding was that teachers did not access, read or use school inspection reports. They instead associated it more with school leaders. A teacher for instance, remarked: "*school inspection reports are available, in the Principal's office. She reads it to us and sometimes we are only told what relates to our department"*. Another teacher in school 2 provides further evidence that inspection report was rarely used by teachers. The teacher reports:

"*After inspection, inspectors gather everybody and tell us our strengths and weaknesses. They allow reactions and later they compile a report which is given to the principal. I think last year our HOD told us in our departmental meeting some things that were recommended in the report, but personally I do not read or use it*".

The results further show that teachers mainly used student daily attendance data, assessment results, final examination results, schemes of work, records of work covered, school programme of events and class minutes for the following purposes:

i) Supporting conversations with students and parents

All teachers reported that they mainly used assessment results, final examinations results, student daily attendance and discipline data to support conversations with parents and students. A teacher in school 1, for example, confirmed: "*We have a tracking record and when an exam is done and results released, it's compared with the previous ones and we note the deviations to know which student to summon for a discussion on performance*." A second teacher in school 2 also said:" *We usually create time to discuss exam data not only with weak students but also with well performing students so that we encourage them to add effort and perform even better*".

ii) Meeting accountability demands

All teachers interviewed reported keeping and using schemes of work, records of work covered, student daily attendance and student assessment results since they were required by the school administration and the quality assurance inspectors. For instance, a teacher in school 2 said:

> "*We are required to have schemes of work and records of work covered. The record of work covered is a record of topics covered daily based on the schemes of work. Here I have a submission of record of work book where the school leader checks the topics I have covered. So it is for managing what the teachers are doing. They have now become a routine*".

iii) Planning Monitoring and identifying areas of need

Teachers were using student enrolment data, schemes of work and school programme of events to plan. For example, enrolment data that provides students' population was used by examinations department to plan how many copies of examination papers to produce. On the other hand, the school programme of events helped all teachers to draw their departmental programmes and to plan on where to slot their own programs so that they do not clash with major school events. Teachers also used schemes of work to plan and monitor syllabus coverage in terms of the amount of content to cover in a term and, to prepare for resources to use in the classroom during instruction. All teachers interviewed also reported using assessment results, final examination results, and records of work covered, student daily attendance and schemes of work data to monitor and identify areas of need. A teacher in school 3 for instance said: "*from assessment and final examinations analysis, it is easier to know which class is tailing or doing well so that you may know which class or topic needs re-teaching*". Teachers also use assessment data to monitor performance of individual students. One teacher in school 1, for example, stated that, "*I use assessment results to compare and check whether students are in the upward or downward trend*." On the other hand students' daily attendances data was used by class teachers to monitor students' truancy and absenteeism.

iv) Instructional changes

Results indicate that teachers in the three schools studied rarely initiated instructional changes in their classrooms based on data. Instead many instructional changes in the schools either resulted from discussions in staff meetings or actions from the school leaders themselves. For instance, the increase teaching hours and testing policy were all initiatives from the school leaders and always passed in staff meetings. Another example is the use of contact cards that was also initiated by a school leader to increase supervision of weak students.

vi) Negative use of data by teachers

Strategic, misuse and abuse of data also emerged during the interview with teachers. First, *misuse* of data by teachers was reported in school 1. One teacher for instance, reported that some teachers had used class minutes data to victimize students who openly aired views about their poor style of teaching and did not for instance, use that information to help them change their teaching approaches. This prompted the school leader to deny teachers from accessing class minutes. Second, in school 3 teachers appeared to *abuse* data by using it to warn and threaten weak students to improve or be asked to repeat classes instead of putting concrete instructional measures to assist such students improve. One teacher gave an insight into this possibility by stating, "*We have data on weak performers. If a student is weak we call them to discuss it and they promise to improve in the presence of the parent. If they fail to improve then we ask them to repeat the class*." Last, strategic use of inspection reports also emerged. Teachers choose to act only on aspects of the report that pleased them while ignoring other recommendations. One teacher explains:

> "*We were told that the last report stressed on value addition on progress reports which we implemented. It also recommended that when teaching; students should also have text books to confirm. That one is debatable!".*

5.3 Question 3: Factors promoting or hindering data use

Study results reveal that a majority of promoting or hindering factors to data use in the schools were similar. Results for each school are given in **Table 9** below

Table 9: Promoting and hindering factors to data use in the schools

	Promoting factors		
Factors	***School 1***	***School 2***	***School 3***
1.Data characteristics	▪ *Access* to reliable, valid, relevant and accurate data which coincides with the needs of the user (SL, HOD's, CT's)	▪ *Access* to reliable, valid, relevant and accurate data which coincides with the needs of the user (SL, HOD's, CT's)	▪ *Access* to reliable, valid, and relevant data which coincides with the needs of the user (SL, HOD's, CT's)
2.School organizational characteristic	▪ *Support* from students, parents, colleague teachers, government and school leader e.g. in collecting data. ▪ *Teacher collaboration* ▪ *Clear vision and goal for data use*	▪ *Support* from students, colleague teachers, government, NGO's and school leader ▪ *Teacher collaboration* ▪ *Availability of data expert*	▪ *Support* from students, colleague teachers, government and school leader e.g. in collecting data. ▪ *Teacher collaboration (SL,HOD's & CT's)*
3.User Characteristics	▪ *Buy in /belief in data*: data use is important in education (SL,HOD's & CT's) ▪ *Perceived ability to improve using data*(SL,HOD's & CT's)	▪ *Buy in /belief in data*: data use is important in education (SL,HOD's & CT's) ▪ *Perceived ability to improve using data*(SL,HOD's & CT's)	▪ *Buy in /belief in data*: data use is important in education (SL,HOD's & CT's) ▪ *Perceived ability to improve using data*(SL,HOD's & CT's)
Hindering factors			
Factors	***School 1***	***School2***	***School3***
1.Data characteristics	▪ *Lack of access to timely data* that coincides with the users needs e.g. "we have the data which makes us delay during the release of examinations due to lack of data expert and sometimes colleagues delay with needed data". (HOD's) ▪ *Inaccurate data e.g."* I have encountered parents and student giving conflicting student date of births leading to confusion" (HOD) ▪ *Inefficient information management systems e.g. "we need computers, modems"(HO,SL,CT's)*	▪ *Lack of access to timely data* that coincides with user's needs e.g. "We try to avail much data to everyone, but being the old system, there is some information that is just stored in some offices and requires bureaucracy to get them. So you give up and end up not achieving what you wanted." ▪ *Lack of efficient information management systems e.g. "we need computers, modems" (HOD ,CT's)*	▪ *Lack of access to timely, accurate data* that coincides with the user's needs –"We only have one person whom you have to wait until when he is free. At times he says not today and you are forced to wait long for that data you needed urgently. At times you encounter wrong entries." ▪ *Lack of efficient information management systems e.g. "we need computers, modems" (HOD , CT's)*
2.School organizational characteristic	▪ *Inadequate facilities* e.g." some vote heads governing the financial system ties the hands of the principal such that he cannot buy computers, leave alone training teachers" ▪ *Lack of training* in data management and use e.g. ''most of our staff are computer illiterate including me. This prevents me from using data the way I want". (HOD) ▪ *Lack of designated data expert* ▪ *Not enough time* (CT's, SL, HOD)	▪ *Lack of training* in data management and use e.g. " we were given little training on data in college which is now outdated" (CT's) ▪ *Not enough time* (SL, CT's)	▪ *Inadequate facilities* (SL) ▪ *Lack training* in data management and use ▪ *Lack of designated data expert Not enough time* (CT's, SL, HOD)-"You can be bogged down with a lot of administrative work and lessons that you may not have time to collect leave alone analyze data."
3.User Characteristics	▪ Inadequate data skills and knowledge (SL,HOD'S &CT's)	▪ Inadequate data skills and knowledge (SL,HOD'S &CT's)	▪ Inadequate data skills and knowledge (SL,HOD'S&CT's) ▪ Teacher attitude:-"there is some apathy towards the use of data, some reluctant when they are needed to do a post mortem in exam results.
KEY: ***NGO's*** =Non-Governmental Organizations; ***SL***= School leader; ***HOD's***= Heads of departments; ***CT's***= class teachers			

Respondents in all schools studied reported some common promoting and hindering factors to data use in their schools. Below are illustrations on the same from the selected schools.

5.3.1 Common Promoting factors

Study results indicate common factors to be school leadership pressure and support, students' support, teacher collaboration, belief in data and perceived ability to improve the school using data.

i) Pressure and Support from school leadership and students

Many teachers mentioned that support and pressure from their school leaders especially in analysis and reporting of final examination and assessment results, forced them in many occasions to use and keep such data. They also argued that data types such as schemes of work, records of work covered and students' daily attendance data that were always demanded for, by the school leaders enabled them keep those data so as that they would produce them on request. Respondents also revealed that they received a lot of support from the school leaders especially in the purchase of records of work books. Many respondents including school leaders also mentioned that they were getting a lot of help from their students in the collection of data such as class minutes and student daily attendance data.

ii) Collaboration among teachers

Collaboration among teachers is another common factor that promoted data use in the schools. Teachers report that they discussed and shared data at subject, departmental and in staff meetings levels. This is exemplified by statements from teachers in all the schools studied that seem to point to the fact that a group of teachers in the examinations departments would analyze data on behalf of the school. The results of the analyses were then discussed in departmental and eventually staff meetings where new target were also set and agreed upon. However, such discussions leaned more towards discussing assessments and final examination results as opposed to other forms of data. For instance, most teachers linked departmental and staff meeting discussions to the release of either assessment or final examination results.

iii) Buy-in belief in data

The study also found that teachers and school leaders believed in the power of data for their improvement and that of the school. All respondents claimed that no school can improve without the use of data in this current age. Consequently, many teachers for instance reported that data helps them to know "where they are' and "where were going'' in their professional duties and therefore without data, their job and the running of the school can be chaotic.

5.3.2 Common hindering factors

Schools studied also had many similar hindering factors to the use of data. Many respondents mentioned lack of training on data management skills and use, lack of efficient information management systems to allow them access data fast and timely (delays). Other hindering factors mentioned by respondents include: few cases of inaccurate data, poor cooperation from parents, inadequate funding and inadequate time to effectively use data. First, despite having a data clerk assisting teachers in school 2, many respondents in this school still felt that they needed more computers connected to internet and fast access to data. A few respondents also reiterated how some data like student demographic data and inspection reports are inaccessible thus prompting them to ignore the use of such data. Delays in accessing data caused by bureaucratic practices and poor co-operation in stakeholders are other problems mentioned by a few respondents in all the schools. Respondents for instance felt that some of their colleagues, subordinate staff, school leadership and parents at times failed to co-operate on data issues. Many HOD's, report that fellow teachers sometimes failed to submit some urgently needed students' assessment data in time. Teachers on the other hand, pointed out delays towards data collection caused by parents. They singled out students' birth certificates which are required for KCSE registration as one data where many parents provide

inaccurate data and fail to submit the data on time. Teachers in school 3 further reported that some parents do not study their children's progress reports.

5.3.3 Differences noticed in the promoting or hindering factors

Although many hindering factors to data use in the schools were also similar, a few differences were notable. For example, school 1 to some extent used data effectively. Respondents in this school mentioned factors like lack of data expert, lack of efficient information management systems (computers), inadequate training, inadequate funding and time as hindering effective use of data in their school. However, having clear vision and goal for data use enabled respondents in this school to use data. The absence of this factor in schools 2 and 3 may have hindered the use of data in these schools to some extent. Also, even though School 2 had data clerk assisting teachers while school 3 took a few Mathematics teachers for training in the use of specific data software, respondents in these two schools still advocated for more computers and access to timely data unlike school 1.

5.3.4 New promoting or hindering factor

Another promoting and hindering factor, not included in the framework, but became visible in the results is students and parents co-operation. This factor fits under school organization characteristics because students and parents are stakeholders in schools. All respondents for instance, mentioned that students helped them in the collection of certain types of data (e.g. class minutes, teacher's lesson attendance data) and, in some cases analysis of student assessment results. Moreover, HOD'S in games and guidance and counselling also explained that they relied on the cooperation from students especially student leaders in the collection of data they use to establish the challenges faced by students on daily basis. Also, all school leaders, 6 teachers and, 4 HOD's mentioned parents' cooperation as another vital factor especially in the collection of timely and accurate data regarding their sons and daughter. They for instance, singled out student demographic data, birth certificates and even students' daily attendance as some areas in which parents' cooperation and support promoted or hindered effective use of some data types in the school. Furthermore, four class teachers reported that sometimes pressure from parents keen to follow their children's progress, forced them to prepare and keep up to date students' progress and daily attendance data.

CHAPTER SIX

6.0 DISCUSSION AND CONCLUSION

In this chapter the study results are discussed, explained and aligned with other literature findings. Conclusions are then made and recommendations presented based on the Kenyan context.

6.1 Introduction to contextual issues

Prior to discussing the results, it is vital to clarify a few methodological and contextual issues anchoring this study. To start with, in this study data were collected by partly interviewing teachers and school leaders. Therefore, teachers and school leaders' self-perception was used to study their use of data. Comments made by respondents during the interview were verified by asking for more details, examples and even samples of data mentioned by respondents were requested for analysis. Still, the data may present a biased picture of the actual use of data in schools.

Furthermore, the study of data use or data-driven decision-making is a complex and difficult cognitive process in which decision makers are never fully aware of the data they involve in their decision making process (Breiter & Light, 2006). Little while reviewing a study by Timperley and Parr (2009) also highlighted the role of content knowledge and institutional contexts. In other words, what data teacher' use, what they notice about those data, and how they make meaning out of the data are all influenced by the teacher's 'working knowledge' and institutional contexts. This suggests that institutional contexts shape data use and that data alone in the absence of knowledge on the part of the user will not lead to improvement. As a result, studying data-driven decision making is a complex task. Moreover, the use of data in this study was done only in the District's top three schools in KCSE 2011. I therefore emphasize again that the goal of this study was not to make firm generalizations, but to gain insight into the use of data within Kisumu East Secondary Schools. This explorative study may thus serve as starting point for follow up studies on data use for curriculum, teacher and school improvement. In the section below, findings with regard to the research questions (i.e. data available, use and, the promoting and hindering factors) are discussed respectively.

6.2 Data available in schools

The results showed three key findings regarding the data available in the selected schools. First, the data types under input, process and outcome categories were similar in all the schools. Slight variations only existed in context data types. Secondly, most input data were kept and used by school leaders and finally, outcome data (assessment and final exam data) were easily accessible and used in almost equal measure by both teachers and school leaders.

The similarity in input, process and outcome data types in all the schools and the fact that they were up to date and readily available, while the context data types had slight variations in the schools, might be attributed to three possible explanations. First, homogenous sampling of schools for the study and, the centralized system of education in Kenya that has almost similar activities in all schools, may have been the possible cause of similarity in the data available in the schools. On the other hand, the slight variations in context data may be due to context variations within the schools. For example, an innovative school leadership that shows clear visions, norms and goals for using data as suggested by (Kerr, et al., 2006; Wohlstetter, et al., 2008; Young, 2006) offers that possible explanation. This fact was evident in the context of school1. The school leader showed vision, norms for data use and was firm but supportive. That might explain the existence of unique sets of context data such as student contact cards for weak students, "Kulisha programme for vulnerable students" and photographs for top three students academically for public viewing on the school notice boards. Moreover, Breiter and Light (2006) also reported that the broader institutional contexts shape what data people notice, make meaning of and use.

Secondly, accountability demands to comply with regulations from school leaders and, or quality assurance inspectors (Coburn & Talbert, 2006), may have enhanced availability of the input, process and outcome data sources. On the other hand, emphasis from the pre- service training of teachers on how to make and keep some data commonly referred to as teaching professional documents (e.g. schemes of work, records of work covered and student progress records) provide explanations for the availability of these process data especially among teachers.

Even though some data samples were not available for analysis, for instance, school inspection reports, lesson plans, annual policy plan of the school, student transfers and student drop-out data as indicated in Table 5, respondents mentioned them. This could produce two possible conclusions: either lack of use of such data by the respondents, or total lack of these data types in the schools. After all, other research also shows that despite availability of data in schools teachers continued to use data improperly or did not use data at all to guide their practices (Schildkamp & Teddlie, 2008; Wohlstetter, et al., 2008). They instead relied on "experience is enough"(Ingram, et al., 2004; Schildkamp & Kuiper, 2010). Increased bench marking (i.e. visiting) other schools and teacher professional development can be suggested as ways that may help to reduce this problem. In so doing, school's staff can learn ways to innovate and use new data types in solving new challenges in their schools through the help of their colleagues in other schools that are doing better than them.

Input data was mostly in possession and use by school leaders. An in-depth analysis reveals that the data types in this category were mainly school level data. A study conducted in the Dutch context (Schildkamp & Kuiper, 2010) also reported that school leaders mainly used school level data. However, for data-based decision making to lead to effective and comprehensive functioning of schools, different data sources need to be shared as basis for decision making as suggested by (Huffman & Kalnin, 2003; Schildkamp & Kuiper, 2010). School leader 1, for instance, showed a good example in this regard by combining information from class minutes and student demographic data to reach a conclusion that there was need to start a feeding programme for needy students. He also combined student discipline and student demographic data to conclude that there was need to start "widows fellowship" in the school. To achieve this goal, teacher collaboration is also required as indicated by (Wohlstetter, et al., 2008; Young, 2006). This might help to reduce isolation in the profession, while enhancing individual teacher's professional growth.

Teachers and school leaders were also found using outcome data such as assessment and final examinations data in almost equal measure. The data source was also very accessible to all stakeholders of the schools to an extent that all notice boards in the schools had assessment and final examinations data. The significance attached to this data source by the schools could be explained by the existence of a competitive exam-oriented system of education in Kenya where ranking of schools are done based on examination results. Parents also choose schools for their children based on how many students pass examinations from the school. Schools therefore, tend to focus on the data to monitor students' progress and to improve on previous results. The Government, students, BOG and school community are also more interested in school's performance in the final examinations and might be less interested in the other forms of data. The effectiveness of school leadership and the commitment teachers (EducationInfoCenter, 2006) also seem to be determined based on final examination results. Consequently, schools struggle to improve every detail of the results. Cawelti and Pretheroe (2001) also found that schools which continue improve started their improvement efforts by carefully reviewing test data to determine where they were succeeding and where they did not so that they directed their efforts for improvement accordingly.

6.3 Purposes/ uses of data

6.3.1 Genuine improvement initiatives

Respondents also mentioned recent improvement initiatives in their schools. The finding reveals that schools and school leaders mostly used assessment and final examinations data to put in place plans and policies geared towards school and curriculum improvement initiatives as opposed to teacher improvement initiatives. Again this finding might be attributed to high-stake test-based accountability system of education in Kenya (EducationInfoCenter, 2006). Schools in Kenya seem to race towards showing their progress in the final examination (KCSE) results. This was even more evident by statements from all respondents that kept touching on efforts to improve examination results. Moreover, as reported by many respondents, school leaders and teachers did not have frequent meetings and when they did, it was in most cases to discuss assessment or examination results. Parents were also mainly invited to discuss examination results. Motivation of teachers and students is also pegged on examination results they produce. Furthermore, examination results dominated school notice boards. Consequently, the high-stake test-based accountability system leaves schools and

school leaders with no option but to emphasize policies on school and curriculum improvement initiatives such as: - bench marking, increasing teaching hours, detaining weak students and increasing the number of assessment tests in a term with the aim to improve student performance both in the upper and lower forms or classes.

The study also showed that teachers hardly used data to put in place instructional changes in their classrooms. This inadequacy might be linked to lack of teacher improvement initiatives by the schools. Moreover, evidence that data was used to put in place school and curriculum improvement initiatives was overwhelming as opposed to teacher improvement initiatives. The finding might be worrying since the improvement of teachers should have a larger impact on school improvement in terms of increased student achievement.

The centralized employment system of teachers by the government through TSC may also explain why teacher improvement initiatives are not given attention by the schools. For example, it is likely that schools feel and assume that the improvement of practicing teachers in public schools falls under the mandate of TSC as their employer. On the other hand, the TSC and parents may also be assuming that teachers employed by the government are fully trained and prepared by their respective teacher training universities and colleges to be able to tackle all challenges within and outside their classrooms up to including, those to do with data use and therefore, do not need further allocation of resources towards improving them professionally. These reasons might further explain why the study results indicate schools which are more focused on school and curriculum improvement initiatives while having less to show of teacher improvement initiative.

6.3.2 Data use by school leaders and teachers

One key finding is that school leaders and teachers use data differently. School leaders mainly use school level data. They aim at ensuring that the curriculum implementation follows government guidelines and the school's own targets. The school leaders are concerned with schemes of work, teachers' records of work covered, teachers' lesson and daily attendance data that directly reveal how the curriculum is being implemented. They are also interested in data on attainment such as students' assessment and examinations results at school level. In general, school leaders are interested in data that might help them plan, develop and implement school policy. The school leaders interviewed use data for the following purposes: (i) Monitoring progress and identifying areas of need, (ii) Planning and policy development, (iii) Supporting conversations with teachers, students and parents, (iv) Motivating students and staff, (v) Evaluating teacher performance and, (vi) Meeting accountability demands and legitimize actions. School leaders appear to use inspection report strategically.

On the other hand, teachers were more interested in classroom level data which revolves around their classroom and students (e.g. syllabus coverage, students' lesson attendance and achievements). Teachers in this study mainly used data data-driven decision-making to inform their own classroom (e.g. increasing the pace of syllabus coverage or to choose a topic to revise). They used data for the following purposes: (i) monitoring progress and identifying areas of need, (ii) Planning for their lessons, (iii) Support conversations with students and parents, (iv) Meeting accountability demands and instructional changes. These findings are in line with what (Schildkamp & Kuiper, 2010) found that school leaders mainly used school level data for planning and policy development at school level while teachers were more interested in classroom level data that showed them how students perceived their lessons as well as student achievement.

However, differences in the use of data by teachers and school leaders might threaten effective data-driven decision-making in schools. Various types of data such as inspection reports, parents' and student's minutes, student assessment results, final examination results, student demographic data including, students' and teacher's daily attendance data for instance, can together provide a comprehensive understanding on the functioning of the schools and may also provide a justification for improving that functioning. Moreover, Schildkamp and Kuiper (2010) argues that just like in scientific research, triangulation of data sources is crucial for data-informed decision-making to be effective. Teachers should not focus on one single source of data for evidence to improve their functioning, but rather take into account different data sources to base their decisions on.

The study results also indicate that teachers and school leaders did not fully rely on data to base their decisions on. They for example talked about lesson plans, inspection reports, policy plan of the school, student turn over and drop –outs data but could not provide latest samples for analysis thus indicating lack of use or absence of the data. Some teachers also reported that parents' minutes were forwarded "for consideration" by the school administration, meaning that decisions were not necessarily made based on them. Moreover, one teacher also stated that some recommendations they from the inspection reports were "debatable", meaning they were not obligated to implement them. Ingram et al.(2004) also found that not all decisions made by schools are data informed-decisions and that majority of decisions were based on intuition and on limited observations. Furthermore, two teachers and one HOD even explained that lesson plans and schemes of work have become a "routine" and for them, only lesson notes were important for classroom instruction.

Despite all indications that annual policy plan of the school that resembles a strategic plan to guide school improvement might be lacking, it was however, evident in staff minutes that schools' staff employed what may be referred to as "emergent planning" which is an approach that focuses more closely on improving student learning. It also differs from most strategic planning in that teachers are largely in control of their own learning. As the word emergent suggests, it is a more responsive approach to planning with short timelines as opposed to annual policy plans of the schools.

The schools in this study were top three performing schools in Kisumu East district. It was evident from interviews and document review that all the schools used assessment and final examination data as a basis for motivating teachers and staff in various ways and this might have resulted into their good performance in the final examinations. Cawelti & Pretheroe (2001) also reported that schools showing improvement, began their improvement efforts by carefully reviewing test data to identify where they were succeeding and where they needed to direct their efforts for improvement. Furthermore, Diamond and Spillane (2004) also found that high performing schools used data to praise school staff for past performance and to stress the need for constant improvement, and to motivate teachers. The study further reported that school performance was praised in team meetings and students outcomes were proudly displayed within the school and, communicated to parents.

6.3.3 Negative uses of data

Not all data- driven decisions were positive. Data was also used negatively. Despite Olembo et al., (1992) reporting that contents of the inspection reports were rarely made public to stake holders like teachers, parents and other interested parties; school leaders in this study continued to show the same strategic use of the reports. Teachers' interviews, also confirmed that the reports were inaccessible. This strategic behaviour might partly be an attempt to avoid internal and external school politics that might challenge school leadership style based on contents of the reports and also partly due inadequate training on data use skills that encourage respondents to view data as an opportunity for discussions and improvement rather than for blame games. However, strategic use of the report by teachers in school 3 might be as a result of inadequate follow-up and support from the school leadership and inspectors to ensure that teachers implement the suggested changes for improvement.

Abuse of students' assessment result in school 2 and 3 at some point, for instance, to "detain" and "threaten" weak students with repeating class if they did not improve respectively can be linked to high-stake test-based accountability system in Kenya whereby performance in examinations is the main criteria used by stakeholders to judge and rank school effectiveness. Schools therefore, want to be top in the ranking list and the only way to achieve that, is to present the "safe case" students for examinations while asking "weak students" to repeat class instead of putting instructional mechanisms to help them improve. Similar finding was reported by Booher-Jennings (2005). Diamond and Spillane (2004) also showed that in high-stake accountability system, the extensive pressure on weak schools lead them to narrow their focus on complying with policy demands and focusing in improving student achievement of only certain students. Finally, the misuse of class minutes by teachers in school 1 to victimize outspoken students is best explained by fear of a school leader who continuously monitors what teachers do in classrooms and hold them to account.

6.4 Promoting or hindering factors

Even though most respondents concurred that their schools had teacher collaboration, school leader support and, access to most data they need in their job, some respondents appeared to hold a different opinion. Two HODS' and two teachers in school 1, one HOD in school 2 and one HOD in school 3 mentioned that some of their colleagues were not co-operating and caused unnecessary delays when it came to accessing some data. Also, with exception of two respondents, the rest of respondents in school 2 reported that their school has a data clerk. Again, it was interesting to note that all respondents responded in the affirmative when asked whether they believe that data is important in their job (i.e. they have buy-in belief). However, when asked whether their schools can improve without data, they all responded in the negative (i.e. having perceived ability to improve using data). It can then be argued that, despite teachers indicating belief in data for improving the school, curriculum and teacher performance, lack of collaboration from some teachers and delays in accessing some data might be caused by many factors among them: inadequate training of respondents on data use skills as suggested by (Wohlstetter, et al., 2008; Young, 2006), lack of proper information management systems and technology in the school as suggested by (Breiter & Light, 2006; Wohlstetter, et al., 2008) and, inadequate time to use data caused by the overloaded curriculum. It is therefore, not surprising that all respondents reported inadequate skills to use data, the need for training, more computers and inadequate funding to put up internet connected data information management systems and technology to increase efficiency and accessibility to data.

However, the request for funding and more computers by all the respondents is debatable. First, many computers existed in computer rooms of school 2 and 3. Yet, teachers in these two schools did not show any efforts to utilize the available computers, for instance, to prepare their schemes of work. They instead prepared them manually thus raising doubt whether inadequate computers was indeed a major hindering factor to their use of data in the schools. Unlike school 2 and 3, school 1 had computers in three key offices only (i.e. school leader, deputy school leader and the examination office). Teachers in this school also requested for more computers to increase efficiency and accessibility of data. However, based on the findings in school 2 and 3, it is highly doubtful that acquisition of more computers might increase data usage by staff in all the schools studied.

Funding as a hindering factor on the other hand, is debatable since it can never be enough in the running of organizations. No matter how rich institutions are, shortfalls always exist. Instead what matters are training to utilize the few available resources (e.g. computers in the schools) to maximize outputs (i.e data usage) in the schools. For instance, teachers in school 2 and 3 should utilize the available computers before asking for more. Also, school leaders may begin training a few teachers on data use skills. Those so trained, should in turn train their colleagues, thus reducing the cost of training from outsourced agencies. In other words, innovation and utilization of resources and, training is the key as suggested by (Goren, 2012; Kerr, et al., 2006; Mingchu, 2008; Young, 2006).

Again, it was surprising that though respondents in school 2 had a data clerk to help with data handling, they still wanted to be trained on data use skills and asked for more computers- a similar request asked by respondents in schools 1 and 3 that lacked data clerks. This concurrence by all respondents on the need for training on data use skills and, more computers regardless of the availability of a data clerk may be a pointer that respondents might not trust data generated by other people and instead needed autonomy or ownership over the data collection, analysis, production and use processes as suggested by (Kerr, et al., 2006; Wohlstetter, et al., 2008; Young, 2006). Similarly, a study by Huffman and Kalnin (2003) also reported that when the staff collect their own data, they took more ownership of issues as opposed to just looking at the data collected by other people.

6.5 Conclusion

One major conclusion based on the study results is that all the data sources are available in the schools studied. A majority of those data are process data followed by context, input and finally outcome data. The data types that are available in the schools are also similar except for the context data categories which have slight variations from one school to another. However, schools should not only have data available, but also do something with the data. In this regard, we conclude that although a majority of decisions by the schools' staff were not data-based decisions, there are examples of good improvement

decisions that were taken by the teachers and school leaders based on data and which mainly aimed at school and curriculum improvement as opposed to teacher improvement. Again, the school leaders' uses of data in all the sampled schools are average but limited for teachers. Furthermore, the former and the later also use data differently. The former mainly use school level data to plan, monitor, identify areas of need and, to develop school policies. Teachers on the other hand, mainly use data to monitor their students' progress and performance.

Another, conclusion is that the main influencing component towards data use in the school studied is firm supportive school leadership. For instance, it was clear in the study that schools whose leadership shows clear visions and norms for data use were more likely to use data, make data accessible and encourage collaboration among teachers in the use of data. Other minor promoting or hindering factors are inadequate training on data use skills and lack of clear vision and norms for data use. In addition, we also conclude that although data use studies are context biased, the western-based study framework by Skildkamp & Kuiper (2010) that was used in this study, served well in the Kenyan context. Only one component- "parents' and students' cooperation" was added to the framework.

Finally, this study was an eye opener to the drawbacks such as the complexity of data-based decision making studies in the school environment. In our view, for instance, the first research question was satisfactorily answered using interview and document analysis. However, we felt that in addition to two methods, we could have used time consuming but practical methods such as participant observation and direct observation methods to get more pragmatic answers to the second and third questions. Another drawback is that students and parents did not form sample of our respondents yet, their consumption and production of data in the schools emerged. Also, although multiple case study design provided in-depth understanding on data use in the sampled schools, the findings could not allow for firm generalizations at the district and national level. We hope future research may shed more light on these issues and, to help focus more attention on data use in Kenyan schools.

6.6 Recommendations

From the study findings, three main recommendations that might have long-lasting impact in the improvement of school-wide data usage in the schools are put forward. First, the schools need to train staff on data use skills, for example, training of staff within data teams. Data teams have many benefits. Through data teams, the teachers' data use skills such as data collection, analyses, interpretation and storage can be enhanced. This may lead to more cooperation, collaboration and data accessibility among staff. For instance, through enhanced collaboration, teachers can also exchange ideas, strategies and learn from each other how to use data. Furthermore, training in data teams may also lead to a reduction in the negative uses of data in the schools and may help the schools to develop clear visions and norms for data use and, to structure time to discuss data. Moreover, emphasis on need for training by respondents in the study not only indicates respondents' interest to learn about using data, but also their interest to own the processes leading to the production and use of data.

Second, the schools need to invest in data systems and technology such as Open Educational Resources (OER). For instance, they can start websites with platforms like Teletop where staff can sign and leave online and, access other forms of data relevant to their needs. In the meantime, the schools should make students' demographic data accessible to class teachers, career masters and the guidance and counselling offices since these offices handle individual students' issues daily and therefore, for informed decision making they need to be fore-armed with individual students' data. Third, when studying school organizational components that promote or hinder data use in Third World schools, the parents and students' cooperation should be added in the study framework

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APPENDICES

Appendix 1

Interview schedule for school leaders

I'm working on a master thesis concerning the use of data, such as assessment results and self-evaluation results, for school improvement. I would like to ask you a couple of questions concerning school improvement initiatives in your school and the use of data. When I talk about data I mean all the information that is available on the functioning of the school, including assessment data, self-evaluation results and inspection report. The goal of my study is to find out various ways in which the school uses data. This interview will take approximately one hour. Before we start this interview, do you have any questions? Do you mind if I audiotape this interview? The results will be treated anonymously.

1. **Could you tell me something about recent curriculum or school improvement initiatives in your school?**

   Let the respondent speak freely, but probe if the questions below are not addressed, and ask for examples and illustrations. Also, ask about the use of data to improve student outcomes.

   a. What is your role in these initiatives?
   b. Does the school use data in these initiatives? If yes, which data?
   c. By whom are these data being used?
   d. How are these data being used?
   e. For which purposes are these data being used?

2. **Which data do you use in your job and how do you use these data?**

   Let the respondent speak freely, but probe if the questions below are not addressed for each data source mentioned by the respondents. Ask for examples and illustrations.

   a. How are these data being used?
   b. How often do you use this type of data?
   c. For which purposes are these data being used?

3. a)**. I brought a list of different types of data (note: this list will be different for each of the countries), which might be available in your school. Can you tell me if these data are indeed available, if you have access, and if you use these data sources?** *Some of the data sources may have already been addressed in question 2. You can skip these data sources. For the other data sources, ask if the respondents uses these. If the respondent uses the data, ask how, how often and for which purposes, if the respondent does not use the data, ask why not. Also, ask for examples and illustrations of use.*

   - School inspection reports
   - Student progress reports (offering an educational track of the student)
   - Information in the annual school programme of events
   - Information on the annual policy plan of the school
   - School self-evaluation results, including teacher and management questionnaires
   - Data on intake, student transfer/ turn over and school leavers
   - Final examination results
   - Assessment results
   - Student demographic data
   - Student questionnaire data and focus groups
   - Parent questionnaire data and focus groups
   - Fees payment data
   - Schemes of work, records of work covered and lesson plans
   - Student and teacher daily attendance data

   b. Did I miss certain data sources either you or your colleagues use? If yes, which ones? How do you use these data, how often, and for what purposes?

4. **For what purpose do you use the data? Do you receive any support in the collection, analysis, interpretation and/or use of data?** *If the respondent is not able to answer this question, you can give some hints by asking if the school board encourages the use of data, if data is discussed collectively in team meetings, if the respondent received any professional development in the use of data etc.*
   b. If yes, how and is this sufficient?
   c. If no, do you want support? If yes, what type of support?
5. a). **Are there any barriers in the school that prevent the use of data?** *If the respondent is not able to answer this question, you can give some hints by asking if the respondent thinks he or she has the knowledge and skills needed to analyze data, of he or she has enough time to use data, and if the respondent has sufficient access to data.*
   b). If yes, what barriers and how do these barriers prevent data use?
   c). Can you indicate whether or not you agree with the following statement and why:
   a. We have little money to use data effectively.
   b. I have little time to use data effectively.
   c. I don't have access to the all data I would like to use.
   d. We receive a lot of our data too late.
   e. A lot of data are not accurate.
   f. A lot of data are not relevant to my job.
   g. I don't think it is important to use data in my job.
   h. I need training in the use of data.
   i. We are capable of improving our school without the use of data.
   j. I encourage data use in my school.
   k. We collectively use data in this school.
   l. Our school has a clear vision and clear goals.
   m. We use data to check if we are reaching our goals.
   n. Our school has a data expert, which helps me in the use of data.
   o. I have the skills and knowledge needed to use data.

This was my last question. Thank you very much for your time. I am going to write a short report based on this interview. I will send this report to you for confirmation. Again, I want to stress that these results will be treated anonymously.

Appendix 2

Interview schedule: For Heads of departments (HODs) and Class teachers (CT's)

I'm working on a master thesis concerning the use of data, such as assessment results and self-evaluation results, for school improvement. I would like to ask you a couple of questions concerning school improvement initiatives in your school and the use of data. When I talk about data I mean all the information that is available on the functioning of the school, including assessment data, self-evaluation results and inspection report. The goal of my study is to find out various ways in which the school uses data. This interview will take approximately one hour. Before we start this interview, do you have any questions? Do you mind if I audiotape this interview? The results will be treated anonymously.

1. **Could you tell me something about recent curriculum or school improvement initiatives in your school?**
   Let the respondent speak freely, but probe if the questions below are not addressed, and ask for examples and illustrations. Also, ask about the use of data to improve student outcomes.
   a. What is your role in these initiatives?
   b. Does the school use data in these initiatives? If yes, which data?
   c. By whom are these data being used?
   d. How are these data being used?
2. **Which data do you use in your job and how do you use these data?**
   Let the respondent speak freely, but probe if the questions below are not addressed for each data source mentioned by the respondents. Ask for examples and illustrations.
   a. How are these data being used?
   b. How often do you use this type of data?
3. a. **I brought a list of different types of data (note: this list will be different for each of the countries), which might be available in your school. Can you tell me if these data are indeed available, if you have access, and if you use these data sources?** *Some of the data sources may have already been addressed in question 2. You can skip these data sources. For the other data sources, ask if the respondents uses these. If the respondent uses the data, ask how, how often and for which purposes, if the respondent does not use the data, ask why not. Also, ask for examples and illustrations of use.*
   - School inspection reports
   - Student progress reports (offering an educational track of the student)
   - Information in the annual school programme of events
   - Information on the annual policy plan of the school
   - School self-evaluation results, including teacher and management questionnaires
   - Data on intake, student transfers/ turn over, student drop-outs and, school leavers
   - Final examination results
   - Assessment results
   - Student demographic data
   - Student questionnaire data and focus groups
   - Parent questionnaire data and focus groups
   - Fees payment data
   - Schemes of work, records of work covered and lesson plans
   - Student and teacher daily attendance data

   b. **Did I miss certain data sources either you or your colleagues use?** If yes, which ones? How do you use these data, how often, and for what purposes?

4. (**a) For which purposes are these data being used? Do you receive any support in the collection, analysis, interpretation and/or use of data?** *If the respondent is not able to answer this question, you can give some hints by asking if the school leaders encourages the use of data, if data is discussed collectively in team meetings, if the respondent received any professional development in the use of data etc.*
   b. If yes, how and is this sufficient?
   c. If no, do you want support? If yes, what type of support?

5. (a**) Are there any barriers in the school that prevent the use of data?** *If the respondent is not able to answer this question, you can give some hints by asking if the respondent thinks he or she has the knowledge and skills needed to analyze data, of he or she has enough time to you data, and if the respondent has sufficient access to data.*
   b). If yes, what barriers and how do these barriers prevent data use?
   c). **Can you indicate whether or not you agree with the following statement and why:**
   a. We have little money to use data effectively.
   b. I have little time to use data effectively.
   c. I don't have access to the all data I would like to use.
   d. We receive a lot of our data too late.
   e. A lot of data are not accurate.
   f. A lot of data are not relevant to my job.
   g. I don't think it is important to use data in my job.
   h. I need training in the use of data.
   i. We are capable of improving our school without the use of data.
   j. The school leader encourages the use of data in this school.
   k. We collectively use data in this school.
   l. Our school has a clear vision and clear goals.
   m. We use data to check if we are reaching our goals.
   n. Our school has a data expert, which helps me in the use of data.
   o. I have the skills and knowledge needed to use data.

This was my last question. Thank you very much for your time. I am going to write a short report based on this interview. I will send this report to you for confirmation. Again, I want to stress that these results will be treated anonymously.

Appendix 3

DOCUMENT ANALYSIS GUIDE

Name of school:……Nature:…….
Date:……

No.	Name of data	Availability	Features