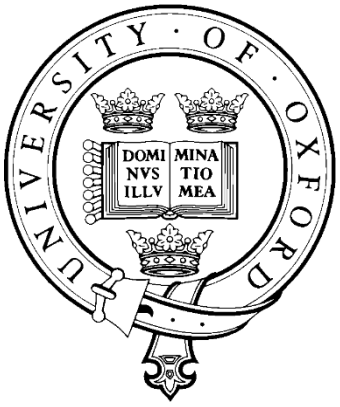
Learning from Classroom Experiences:

A Sociocultural Analysis of Teaching



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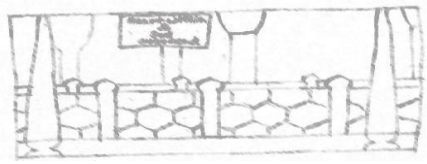
Dedication



Praise to Sarkar and Baba
I dedicate this thesis to my precious Sarkar, Khwaja Qutubuddin Bakhtiyar Qaqi, and my beloved Baba, Khwaja Ameenuddin Mukhtar Saki. They are the authors of my destiny and my life.

All my accomplishments are expressions of them.
Whatever I am, I am because of their infinite grace, mercy, love and glance of kindness. I bow to them and thank them for fulfilling my dream.

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Abstract

This thesis seeks to investigate how teachers transform subject content for student learning in classrooms. Research on teacher expertise has downplayed the framing of macro-regulative contexts; views expertise as a skill that might be acquired stagewise over time; and defines expertise in terms of attributes. By means of examining teachers identified for their consistent exemplary performances over a period of time within their school community, this study provides insight into the combination of processes involved in the conceptual progression of subject content and through that reframes an understanding of teacher expertise.

The study draws from both psychological and sociological fields. Deriving from the works of the educational psychologist, Vygotsky, the basic premise of the study is that an individual's thinking is situated in society. With reference to classroom teaching and learning situation, Vygotsky (1978, 1987) refers to micro processes in terms of students thinking and understanding of the subject content being shaped by classroom discourse. He brought to focus the teacher's role in mediating learning in classrooms through the use of psychological tools but could not fully, in his lifespan, attend to the sociocultural contexts that impact those who work within them. In order to address this gap, the study draws on the educational sociologist Bernstein's social theory (1990) which states that the ways in which institutions regulate the social relations within them impacts on the pedagogic practices in these contexts. The study also draws from Holland, Lachicotte, Skinner and Cain's (1998) concept of figured worlds to conceptualise the way teachers design pedagogy.

Several teachers of English and mathematics from secondary schools in Oxfordshire were observed. Data were generated in three ways for each lesson observed: think aloud protocols were used to record lesson planning; classroom observation and video recording of the lessons; stimulated recall and semi-structured interviews were used for post-lesson debriefing with the teacher. The purpose was to gain insight into the teacher's thinking of the minute-by-minute decisions they took for teaching the subject content for learning. Data were analysed in the light of sociocultural and sociological theories in several phases, among these were: analyses of the school contexts; writing school descriptions; narrative analysis; and thematic analysis.

The study deconstructs the notion of quality of teaching through a sociocultural analysis of teaching and learning in classrooms. It forges a connection between the micro processes of teaching and learning and macro regulative discourse; it demonstrates that teachers' pedagogic decisions are influenced by their reflections on their personal sense of experiences and by their institutional culture within which and by means of which they work. The study demonstrates an interplay of several processes in the ways in which teachers mediate and shape the quality and conceptual progression of their students' learning. It calls for a required shift in viewing teacher expertise not as a skill acquired stagewise over time but viewing it as the capacity of teachers to operate by means of sociocultural contexts as psychological tools in order to transform subject content for their students' learning and in shaping the quality of teaching. (93658 words)

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List of Abbreviations

DfE	Department for Education, UK
FA	Formative Assessment
GCSE	General Certificate of Secondary Education
HoD	Head of Department
IWB	Interactive White Board
KS3	Key Stage 3
NCO	Narrative of Classroom Observation
NTL	Narrative of Teaching and Learning
PCK	Pedagogical Content Knowledge
PGCE	Postgraduate Certificate in Education
SoW	Scheme of Work
TAP	Think Aloud Protocol
VSR	Video Stimulated Recall
ZPD	Zone of Proximal Development

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Chapter 1 Introduction

> '[A] crucial aspect of human mastery…is the creation and use of auxiliary or "artificial" stimuli; through such stimuli an immediate situation and reaction linked to it are altered by active human intervention' (Vygotsky, 1978, p. 123).

> 'Every reading act is an event, or a transaction involving a particular reader and a particular pattern of signs, a text, and occurring at a particular time in a particular context…some expectation, some tentative feeling, idea, or purpose, no matter how vague at first, starts the reading process and develops into constantly self-revising impulse that guides selection, synthesis, and organization' (Rosenblatt, 2005, pp. 7-8).

1.1 Context, Focus and the Importance of the Study

This thesis seeks to investigate classroom teaching and learning processes by means of observing teachers recognised as expert performers over a consistent period of time within their school community. The intention is then to explore micro teaching and learning processes and through that form an understanding of the nature of teacher expertise in shaping students' learning in the classrooms.

My beliefs and teaching experience have shaped the way I view the phenomenon of teaching and learning as a transaction and *via* a sociocultural lens. As a former teacher, I was fascinated by Rosenblatt's transactional theory, which she explains in her seminal text *The reader, the text, the poem: The transaction theory of the literary work* (1978). The theory emphasises the reciprocal dynamics of reader and text in the reading of a literary text. The reading of the text involves the readers bring their knowledge and assumptions as well as their social and historical contexts into their interpretations (I further discuss details of her theory in Chapter 3). My interest in the theory predisposed me towards seeing the phenomenon of teaching and learning from a sociocultural perspective which proposes that learning is socially and culturally mediated and that social practices shape one's higher mental functions.

Another point of influence was the work of the Canadian narrative inquirers, Connelly and Clandinin, their book *Teachers as Curriculum Planners: Narratives of experience* (1988) and their other published books and articles. According to the authors, each teacher, whether novice or experienced, is defined or shaped as a teacher according to his or her personal past experiences. Their personal histories intervene in managing day-to-day teaching practicalities. Their personal practical knowledge, from this point of view, is seen as 'a moral, affective, and aesthetic way of knowing life's educational situations' (Connelly & Clandinin, 1988, p. 59). Teachers' knowledge about themselves and their teaching evolves and changes throughout their personal lives (Johnson & Golembek, 2002) and impacts their classroom interaction.

Central to the processes mentioned above is the concept of continuity that has its roots in Dewey's notion of experience. According to Dewey (2004), there are three criteria of experience: firstly, it is both personal and social; secondly, it is continuous and shapes subsequent experiences; and thirdly, it depends on the quality of experience. The third criterion further involves two things: an experience which involves 'a continued readaptation of the environment to the needs of living organisms' (p. 2); and an experience that is both active and passive combined, involving a backward and forward movement of making connections between 'what we do to things and what we enjoy or suffer from things in consequence' (p. 134). In this context, the three-dimensional narrative space (Clandinin & Connelly, 2000) – temporality, sociality and place – was not only absorbing but also seemed practical to me. It offers a space to the teachers to analyse and describe their personal professional experiences: by connecting their present experiences to the experiences before it and with experiences that will come after it; by moving between their inner and outer social space that includes their 'internal conditions, such as feelings, hopes, aesthetic reactions, and moral dispositions' and their outer 'existential conditions' (p. 50); and by

moving between the landscapes of their inquiry which includes ‘specific concrete physical and topological boundaries’ (p. 51). In doing so, teachers or readers are involved in the following ways: they draw from their past experiences and present interests; they are guided by the stances they take; they compose their understanding of their social situation in a particular time; and are involved in a transactional experience.

Although these concepts were beneficial in shaping an understanding of classroom teaching and learning, they did not provide sufficient guidance for an investigation of the “how” of micro processes involved in classroom pedagogy, which directed the main research question for this study. During the process of reviewing the research question, my interest in the work of Vygotsky arose, especially in his notion of transformation. Reading his texts, *Mind in Society* (1978) and *Thought and Language* (1986), helped me in grounding the micro processes involved in teaching and learning. In particular, the reading of the texts assisted in investigating the process of transformation of subject content through three concepts: the Genetic Law of Development; the Zone of Proximal Development (ZPD) (discussed in section 2.1); and the concept of mediation (discussed in Chapter 3). Though Vygotsky provides, through his concepts, an analytic base that could be used in explaining classroom teaching and learning processes, a way of framing the social systems within which such activities take place was missing, and that gap was supplied by Bernstein (1990, 1999). Bernstein was influenced by Vygotsky’s Genetic Law of Development which holds that ‘intermental’ (social) experience shapes ‘intramental’ development (Vygotsky, 1978). In his formulation of a framework for pedagogic discourse, Bernstein uses the notion of social conditions shaping human consciousness (Daniels, 2012). He acknowledges the macro processes involving social discourse and how social discourse mediates human action. Bernstein’s work is discussed in detail in sections 3.1.4 and 4.7.2. Apart from Bernstein’s framework of pedagogic discourse, another concept from Holland, Lachicotte, Skinner and

Cain (1998), the concept of figured worlds, which is a part of their theory of self and identity, is used to understand how discourse mediates human action. The concept highlights the importance of the Vygotsky's concept of mediation through the use of psychological tools which works as a means to evoke figured worlds (I will return to this concept in detail in Chapter 3).

In this thesis, I examine the process of teaching and learning in the classroom by drawing a connection between social and psychological dimensions, deriving my theoretical framework mainly from the works of the psychologist Vygotsky and other sociocultural theorists, and from the work of the sociologist Bernstein. Combining the social and psychological processes involved at micro and macro levels of human interaction, that is, at both the classroom and the institutional level, I intend to examine the relationship between individual thinking, social contexts and their impact on classroom subject pedagogy.

Central to this thesis are two arguments. The first argument is that the quality of teaching depends on the quality of talk between the teacher and students. The quality of talk further depends on the auxiliary tools which teachers use to challenge their students in order for them to make sense of their classroom learning experiences. When viewed from Vygotskian perspective, in terms of the concept of mediation, the starting point for him was 'man's productive relation with the natural world' and 'not social relationships' (Young, 2012, p. 16). The former relation happens through the use of tools and artefacts, as mediational means, in changing the child's view of the world which 'depends on the pedagogy of formal education' (Young, 2012, p. 17). It is essential to mention here that Vygotsky did not neglect social relationships. His Genetic Law of Development (1978) emphasises that social experience shapes human consciousness, and thus highlights the importance of both social and psychological in the development of understanding. Therefore, the quality of teaching from a Vygotskian perspective depends upon two

intertwined things: the psychological tools that teachers use to engage their students in dialogue; and the role that teachers play, along with the students' peers, as more capable others in engaging the students with academic concepts. The second argument is that individual thinking is regulated by institutional discourse and thereby might influence the ways in which teachers shape the quality of talk in classrooms. Though Vygotsky referred to both social and psychological processes when he explained his Genetic Law of Development, he confined himself to referring to classroom learning experiences. He failed to acknowledge the role that institutional or social contexts play in shaping and regulating human consciousness, something which Bernstein addressed through his concept of pedagogic discourse (2000) which refers to implicit rules that control how knowledge is regulated within an institution.

In the literature, the quality of teaching is explained by looking into the notion of teacher expertise that has been the continued focus of much research aimed at understanding classroom subject pedagogy (Beijaard & Verloop, 1996; Day, 1999; Turner-Bisset, 2001; Marshall, 2003; Shulman, 1986, 1987; Traianou, 2006; Yandell, 2013; Stylianides & Watson, 2015; Alterator, Deed & Prain, 2018). Research has indicated that expert teachers understand the relationship between teaching and learning as they enhance not only their students' learning but also the growth of their own professional knowledge of practice (Turner-Bisset, 2001). Further research on teacher expertise reveals a connection between teachers' beliefs about students' learning (Alterator et al., 2018) and that beliefs develop over time and shape their expertise (Traianou, 2006; Männikkö & Husu, 2019). Thus implying that expert teachers not only help their students learn but, in the process, learn for themselves and add to their knowledge of teaching practice. Research on reflective practices has pointed out the difficulty in formulating a definitive description of a good teacher (Korthagen 2004). The qualities of a good teacher are described without reasons behind

actions in terms of competencies that get support from the policy makers (Turner-Bisset, 2001; Korthagen, 2004). For instance, the Office for Standards in Education (Ofsted), which plays a crucial role in shaping the discourse in schools in England, uses the term 'Outstanding' in their key indicators for teachers and students teachers to denote the level of teaching performance. Despite efforts from Ofsted in reducing the categories (Baxter & Clarke, 2013) upon which it bases judgements on school effectiveness that is linked to the quality of teaching and learning (Ofsted, 2015, 2018), the problem lie in the descriptions of these indicators that refer to certain actions that a teacher must take during the lessons. The criteria for 'outstanding' and 'good' quality of teaching mentioned in the Ofsted school inspection handbook (2018, pp. 52-54) indirectly refers to the teachers' competencies and continue to shift teachers' focus from the processes of teaching and learning to a set of things that need to be done during a lesson and, in that, risk reducing a complex task to a simplistic exercise. The focus of teachers continues to remain on behaviours (Beere & Gilbert, 2016) that are equated with outstanding performance, as a result of the pressure from their school's focus on keeping up with Ofsted standards. Therein also lies the risk of equating observable behaviours with the quality of teaching. With a very recent change in the way the Ofsted inspections (Ofsted, School inspection handbook, 2018) will be held starting from September 2019, a small positive step has been taken to take the load off the teachers' shoulders. The change proposes not to evaluate individual lessons or grade quality of teaching performance or make judgements based on examination results. Instead, quality of education which will include intent, implementation and impact as subcategories will be the key factor in grading the school's performance. The onus of quality of education will rest on schools in a new scenario and will tend to rest on all teachers. Although the external direct pressure is taken off, it will be interesting to note, how in future, what internal pressures the teachers will have to cope with. However, the descriptors or the skills, on the

basis of which the Ofsted inspectors will discuss the lesson with the teachers and headteachers, still remain the same. Therefore, the competencies are still very much a part on the basis of which teacher's performance will be judged.

This study aims to deconstruct the notion of quality of teaching through a sociocultural analysis of teaching and learning in classrooms by investigating the main research question: **How do 'expert' teachers transform the subject content in order to support student learning in classrooms?** To understand the processes of transformation of the content and thereby the nature of teacher expertise from a sociocultural perspective requires two things: (a) to understand the ways in which teachers support their students in their learning of subject content; and (b) to frame and situate these teachers within their institutional and classroom contexts so that connections between micro pedagogic and macro regulative processes can be drawn.

1.2 Overview of this Study

The core requirement for understanding the processes that define the quality of teaching was to select teachers with 'exemplary performances' from which we can learn by providing 'richly detailed descriptions of instructional events' (Berliner, 1986, p. 6) and derive data in order to analyse the phenomenon of teaching and learning. The first step involved listing the characteristics of teachers required for the study or expert teachers identified in the literature. This list was used in a small empirical study involving observations of several teachers from different secondary schools in Oxfordshire. The primary purpose of these observations was to derive criteria in order to identify 'expert' teachers for the main study. These criteria are described in section 4.3.

In the main study, a multicase study was employed. Several secondary school teachers of English and mathematics were observed in different school contexts. The

purpose was to achieve variance among participants by selecting different schools in order to examine the ways in which contexts shape individual teachers' thinking and by selecting them on the basis of two subjects, English and mathematics. In a comparative study of English and mathematics secondary school subject teachers, Grossman and Stodolsky (1995) found that subject matter differences among teachers helped explain curricular and instructional patterns. The subject matter differences acted as the context within which teachers work; they spoke of their work in relation to constraints and possibilities they perceived. For example, English teachers spoke of the 'permissive' (p. 7) nature of the subject, while mathematics teacher referred to the constraints in the 'sequential' (p. 7) nature of the subject. It is worth noting that research on Pedagogical Content Knowledge (PCK) is more prominent in maths than in English. Research on PCK in English (Grossman, 1989; Gudmunsdottir, 1991) shows prominence to a personal orientation towards the subject with the exception being in research on the technical aspects of English language, for instance, on phonemes in spellings (Phelps & Schilling, 2004) as it goes beyond the sociocultural and personal aspects. It is for the same reason that research on PCK in mathematics is extensive as there are 'more chances of producing generalisable models of PCK' and examples of 'common conceptions and misconceptions about specific topics' to produce examples of PCK which are 'transferable' (Menter, 2014, p. 20).

Apart from the differences stated, maths and English have retained a special status in the league tables and are at the heart of the new measures of achievement initiated by the Department for Education (DfE) in England. Firstly, the proportion of students achieving a General Certificate of Secondary Education (GCSE) Grade 4 or above, which was Grade C or above according to the old grading system, in these subjects are reported for league table purposes under the percentage achieving GCSE Grade 9-4 or A*-C with English and maths' measure. Secondly, since English and mathematics are part of the Ebacc (English

Baccalaureate), they will count towards the schools' percentage of students achieving the Ebacc[1]. Thirdly, the pressure is on the teachers of these two subjects to perform in the context of exam results because their results are indicators of their school performance and are reported in annual performance tables (Perryman, Ball, Maguire and Braun, 2011). Hence, I want to look at teachers who both manage this pressure and engage their students in these subjects. Furthermore, examining teaching and learning as it happens in two core subjects will help reduce some of the biases that I might have as a former English teacher. Through examining the lessons of teachers from these two different subject backgrounds, the study also explored both similarities and differences in order to examine patterns of the teachers' functioning and their classroom subject pedagogy.

The participant teachers were asked to think aloud to record their lesson plans; their lessons were video recorded which were followed by stimulated recall and semi-structured interviews. The methods in combination assisted in drawing connections among teachers' past, present and future thoughts: their in-the-moment decision making emerging from their past experiences; their present experiences impacting their future intentions and planning; and their present responses and decisions emerging from their ongoing dialogue with the students.

Explaining classroom teaching and learning experiences, Vygotsky (1978) draws a connection between the social and psychological in arguing about individual development. He argues that 'an interpersonal process is transformed into an intrapersonal one' (pp. 56-57). Two aspects are inherent in this concept: that human cognition is inherently social; and that transformation happens when other-regulation is changed to self-regulation. The former involves activities mediated by other people or cultural artefacts, while the latter involves the appropriation and reconstruction of the cultural artefacts to regulate or own activities

[1] If the students sit for both English language and Literature, the higher grade is double weighted.

(Johnson & Golembek, 2011, p. 3). There have been recommendations in the literature to think about teaching in a way where learners understand themselves as actors as part of a larger social context (Rosenblatt, 2005; Fecho, Amatucci & Skinner, 2007). This can involve: emphasising the purpose of teaching to engage students with the 'tools that matter in a culture' (Edwards, 2015, p. 14); developing students' conceptual understanding by engaging them through the setting of tasks (Edwards, 2015; Thompson, 2015); or making a shift from product to the process of learning (Burgess, 2007). Such a view of learning emphasises the interdependence of social and individual processes in the construction of knowledge, which is one of the basic premises of sociocultural approaches. However, a process of regulation does not just occur within the boundary of the classroom. The discourse that takes place within the school as an institution, in both explicit and implicit ways, regulates teachers' thinking, which, in turn, informs the actions and decisions that the teachers take in the classroom about the content they teach (Bernstein, 2000).

In reviewing the literature on teacher expertise and several aspects of teaching and learning, I found a few gaps. Firstly, in more recent research on teacher expertise, where sociocultural contexts are considered (Anthony, Hunter & Hunter, 2015; Yoon, Koehler-Yom, Anderson, Lin & Klopfer, 2015; Beltramo, 2017; Männikkö and Husu, 2019), framing of institutional contexts has been neglected and thereby the research has downplayed a relationship between classroom pedagogy and institutional discourse. Secondly, the traditional research on expertise dealing with expert-novice differences (Berliner,1986, 2001; Livingston & Borko, 1989; Sato, Akita & Iwakawa, 1993; Sternberg & Horvath, 1995; Ethel & McMinen, 2000; Turner-Bisset, 2001; Hattie 2003; Tsui, 2009; Píšová & Janík, 2011; Hattie & Yates, 2014; Enow & Goodwyn, 2018) define expertise in terms of a particular skill but not in terms of their participation in the contexts in which they thrive. Thirdly, the literature on teacher expertise reflects that reaching expertise requires a

stagewise development from one phase to another over a period of time (Alexander, 2003; Dreyfus, 2004; Enow & Goodwyn, 2018), which might be discouraging for novice or beginning teachers or for those working towards becoming their own experts (Richmond, 2019). In the same vein, the literature also states that experience is not synonym with expertise (Berliner, 1986, 2001; Korthagen, 2004; Hattie & Yates, 2014), hence making 'reaching expertise' or 'becoming an expert' more elusive. Fourthly, research in reflective practice is more on beginning teachers and how such practices help them in gaining expertise (Korthagen, 2004; Mutton, Burn & Hagger, 2010; Schmidt, 2010; Mutton, Hagger & Burn, 2011); and lastly, research in daily teaching and learning from sociocultural perspectives shows a sporadic presence in the literature (Brown & Hirst, 2007; Fisher, 2012; Thoutenhoofd & Pirrie, 2015; Thompson & Wittek, 2016) and calls for more evidence in understanding these processes. In order to address these gaps, my study seeks to answer the main research question – How do 'expert' teachers transform the subject content in order to support student learning in classrooms? The question was further subdivided into the following sub-questions:

1) *What are 'expert' teachers' conceptions of the subject they teach or of teaching and learning, or of their students' learning?*
2) *What conceptual frameworks do 'expert' teachers utilise to explain the content to be taught and initiate a dialogue with the class?*
3) *What tasks do 'expert' teachers assign for students' understanding of the concepts introduced?*
4) *What understanding do 'expert' teachers make of their students' learning from the classroom interaction?*
5) *What understanding do 'expert' teachers come to of their own learning from the classroom teaching and learning experience?*
6) *What knowledge bases do 'expert' teachers draw on to reflect on their thinking for teaching and learning to happen in the classroom?*

The significance of my study is that it forges a connection between micro processes and macro processes of regulation in the formation of classroom teaching and learning. The study contributes towards knowledge of how, in both planning and in-the-moment decision-

making, the teachers translate their expertise into ways in which their students understand the subject content and abstract concepts; and thus help their students recontextualise their previous learning and reapply that in their understanding of more difficult concepts. By framing the institutional contexts within which the participant teachers worked, along with drawing on the connection between their beliefs and their adaptiveness to students needs as they emerge in classroom situations, this study contributes towards deconstructing the notion of quality of teaching. It also contributes to the ongoing dialogue on teacher expertise by revisiting the concept from the lens of quality of teaching.

1.3 Structure of the Thesis

The dissertation is divided into eight chapters. This chapter (Chapter 1) has provided a brief introduction to the thesis. In Chapter 1, I had provided a brief introduction to my beliefs, influences and teaching experience to place this thesis within my own context. I then moved on to introduce the theme of this thesis followed by an overview of this study, in which I discussed the selection process of participants, provided a brief about qualitative approach and methods used in this study, and closed the chapter with the significance of this study. I will discuss the points in detail in the subsequent chapters.

Starting with the background for the thesis, Chapter 2 discusses the literature identified to explore the process of subject content transformation. Four key areas were identified to study such processes and the role of a teacher in it. Sociocultural perspectives that have influenced me in my journey as a teacher and a researcher have assisted in exploring the role of a teacher in subject transformation processes. Teacher content knowledge was identified, and the section discusses its conceptualisation from PCK to more fluid concepts of personal practical knowledge and reflective practices. Recent literature on formative assessment and its use in classroom teaching, something that emerged from the

analysis of this thesis was considered as well. Apart from these, different orientations that throw light on the nature of teacher expertise is discussed.

Chapter 3 builds on Chapter 2 and outlines the theoretical background within which the study is placed. It deals with the concepts central to this thesis and highlights the relationship between the concepts. The concepts function as a guide that bound and organise this study.

Chapter 4 sets out the research design and details the approach that this study will undertake to study the functioning of the participant teachers in classrooms. The chapter is divided into two parts. The first part of the chapter explains the process of participant teacher recruitment; while the second part argues the case for using a multiple case study, describes the methods of data collection and analysis, the contexts of the teachers by situating them within the type of schools they worked in and further framing of their institutional context. The chapter also addresses the possible ethical considerations.

Chapters 5 and 6 present the findings. Chapter 5 presents findings from four individual cases and provides evidence of how teachers assist their students towards their conceptual progression of subject content from the start of a lesson to its end or in a set of lessons. The selection of cases is made on the basis of differences in subject, contexts and number of years of teaching experience within each subject. The data from the rest of the four teachers along with the data from the cases presented in Chapter 5 are used in discussing themes presented in Chapter 6, which deconstructs the process of conceptual progression of students' learning into elements or processes by means of which the teachers assisted the students in their learning. Hence, the chapter provides comparison across cases and highlights the major themes that emerged.

In Chapter 7, I discuss the findings of the study in light of previous research, as discussed in Chapters 2 and 3. It starts with a discussion of the sub-research questions,

followed by a discussion of the theoretical perspectives before addressing the main research question. The chapter concludes with the discussion on the nature of teacher expertise that emerged from a sociocultural analysis of teaching.

Chapter 8 presents the conclusions drawn from the study. In doing so, it revisits the notion of subject content transformation and the nature of teacher expertise that emerged from the findings; provides reflections on methodological choices; discusses some of the implications of the study for various stakeholders; and, finally, suggests directions for future research.

Chapter 2 Teachers' Role in Teaching and Learning

The participants in this study are secondary school teachers of English and mathematics, and the focus of the study is the role that teachers with consistent exemplary performances over a period of time play in classroom teaching and learning of subject content. This study draws from both Vygotskian sociocultural perspective and Bernstein's sociological theory. Four areas of literature were identified as being of particular interest: the teacher's role in teaching subject content from a sociocultural perspective; teachers' content knowledge; formative assessment; and teacher expertise and learning. Each of these areas has a vast wealth of literature; hence I have limited my review to those texts that are relevant to the subject and have guided my response to the central question of this thesis: How do 'expert' teachers transform the subject content in order to support student learning in classrooms? The chapter discusses the complexity involved in such processes and, at the same time, presents an argument for the meaning of quality in the micro processes of teaching and learning. I will examine the four areas of research interest to this study in the following sections; the concepts that apply to my theoretical perspectives are explored in detail in Chapter 3.

2.1 Teaching Subject Content from the Sociocultural Perspective

In the classrooms, the students do not come with a *tabula rasa* (blank state) but with social and cultural backgrounds encompassing their life events (Kinard & Kozulin, 2008, p. 17; Rosenblatt, 2005, pp. 6-7) and experiences that are informed by cognitive functions, 'both formed and emergent' (Kinard & Kozulin, 2008, p. 17). The work at hand for the teacher is to transform the pre-existing elements of understanding and thought into cognitive processes that correspond to the cultural and social aspects of the subject (Kinard & Kozulin, 2008; Thompson, 2015). Alternatively, the work at hand for the teacher is to transform the subject

content handed down to them, which was shaped by pedagogic discourse among the powerful, according to Bernstein's (2000) concept of recontextualisation (see section 3.1.4).

The point to make here is that subject content that is introduced to the students in lessons does not emerge from student experiences but must be related to their experiences by the teacher. Vygotsky (1997) refers to the relationship between the students' everyday experiences and abstract concepts through the use of psychological tools, and to the role of the knowledgeable other in merging that understanding and generating new knowledge that occurs within the Zone of Proximal Development (ZPD). There are three things interrelated and relevant here: the use of tasks as mediating tools; the role of knowledgeable other, that is the teacher and peers in mediating learning within the ZPD; and the relationship of tasks and ZPD in the students' conceptual progression in learning. I will address the points in the following sections.

2.1.1 Task Design and its Relationship to Learning

The central role of the teacher is to support the students in their engagement (Edwards, 2015) with the tasks which are 'the content they encounter on a daily basis' (Doyle, 1983, p. 162). The academic tasks are defined by

> '(a) the requirements for the products students are expected to hand in, such as an expository essay or a test paper; (b) the resources available to students while accomplishing work, such as a model of a finished essay supplied by the teacher or fellow students; and (c) the operations that are to be used to generate the product, such as memorizing a list of words for a test or classifying examples of a concept for a worksheet exercise' (Doyle & Carter, 1984, pp. 130-131).

As stated above, the teachers' function is to set up opportunities for students to engage with the substantive and syntactic knowledge (discussed in section 2.2.1) of a subject by designing tasks they take part in; in other words, to engage students in learning the subject content. Doyle (1983) calls attention to task research; he argues that 'tasks form the basic treatment unit in classrooms' (p. 162) in terms of what they lead students to do, draw

attention to some aspects, derive selectively from their experiences and, at the same time, acquire information and operations required to accomplish the tasks. Tasks, in this sense, assist teachers in making classroom teaching productive as they form the core of a curriculum, classroom instruction and learning.

Recently, researchers have again started to urge the significance of subject tasks (Burgess, 2007; Thompson, 2015; Edwards, 2015; Stylianides & Watson, 2015). Task design is used as a pedagogic tool to perform the dual function of enhancing students' learning and 're-professionalising' teachers (Thompson, 2015, p. 3). It brings the focus on the centrality of a learner in the classroom and to the development of concepts within teaching subjects (Burgess, 2007). The re-professionalisation of teachers, argues Thompson (2015), requires shifting the role of agency from teacher to students, such that the students become the agents of their own learning. According to the sociocultural view, learning is an active process of constructive transformation. It assumes that students 'acquire conceptual understanding' to be able 'to engage with or act on the cultures of literate practices' (Thompson, 2015, p. 88). Task design involves designing learning activities and designing learning environments. It allows students to tackle tasks as 'cultural and communicative activities through social interaction' and also helps them in 'internalisation and appropriation of the psychological tools required to accomplish the activities' (Thompson, 2015, p. 89). Thus, learning is no longer a simple recall of that which was previously learned but involves issues such as 'time, situatedness, and reciprocity between individuals and cultural practices' (Säljö, 2009, p. 203). Thus, to accomplish learning, the focus needs to be on designing a task complete in itself (Edwards, 2015, p. 14). In other words, tasks must include subject concepts (terms and concepts), pedagogical ideas (a way of inquiry or critical argument) and make students think in order for them to make choices or preferences (Stylianides & Watson, 2015). With reference to secondary school mathematics teaching,

Stylianides and Watson (2015) state that ‘it is important to understand that tasks on their own cannot scaffold the shifts in perception and cognition required to understand abstract mathematical ideas’ (p. 49), echoing a point made by Wertsch (1998) on the powerlessness of cultural tools unless agents (teacher and students) use them. They further add that tasks rooted with immediate pedagogical activity assist in the process of teaching and learning as these generate or afford discussion of content related ideas.

Although the task assigned is accompanied by a pedagogical activity, it is the nature of the activity which Smagorinsky (2008) refers to as ‘construction zone’ (p. 157) that starts the process of learning and which helps students build and reflect on tasks. To cite an illustration, Smagorinsky (2008) recounted an example of teaching one of Hemingway’s texts to high school students with one of his colleagues. The students, he said, had been sent to extensive programmes on substance abuse and so when they approached the text, they interpreted the ‘besotted characters as symbols of the ravages of alcohol’ (p. 127). The spontaneous knowledge that the students brought to the dialogue helped Smagorinsky and his colleague decided to provide some background about Hemingway’s life and values to help students inform their responses. As this incident helps to make clear, knowledge of the concepts will help students bring critical prior knowledge to the reading of a text, give them authority as knowledgeable readers, help them organise their understanding according to the concepts and provide them with opportunities to reflect on their experiences and construct new knowledge (pp.126-127). The same logic could be applied to the reading of mathematical problems as texts, where the central mathematical concept becomes the guiding principle in bringing a shift in students’ thinking from one situation to another (Lange, 2015). The concept of a right-angled triangle is at the heart of concepts such as tangents, vision lines, blind angles or areas, shadows and glide ratios. Hence, if students

know the concept of right angles, this could be brought in as critical prior knowledge and substantive knowledge.

Therefore, deriving from the authors from the above discussion, it can be concluded that the necessary components of academic tasks include the following: a clear idea of a product (what is to be learnt) that the students are supposed to work upon and complete (Doyle & Carter, 1984; Edwards, 2015; Stylianides & Watson, 2015); in order to complete the product students select from their experiences or previous knowledge (Doyle, 1983; Edwards, 2015); introduced to new knowledge and operations critical to complete the tasks and thereby acquire scientific knowledge of the subject concepts (Smagorinsky, 2008); provided with support material to accomplish the tasks (Doyle & Carter, 1984); engage in an activity that requires them to reflect on their experiences; and participate in dialogue by means of immediate pedagogical activity (Smagorinsky, 2008; Thompson, 2015; Edwards, 2015; Styliandes & Watson, 2015). To my understanding for learning to be complete, taking clues from this assimilated definition of academic task, it must involve both dialogic (interaction with peers and a teacher as others) and dialectic (task as other; external activity reflected in the internal consciousness) processes. Engaging in dialogical and dialectical processes, students gain insights into the thinking of others and into their own. Such engagement with the other is the constant through which learning takes place (Fecho et al., 2007). Thus, the role of the teacher lies in building a relationship between the psychological and social, the key tenet of Vygotsky's work (1987), by means of practices that matter in culture (Schwab, 1964; Kinard & Kozulin, 2008; Thompson, 2015; Edwards, 2015).

The literature shows the importance and need of dialogic culture in teaching and learning and thus implicitly makes a case for the relevance of social interaction in shaping human cognition. Alexander (2004) presents a case for dialogic teaching and identifies two dialogic moves that involve whole class interaction – interaction between teacher and

student or group, and interaction among the students: (a) discussion, which involves ‘exchange of ideas with a view to sharing information and solving problem’ (p. 28); and (b) dialogue, which refers to ‘achieving common understanding through structured and cumulative questioning and discussion’ (p. 28). Both highlight the role of the teacher and the knowledgeable other through the use of collaboration, reciprocity and support.

Mercer (2000) explains the term ‘exploratory talk’, which he takes from Barnes (Barnes & Todd, 1995) and operationalises in his research, as talk in which

> ‘partners engage critically but constructively with each other's ideas. Relevant information is offered for joint consideration. Proposals may be challenged and counter-challenged, but if so reasons are given and alternatives are offered. Agreement is sought as a basis for joint progress. Knowledge is made publicly accountable and reasoning is visible in the talk’ (p. 98).

In a classroom, a teacher might, on the one hand, use dialogue to enable a talk for thinking (Barnes, 1976; Barnes & Todd, 1995; Rojas-Drummond & Mercer, 2003) and to negotiate meaning with students (Doerr, 2006) and, on the other hand, might utilise peer support in a set activity that may work to bring a qualitative change in students’ work (Thompson & Wittek, 2016). In short, they might use different overarching approaches to teaching and learning in the classroom to engage the students in performing the agentic function in their own learning, higher psychological order learning and meet the daily challenge of engaging them.

Thompson and Wittek (2016) explored the relationship between writing as a tool for learning and dialogical communicative processes involved in advancing inner speech to written speech. The qualitative case study involved a state secondary English class for 13- to 14-year old students in the UK. The authors drew from the works of Mercer, Vygotsky (discussed previously) and Linell. Linell (2009), a linguist, offers a concept of dialogical-self formed as a consequence of different ‘social representations’ or ‘voices’ (p. 136) acquired through the use of language. The findings of the study suggested that collaborative

writing in a socially mediated activity worked as a tool for the students' meaning making. Such an activity helped the students make sense of the roles that they were assigned in the task of producing a school magazine for their parents. It is important to note that this collaborative activity was not short of conflicts; it involved tensions between the editor and sub-editors, which were the roles assigned to the students within a group. The problems were solved with the teacher working as a consultant. The teacher subtly used questions that 'created a dialogue that allowed the students to develop their confidence in their role' (p. 90).

Counsell (2015), a secondary school English teacher, explored the impact of group discussion on Year 8 students' writings. He experimented with collaborative reasoning as an intervention strategy. He builds upon the Vygotskian premise of mediation through tools and knowledgeable others; in this case, with peers playing a prominent role. The students were reading Louis Sacher's *Holes* for three weeks before the intervention and working towards a final essay task based on the question: 'how are the themes of innocence and experience presented in the novel?' (p. 42). Focusing on transfer between discussion and writing, Counsell first instructed the students to write their first ideas and support their conclusions with evidence, so that each one had a 'starting point' (p. 42) for discussion. The rules for discussion were jointly established with the students. He then assigned twenty-five minutes for discussion. Collaborative reasoning and discussion helped shape the thinking of high attainers who were challenged with the arguments of their peers and, in turn, reviewed their own ideas. It also demonstrated that dialogic spaces could also be the spaces for argumentation that challenge perceived social norms, where consensus is valued. The results indicated that students made very strong progress, with 21 out of 31 students progressed 'at least two sub-levels' (p. 44) in comparison to their previous assessment on the same novel.

Ingram, Pitt and Baldry (2015) examined the way in which mathematical errors are managed both by teachers and students when they arise spontaneously during whole class interactions. More specifically, they were interested in the third turn which, according to them, is 'not only contingent upon the student's response it follows but also on the pre-planned intentions of the teacher which can be made explicit through how the teacher moves the interaction forward through the design of this third turn' (p. 187). The study included eight teachers from seven secondary schools in England, ranging from comprehensive to independent fee-paying schools. The examination of the third turn showed that the teachers and the students did much interactional work to evaluate the answers positively; negative evaluation of answers was avoided as that might cause embarrassment or threaten the student.

Boukafri, Civil and Planas (2018) presented the two episodes from one of the four lessons they had observed of 12-year-old students to explore teachers' use of revoicing to promote students' mathematical thinking and learning opportunities in solving a distance problem and its relationship to Pythagoras Theorem. The spider and the fly task introduced stated that the spider was sitting in the middle of one of the smallest walls in the living room and the fly was resting by the side of the window on the opposite wall. The students had to find the shortest path the spider would take to crawl to catch the fly. The students first engaged with the task in groups and then participated in whole class discussions in which they presented their way of finding the path between two points in a plane. The teacher revoiced the approaches taken by two groups. One group suggested a straight-line path passing by the window wall; the other suggested to take a longer route covering three segments, which included going through the ceiling. The other students offered their reasons for which out of the two suggested paths would be the best path. The teacher used the responses from the students, revoiced those and put it back to them to think: 'How do we

know that diagonal path is shorter than doing two straight segments?' (p. 162). The results thus indicate that it was only through dialogue that the students thinking became accessible to others and that teacher was able to assist them in constructing the concept of distance and understanding a formal definition of the concept.

The studies cited above demonstrate the ways in which teachers' use of tasks accompanied by initiated classroom dialogue assisted the teachers to guide and support their students' learning; instead of teachers orchestrating and preserving the control of classroom talk (Mehan, 1979; Myhill, 2006), they provided the students with opportunities so that their thinking became explicit to others in the class. The students were able to build upon, reciprocate to, or argue against and, in the process, build a conceptual understanding of the content at hand. However, though a mere exchange of ideas or providing reasons for their responses or questioning one another in groups or whole class discussions might be useful in boosting students' confidence, such a pedagogical activity of learning might still be devoid of learning opportunities (Smagorinsky, 2008) but which would be possible with productive interaction (Wells, 1999) that would involve students drawing connections between each other's responses or between ideas, or proposing new questions in order to find solutions to the problems they might be handling (Van Zoest, Stockero, & Kratky, 2010), and teachers playing a pivotal role in mediating such interactions.

Hence, the use of dialogue to augment teaching and learning is of benefit when students engage with the subject content as a collective group of learners, working towards the common goal of learning the subject content while simultaneously weaving that learning experience with their own personal experience. In addition, they engage with the processes of learning the content or skill at hand in a way that is deemed important in the sociocultural practices of the subject they are learning (Wertsch, 1998; Edwards, 2015). For instance, in English the process of interpretation, argumentation and writing processes are key (Barnes,

1976; Ellis, 2007; Smagorinsky, 2008; Thompson, 2015), while conventions of mathematical inquiry might include questioning, reasoning, justifying or hypothesising, testing, validating (Brown & Hirst, 2007; Styliandes and Watson, 2015).

In this sub-section, I provided a definition of task, its relevance in a teaching and learning situation; presented a case for the importance of dialogue in teaching and learning; and discussed the mediational role of a teacher through the use of tasks and dialogue around it. In the following sub-sections, 2.1.2 and 2.1.3, I will further discuss the processes involved in the transformation of subject content by explaining the concepts of the Zone of Proximal Development (ZPD) and the Genetic Law of Development.

2.1.2 The Function of ZPD in Students' Learning: Conceptual Progression

Vygotsky (1978) defines the ZPD of the child as:

> 'The distance between the level of his actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers' (p. 86).

Within whole class instruction, the ZPD functions as a zone in which 'the transition from inter-psychological to intra-psychological functioning can be made' (Wertsch, 1985, p. 67). In Vygotskian terms, the ZPD works as a tool for classroom instruction. The relationship between classroom instruction and the mental development of the child can be seen in the interrelationship between scientific and spontaneous concepts (Vygotsky, 1987, 1997). Instruction precedes development, and so does learning (Vygotsky, 1997). While learning scientific concepts through various mediational means employed by the teacher, there might be a moment in time when something clicks with the child, and they grasped the general principle, and their 'developmental curve rises markedly' (Vygotsky, 1997, p. 185). Scientific and spontaneous concepts cannot be taken as separate as they together form a single process, which is the development of concept formation (Vygotsky, 1997).

Spontaneous concepts develop earlier than scientific concepts because, with the latter, the difficulty is in verbalising it due to 'excessive abstractness and detachment from reality' (Vygotsky, 1997, p. 148). In a classroom situation, spontaneous understanding gains a 'conscious and volitional control' (Vygotsky, 1997, p. 194), which it lacks otherwise. The two concepts are analogous and 'work in reversible direction' (Vygotsky, 1997, p. 196), each influencing the other. He explains,

> 'The development of the child's spontaneous concepts proceeds upward, and the development of his scientific concepts downward, to a more elementary and concrete level' (Vygotsky, 1997, p. 193).

Starting from opposite directions, the two meet each other; they merge. Working upwards, the spontaneous concepts provide a series of structures derived from the empirical and practical use and pave the way for the evolution of the scientific concept. The latter, in working downwards, provide structures for the upward development of the students' concepts for deliberate and conscious use (Vygotsky, 1997). According to Vygotsky (1997), the students' everyday knowledge, their experiences of the concepts (spontaneous concepts) should be made use of by the teachers to illustrate abstract concepts, that is, scientific knowledge. It should not be mistaken that he gives prominence to everyday concepts over abstract concepts. The former is used only as an illustration, but the starting point is the abstract concepts, which

> 'gradually transforms the structure of the child's spontaneous concepts and helps organize them into a system: this furthers the child's ascent to higher developmental levels' (1997, p. 206).

Kozulin (2003) asserts that Vygotsky was more interested in with the formation of scientific concepts as these require systematic reasoning. The content here involves both the content and the reasoning involved. The content contains the historical character of human cognition, that is, a known fact of human thinking. The challenge is to design and organise learning around this content. The goal is then not just in learning the content, but the changes

it produces in the learner. Learning activities are used to convey information, but, primarily, these are used to construct students' theoretical understanding actively.

Karpov (2003) distinguishes two kinds of learning: empirical and theoretical. Empirical understanding is based on students picking up common characteristics of several objects or events on the basis of their spontaneous concepts and formulating a general concept about a class of objects on the basis of such comparison. Theoretical learning is needed to provide an analysis of the essential characteristics of objects. Sometimes this learning coincides with the empirical learning concepts, and sometimes it leads to misconceptions. The risk is that students might use their understanding gained in other situations inappropriately. Karpov (2003) makes two points clear here. First, it is necessary to use scientific concepts and grasp the principles that underlie them. Second, it is also necessary to grasp procedures, 'the methods of analysis in the relevant domain' (Karpov, 2003, p. 71).

Hence, returning to the concept of ZPD in the classroom situation, during the whole class interaction with the more advanced learner, whether the teacher or their peers, the student confronts the current degree of consciousness and deliberation in spontaneous concepts and starts to reflect on the subject content and to verbalise it. Doing so paves the way for their understanding of scientific concepts and, sometimes, makes explicit the misconceptions held by the students on the specific subject content (Karpov, 2003).

2.1.3 Transformation of Psychological Functions: Contradiction and Struggle

In working towards students' conceptual progression, the role of the teacher does not rest in her or his presence as a knowledgeable person in classroom discussions, but in assisting the students through creating a predicament, some kind of contradiction, from which the

students could only liberate themselves by making a development, 'a qualitative transformation' (p. 90) of their own psychological structure (Blunden, 2010):

> 'It is the child who responds to their frustration by refusing the existing relations of dependence…there may be no intention on the part of the child to change the social situation; it is just that the child now finds the situation insufferable' (p. 91).

The contradictions confronted in the principal activity in the social situatedness during the learning of content in the classroom contribute to the development of the functions that lead to the structural reorganisation of a child's psychological functions. By engaging in actions relevant to the contradictions, the functions needed for a transition to a new age period (a structural change in the organisation of functions) are formed (Chaiklin, 2003):

> 'Vygotsky never assumed that learning related to the zone of proximal development is always enjoyable. Vygotsky (1967, p. 16) gives an example: a child running a race may not be having pleasure, especially after losing, yet still this action can still be part of the zone of proximal development. Similarly… the potential is not a property of the child — as these formulations are sometimes interpreted — but simply an indication of the presence of certain maturing functions, which enables a situation that gives a potential for meaningful, interventive action' (Chaiklin, 2003, p. 43).

Borrowing from Hegel's idea of *Gestalt* as a system of concepts, Vygotsky views the developing individual as a *Gestalt* in which the individuals and their social situation are taken as a concept (Blunden, 2010):

> 'Vygotsky does not begin from an inside/outside dichotomy, but on the contrary, the self-conscious and independent individual confronting an external world of social structures, emerges as the *outcome* of a long drawn out process of differentiation of a mode of social interaction and a mode of psychological functioning constituting a *Gestalt*' (p. 92).

Vygotsky implies that an individual's activity is always represented first as an external activity and not as an internal activity. The individual is not seen as the 'sole constructor of, or responsible for, all his or her actions' (Piaget, 1970, as cited in Lourenço, 2012).

Hence, from the above discussion that includes the review of three Vygotskian concepts (mediation through tasks and learning, function of ZPD and the transformation of students' psychological functions), it can be argued that the role of the teacher is not to

undermine prior knowledge and experiences of the students that form their spontaneous concepts, but rather to make use of those as tools for 'recontextualizing' (Linell, 2009, p. 73) their learning. The concept of recontextualisation, when applied to a teacher's role in classroom instruction and learning, refers to the teacher's action in a whole class interaction as a dialogue with the students that retains some of the aspects of the 'quoted' context to form new meanings in the new 'quoting' contexts (Linell, 2009, p. 248). The teacher's role is to create tasks that have a developmental effect by challenging students to engage in 'actions that serve to develop the psychological functions needed for that activity' (Chaiklin, 2003, p. 48).

It is critical to point out here, after the discussion of processes involved in subject content transformation from a sociocultural lens, that a spontaneous reference to Vygotsky's sociocultural theory somehow overlooks the notion that it is a theory of cognitive development, and by that means sociocultural theory stands on the relationship between the mind and the world; it refers to learning as mind-in-society. Drawing the relationship between cognitive and sociocultural constructs, Edwards (2005) suggested that 'socio-cultural version of mind is outward looking, resourceful and intent on decoding and responding to the world' (p. 50) as opposed to the cognitive model of the mind that 'emphasizes encoding, knowledge storage and recall' (p. 50). She further adds that it is not that decoding mind does not store knowledge, it does so by means of seeking out patterns and using 'environmental resources to support actions' (p. 50), and thus draws a connection between the two approaches. Greeno (1998) also asserted the overlap between the two approaches. He argued that the cognitive approach says little about the interactions between individuals and of the individuals with the material resources of their environments as it focuses only on the informational content of the activity and not on the activity. Sociocultural theory, on the other hand, subsumes the cognitive approach as it gives

prominence to interactions – both dialogical and dialectical – in understanding human behaviour. It helps in analysing informational contents of people's interactions – how 'people accomplish the goals and functions of tasks that they undertake' (Greeno, 1998, p.6); the conditions that are present for actions to be possible.

2.2 Teachers' Content Knowledge

Conceptions regarding teachers' content knowledge have evolved over the years, reflecting a shift in the view of teaching from a focus on teaching to a focus on students' learning. In this section, I will examine the concept of content knowledge and how it has extended.

2.2.1 The Construct of Content Knowledge

Shulman (1986) classifies content knowledge into three categories: Content Knowledge; Pedagogical Content Knowledge (PCK); and Curricular Knowledge. He defines the first category, content knowledge, as 'the amount and organization of knowledge per se in the mind of the teacher' (p. 9). This kind of knowledge requires an understanding of the structure of the subject matter, which Schwab (1964) divides into substantive and syntactic knowledge. By 'substantive knowledge' (p. 13), he refers to the use of conceptual devices in defining, bounding and analysing the subject matter to be investigated, while he defines 'syntactical knowledge' (p. 14) as the logical structure that the subject exhibits. He explains how disciplines themselves reveal what learning entails. Examining the processes of what writers do, how historians know something or how ideas develop in scientific communities should inform what students do in schools. Such an examination suggests that experiencing the process of knowing is a central aspect of learning (Schwab, 1964). Edwards (2015) provides a lucid explanation of substantive and syntactic knowledge; she explains that the former is the knowledge that the teacher needs, the knowledge of 'concepts and their

relations to each other', while the latter refers to the 'ways of thinking and representing' that is expected of subject specialists (p. 3). Edwards (2015) in explaining the syntactic knowledge refers to the structure of teaching and learning of the subject content that Schwab (1978) describes as the following:

> '… the methods are rarely if ever neutral. On the contrary, the means we use colour and modify the ends we actually achieve through them … If the structure of teaching and learning is alien to the structure of what we propose to teach, the outcome will inevitable be a corruption of that content' (p. 243).

Schwab thus distinguishes between the syntactic knowledge that refers to the skills and processes fundamental to a subject discipline, and pedagogical structures that refers to a method of inquiry imposed on a subject in order for a certain type of enquiry to take place and as a result of which evidence will be brought forward.

The second category, PCK, refers to subject matter knowledge for teaching (Shulman, 1986). It includes the 'most useful' forms of 'representing and formulating the subject that make it comprehensible to others' (p. 9). It also includes conceptions and preconceptions, and some substantive knowledge of the subject that students of different age groups and backgrounds bring with them to their learning of the content given that they do not enter the classrooms as blank states. However, when students bring misconceptions in the form of preconceptions, teachers might require knowledge of strategies that would be useful for them in reorganising their students' understanding of the subject content.

Despite its usefulness, the main problem with Shulman's notion of PCK is that it takes a passive view of pedagogical content knowledge. It neglects the action part of knowledge creation, the 'pedagogical content knowing' (Cochran, DeRuiter & King, 1993, p. 263), which includes knowledge about the learning of their students and the context in which teaching and learning takes place; and the teachers' learning processes (Hashweh, 2005; Ellis, 2007). Instead, PCK assumes knowledge to be in the teachers' head as evident in Shulman's (1987) model of pedagogical reasoning and action. According to the model,

transformation comes before instruction. Transformation, he argues, refers to the steps – preparation, representation, selection and adaptation – involved for a teacher to reshape subject content and adapt it for instruction; and it does not include active participation of students.

The third form of content knowledge that Shulman (1986) identifies is curricular knowledge. The curriculum that the government and the school provide to the teachers is 'represented by the full range of programs [resources] designed for the teaching of particular subjects and topics at a given level, the variety of instructional materials available in relation to those programs' (p. 10). Teachers at secondary schools teach the subject in which they specialise at different levels, often according to a Scheme of Work (SoW) provided by the school for each level. SoW functions as a resource for teachers to use when reflecting on what to teach at a certain level. Teachers draw from these resources for teaching a particular content. The range of information in SoW varies depending upon the school: from simply naming the topics to teach during a term/year to providing websites, providing full details of the lessons to be taught, or providing details such as students' problem areas in a particular topic. Apart from this, the teachers might also have additional knowledge of the content that might appear during later years in the school and knowledge of the content that might be taught simultaneously in other subjects. Such knowledge helps in relating a specific topic to issues discussed simultaneously or with those that might have already been discussed in other classes (Shulman, 1986).

Shulman (1987) added more categories to his previous list of categories of knowledge base of teachers: general pedagogical knowledge, knowledge of learners, knowledge of educational contexts and knowledge of educational ends. To this list, Turner-Bisset (2001) added another category, knowledge of self, which, she says, is the essential requisite for reflection, and defines it as 'an investment in one's own personality in teaching

and the impact of teaching on self' (p. 155); a general understanding of one's 'traits, dispositions, qualities and passions which feed into their teaching' (p. 155). She divided the category of knowledge of learners that she took from Shulman (1987), into cognitive knowledge and empirical knowledge. The former refers to teachers' knowledge of child development and knowledge as context-bound in terms of their regular contact with their students. The latter, she says, refers to knowledge about their age, the way students behave, their interests and the way changes in the weather might inform teacher-students relationship. She refers to knowledge bases as professional knowledge required by teachers to function in their profession. Hashweh (2005) presents another view of PCK as a collection of teacher professional constructions. These professional constructions constitute knowledge of teaching specific topics that an experienced teacher builds and accumulates. Ball, Thames and Phelps (2008) further divide Shulman's (1986) concepts of PCK and content knowledge. They divide the concept of PCK into 'knowledge of content and students' (KCS) and 'knowledge of content and teaching' (KCT), while they divide content knowledge into 'common content knowledge' (CCK) and 'specialised content knowledge' (SCK). Tamir (1991) elaborates on the concept of teacher knowledge and suggests a distinction between personal and professional knowledge of teachers. He states that in teaching, knowledge is both general and personal; it is experiential; it is not only found in mind but also in practice. Connelly and Clandinin (1988) term such a mix of personal and professional, as 'personal practical knowledge' (p. 25). Such a notion captures the idea of experience in the way we refer to teachers as knowledgeable and knowing persons. It takes the form of images, metaphors (Clandinin, 1986; Connelly & Clandinin, 1990, 1994), emotional aspects (Hargreaves, 1998) and beliefs that determine teachers' actions in class that shape teaching and learning (Korthagen, 2004; Traianou, 2006; Männikkö & Husu, 2019).

2.2.2 Reflective Practice

Several studies show that both content knowledge and PCK affect classroom practice and are modified and influenced by practice (Wilson, Shulman & Richert, 1987; Peterson, Fennema, Carpenter & Loef, 1989; Howey & Grossman, 1989). Teachers use their knowledge of the subject matter to generate alternative ways to represent the subject content to their students and, in doing so, take into consideration their students' ability, their prior knowledge and their learning preferences. In this way, they shape classroom practice by the pedagogical choices they make. The way students respond to the illustrations or representations provides an understanding of the difficulties the students might have faced and, hence, provide a teacher acquire a refined understanding of what works and what does not in a teaching and learning situation. It broadens the teachers' understanding of the content about how their students learn the content. This conclusion draws attention to the notion of knowing 'in the situation' (Schön, 1983, p. 132), in which one reflects in the midst of the action. It is within the context, in its state of continuity, that a difference can be made to a situation at hand. Such a thinking 'serves to reshape' what is being done while still doing it (Schön, 1983, p. 26). In such situations, new tools are designed for thinking. Such form struggle in-the-moment, therefore, suggests that learning is situated and that is one of the reasons for my interest in Vygotsky's sociocultural theory, which holds that learning is founded within participation in social and cultural practices.

The notion of reflective practice does not merely mean to reflect on something; rather it means to reflect on something particular, which Turner (2012) describes as 'focused reflection' (p. 268). Such a reflection could also be performed after the activity is over, which Schön (1983) calls reflection-on-action, a process which involves practitioners analysing past actions pertaining to a particular activity (I will further discuss these two concepts in Chapter 3).

Dewey (1997) describes reflection as involving sub-processes of

> '(a) a state of perplexity, hesitation, doubts; and (b) an act of search or investigation directed toward bringing to light further facts which serve to corroborate or to nullify the suggested belief' (p. 24).

In such situations, Dewey argues that 'there is a feeling of a discrepancy, perplexity, or difficulty' (p. 100) that may be felt as something strange, unexpected, a shock or something disturbing. Furthermore, he asserts that observation is necessary to 'bring to light just what is the trouble, or to make clear the specific character of the problem' (p. 101) and that this observation contains the possibility of challenging familiar beliefs and practice.

Korthagen (2004) asks questions about what factors define the qualities of a good teacher and how one could help people become good teachers. He argues that some governments have initiated short-term courses, while some have teacher training courses that involve teacher education in schools. In such courses, he claims, the emphasis is placed on teacher reflection, but what they have to reflect on is not mentioned. Lack of specificity on what to reflect upon, he argues, has serious implications for training new teachers since the context of a specific teaching behaviour cannot be understood by trainee teachers. Such courses thus ignore the connection between thinking and feeling. It is in this context that he argues for 'multiple-level learning' for teacher professional learning that places 'I' at the centre of the learning process and emphasises that 'people who go through a process of deep learning, change at several levels simultaneously' (Korthagen, 2009, p. 196). The levels are represented as an onion: [outer layer] environment; behaviour; competencies, beliefs, professional identity; and mission [innermost layer] (pp. 196-198).

Freire (2000), an advocate for justice and social empowerment in Brazil, shows his contempt for the 'banking concept of education' (p. 72) that he describes as:

> 'Education thus becomes an act of depositing, in which the students are the depositories and the teacher is the depositor…knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing' (p. 72)

The banking concept, according to him, minimises student creativity by regarding them as oppressed and lacking 'critical consciousness which would result from their intervention in the world as transformers of that world' (p. 73). Freire, like Vygotsky, emphasises the importance of social mediation in teaching and learning. The role of teachers, according to him, is not to domesticate their students but to serve the cause of their liberation. Such a role, Freire (1998) says, is achieved through the process of 'conscientization' (p. 55) which, he explains, is an awareness of 'our unfinishedness' (p. 56), permanently engaging oneself in the process of search and, hence, being involved in the production of knowledge. He explains that consciousness is a starting point of reflection in which the possibility of learning resides, and which is never static,

> '[it] gives rise to a permanent movement of searching, of curious interrogation that leads us to not only an awareness of the world but also a thorough, scientific knowledge of it' (Freire, 1998, p. 66).

This cycle of awareness and reflection has implications for teaching practice. 'To teach is not to transfer knowledge but to create possibilities for the production or construction of knowledge' (1998, p. 30) and, in this process, 'Whoever teaches learns in the act of teaching, and whoever learns teaches in the act of learning' (1998, p. 31). Both Freire and Vygotsky give importance to a dialogic relationship between the student and the teacher. For Vygotsky, the aim is to account for how people learn and, in particular, his focus is on the teaching of academic concepts in schools. Freire, on the other hand, is interested in how to use dialogue as a means to engage people to deconstruct their histories and construct their future reality. For him, the dialogue is not 'a mere technique' (2000, p. 17) to involve students in a particular task. Rather, he views dialogue as 'an indispensable component of the process of both learning and knowing' (2000, p. 17), which holds true for Vygotsky as well.

The aim of reflective practice is different for different authors: for Dewey (2004), education has a social function that requires 'transformation of the quality of experience' (p. 10) whereby the immature becomes mature, 'understands the interests, purposes, and ideas current in the social group' (p. 10) and partakes it; Schön (1983) focuses on teachers' reflection on ongoing teaching and their classroom practices; Korthagen (2009) holds teaching practice is dependent on the teachers themselves and on the changes that emerge from the core, from their being; and Freire (1998, 2000) focuses on transforming practice in which the teachers play a crucial role from shifting from a banking concept of education to an emancipatory approach to education.

A few points are essential in the discussion on reflective practices. Firstly, the teacher learns 'in the situation' (Schön, 1983, p. 132) the emerging problems in students' understanding of the content, and that is where the capacity of 'seeing-as' and 'doing-as' lies (Schön, 1983, p. 139). Just as one sees the new problem as a variation of an old one, so is a new way of problem solving a variation of the old one. Hence, it is in learning that teaching is possible. Secondly, such notions of learning give prominence to both the experience of teachers and their understanding and learning of the experiences of students. Thirdly, the cognitive processes of both teachers and students are formed and re-formed in the experience of learning.

2.3 Formative Assessment

The first two points in the above paragraph point towards teachers doing some kind of assessment of students' learning while the action is going on and using that information to shape the learning experiences of students. Such a manner of assessment has been termed formative assessment or assessment for learning in literature that has been a key initiative taken by the United Kingdom (UK) government through the Assessment Reform Group

(ARG) (Broadfoot, Daugherty, Gardner, Harlen, James & Stobart, 2002) and derived from the work of Black and Wiliam (1998), *Inside the Black Box*. According to the authors, the term assessment generally refers to

> 'all those activities undertaken by teachers — and by their students in assessing themselves — that provide information to be used as feedback to modify teaching and learning activities. Such assessment becomes formative assessment when the evidence is actually used to adapt the teaching to meet student needs' (Black & Wiliam, 1998, pp. 1-2) or 'meet learning needs' (Black, Harrison, Lee, Marshall & Wiliam, 2004, p. 10).

The main concern highlighted in the above quote is responding to the information gathered from such assessments and not merely gathering information. The term Assessment for Learning (AfL) was used instead of Formative Assessment (FA) by the UK Assessment Reform Group (Broadfoot et al., 2002) and is defined as,

> 'the process of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go and how best to get there' (pp. 2-3).

The above definitions suggest the implicit attributes of the goal and nature of FA. The goal is to advance learning, both that of the teacher about their students' learning and that of the student of the subject content at hand; it thrives on dialogue; it requires the use of certain strategies to make learning by the students explicit; and it requires active participation of the students in their own learning.

The point missing emphasis in the discussion is that the teacher in seeking and interpreting evidence in order to make decisions on learning becomes the learner in the process and not a person with all-encompassing knowledge about the students' generalised knowledge or of their beliefs in relation to the content they learn or of their difficulties in learning. They learn about these through interaction with their students in the classroom. However, coming back to the definition of FA, Black and Wiliam (2009) restated their definition as:

> 'the creation of, and capitalization upon, 'moments of contingency' in instruction for the purpose of the regulation of learning processes' (p. 12).

Thus, they highlight and draw attention to the necessary conditions and the processes to be considered in conducting such assessments, which, to state again, are intended to improve learning and, additionally, have the intention of improving instruction (Wiliam, 2011).

The three conditions identified for effective FA are: the quality of interaction, 'not on its mere existence or absence' (Black & Wiliam, 1998, p. 13), between the students and the teacher that 'is at the heart of pedagogy' (Black & Wiliam, 1998, p. 16); students' involvement in active learning (Wiliam, 2011); and the teachers' use of tasks that interest students and are 'likely to activate energy along the growth pathway' (Wiliam, 2011, p. 12). Teachers' use of task and dialogue might involve students in self-assessment or peer assessment, thus '[A]ctivating students as owners of their own learning' (Wiliam, 2011, p.12). This kind of assessment is more common in higher education (Parsons, 2017; Van Ginkel, Gulikers, Biemans & Mulder, 2017) than school education (Tiknaz and Sutton, 2006). In higher education, the results have indicated that without the teacher's intervention, a full diagnosis of a learning problem was constrained that further impacted student learning (Parsons, 2017); the students appreciated the feedback from their teacher more than their peers owing to the teacher's authority, knowledge and experience (Van Ginkel et al., 2017). Tiknaz and Sutton (2006) found that teachers in implementing peer- and self- assessment in a secondary school context in the UK found difficulty in finding time for such assessments in comparison to the need of meeting the statutory requirement of the programme of study; difficulty in translating the assessment criteria in language that students could understand, and due to teachers' perceptions of students' ability in engaging with the assessment process; and difficulty in deconstructing the abstract language of national curriculum verses suggestions from their subject education community that led to tensions between policy and practice.

So far in reviewing the literature, I have discussed teachers' role in teaching and learning from a sociocultural perspective; various forms of teacher knowledge including reflective practice; and the role of FA in classroom interaction. I will now discuss the literature on teacher expertise. The aim of this study, as stated earlier, is to examine teachers with exemplary performances consistent over a period of time (3 or more years) to be able to derive pedagogical knowledge from the classroom teaching and learning experiences. For my study, I identified the teachers using a two-phase process: criteria derived from existing literature; and by developing my criteria through classroom observation. I will discuss both these phases in section 4.3.

2.4 Teacher Expertise and Learning

Throughout the review of literature on teacher expertise, I found that the term has been used alternatively with another term, expert teacher (Sternberg and Horvath, 1995; Ethel & McMinen, 2000; Tsui, 2009; Píšová and Janík, 2011; Enow and Goodwyn, 2018). However, it is important to point out here that none of these authors is promoting the superiority of one teacher over another. They are not ascribing to a static view of 'expert' teacher; they are doing so as a means of referring to such teachers or individuals with expertise as 'expert' teachers or 'expert' performers. Moreover, research on stable or expert-novice division is considered as a traditional view of expertise in comparison to the newer emerging forms of expertise. With changing times and advent of technology, workplaces have seen immense changes and meet with daily challenges in work conditions owing to disruptions by use of technology and unexpected events. Such new challenges require a new form of expertise that might require no formal training and/or working in mixed groups collectively towards a moving object of activity (Engeström, 2018) or might require relative expertise of individuals working in different professions to bring improvements in the object of activity

(Edwards, 2010). In research on teacher expertise, there are several terms circulating in the literature to capture the dispositions and traits of highly practised professionals as shown in Table 1.

Table 1. Terms for teacher expertise

Terms for teacher expertise	Literature
Expert teacher	Berliner,1986, 2001; Livingston & Borko, 1989; Sato, Akita & Iwakawa, 1993; Sternberg & Horvath, 1995; Ethel & McMinen, 2000; Turner-Bisset, 2001; Hattie 2003; Tsui, 2009; Píšová & Janík, 2011; Hattie & Yates, 2014; Enow & Goodwyn, 2018.
Inspiring teacher	Sammons, Kington, Lindroff-Vijayendran & Ortega, 2014
Good teacher	Korthagen, 2004
Advanced Skills Teacher	Department for Education and Skills, 2006
Master teacher	Department for Education, 2011
Outstanding	Ofsted, 2018
Champion	Lemov, 2015
Adaptive experts/expertise	Hammerness, Darling-Hammond, Bransford, Berliner, Cochran-Smith, McDonald, & Zeichner, 2005; Anthony, Hunter & Hunter, 2015; Yoon, Koehler-Yom, Anderson, Lin & Klopfer, 2015; Beltramo, 2017; Männikkö and Husu, 2019
Expert teachers' expertise	Ding and Jones, 2018
Relative expertise	Edwards, 2010

Studies grounded in cognitive psychology, a traditional approach to understanding teacher expertise, relate to how expert teachers process information. The general approach in cognitive research is to investigate the differences between expert-novices or expert-experienced teachers. The research findings in these areas inform that expert teachers differ from novices in various ways: they excel in impromptu thinking, cover a wide range of content with elaboration, are contextual thinkers as they give more attention to the content of students' answers, they are more evaluative in attending to atypical problems, and are actively and deliberately involved in the teaching and learning situation (Sato, 1993); differ

from novices in terms of the structure of their knowledge base in both pre-active and interactive phases (Clark & Peterson, 1986); that expert teachers have both pedagogical and subject matter knowledge superior to that of novices (Livingston & Borko,1989; Sternberg & Horvath, 1995; Ethel & McMinen, 2000); they are opportunistic, flexible and more interactive, willing to change activities whenever they deem essential, and accommodate a range of learner skills and abilities (Schempp, Manross, Tan & Fincher, 1998); their knowledge structures include 'stores of powerful explanations and examples of representing subject matter to students' (Livingston & Borko, 1989, p. 39); experts have a larger knowledge base to draw from, and 'they organize knowledge more efficiently in complex interconnected schemas and utilize it more effectively' (Ethel & McMinen, 2000, p. 88); and they have 'well-developed but flexible and adaptive sets of strategic knowledge' to use while planning (Píšová & Janík, 2011, p. 102). All the markers mentioned suggest the comfort with which expert teachers perform the daily task of teaching, and implicitly hint at individual competency and the experience required to reach such ease. Though the number of years of experience is considered as one of the contributing factors in achieving expertise, it is not considered synonymous with expertise (Berliner, 1986, 1987, 2001). The reference to 'deliberate practice' (Livingston & Borko, 1989; Ericsson, Krampe & Tesch-Römer, 1993; Palmer & Stough, 2005) that requires 'hours of practice' (Tsui, 2009) emphasises on the relevance of experience in the making of an expert. The point of deliberate practice is critical in understanding teacher expertise: the number of hours of practice help expert teachers develop routines, and that distinguishes them from non-experts. However, the key is that despite established routines, the expert teachers continue to work on their expertise over time by always seeking to challenge themselves, working 'at the edge of their competence' (Bereiter & Scardamalia, 1993, p.34). The authors, Bereiter and Scardamalia,

thus mark a shift in the understanding of teacher expertise from all-knowing individual to an individual who constantly challenges oneself and problematises one's routine responses.

Bereiter and Scardamalia (1993) related expertise with problematising and reconceptualising routine situations to extend one's capabilities and expertise. In their comprehensive study on expertise, they provided, among others, an instance of expert and less competent writers (p. 35). They had found that expert writers set high standards for themselves and responded to a task as a challenging one, which helped them extend their skills. Also, when conscious effort to solve a problem was replaced by routines, the expert writers used that freed up mental resource by investing in tackling problems at a higher level. In this sense, the authors argue that expertise is a process rather than a fixed state; it is a process involving 'progressive solving of learning problems' (p. 181) and advancing beyond present limits of competence. They argue that the research on comparative study between expert and novice/experienced teachers support the static nature of teachers' knowledge which is a limiting factor because such comparative studies show what expert teachers know and do in a specific situation at a given time, but they show nothing about how expert teachers reached there or how they maintain that. The authors further argue that over time, people learn; they encounter new information and assimilate that into their existing knowledge. However, it is the difference in learning that leads to an expert performance or a non-expert one. The expert is a learner who deals with newly emerging complexities not by problem reducing or risk-reducing changes, which the non-expert learner does, but by constructing new knowledge structures that deal with any inconsistency between existing beliefs and new knowledge. A more recent term for such type of expertise or for teachers with such orientations is adaptive expertise or adaptive experts (Hammerness, Darling-Hammond, Bransford, Berliner, Cochran-Smith, McDonald, & Zeichner, 2005; Anthony,

Hunter & Hunter, 2015; Yoon, Koehler-Yom, Anderson, Lin & Klopfer, 2015; Männikkö and Husu, 2019) or adaptive pedagogical relations (Griffiths, 2013).

The Dreyfus model (2004) developed by S. E. Dreyfus and H. L. Dreyfus (1986) focuses on expert performance, in specific how expertise develops through five developmental stages; has been recognised and referred in the development of teacher expertise (Berliner, 2004; Edwards, 2015; Enow & Goodwyn, 2018). The first novice stage, according to Dreyfus (2004), starts with rigid adherence to rules with no exercise of discretionary judgement. Enow and Goodwyn (2018) observed fifteen English teachers at different milestone stages to study teacher cognition, levels of expertise and uses of learning design; the study demonstrated that at this stage teachers use elaborate and scripted plans. With experience, the novice moves to an Advanced Beginner stage and begin to develop a limited understanding of the context (Dreyfus, 2004). Even at this stage teaching can be detached as teachers at this stage develop their own maxims to adhere to in different situations (Enow & Goodwyn, 2018); episodic knowledge builds up (Berliner, 2004). Next stage is a competent stage. In this, the learner feels responsible for his choices and might feel remorseful for his mistakes or if things do not work out; the learner is emotionally invested. Unlike the previous stage, the situations here are more than that can be defined or assigned rules. Moreover, the learner cannot even put an excuse of not been provided with adequate rules (Dreyfus, 2004). This is a more advanced stage. In teaching, it means that the teacher has had the experience of 5-10 years; had had the experience of teaching entire curriculum and might have used multiple approaches to teaching; the teachers are more student-centred, more confident of generating examples without much prior planning (Enow & Goodwyn, 2018), but they are not yet very fast and flexible in their behaviour (Berliner, 2004). This is the stage where teachers generally reach a plateau (Huberman, 1989; Farrell, 2014; Enow & Goodwyn, 2018) and a major problem of this stage is that:

> …while novice and advanced beginner teachers can still see what they need to learn, the competent level teacher risks feeling comfortable with what works and has worked for many years. This could turn to rigidity; an antithesis to pedagogical growth, thwarting the prospect to progress to proficiency and expertise' (Enow & Goodwyn, 2018, p. 127).

The competent level might develop to a level of proficiency 'only if, experience is assimilated' in 'embodied, atheoretical way' (Dreyfus, 2004, p.179). The rules and principles generated by positive and negative past emotional experiences, are replaced by the ability to discriminate between situations. The issue at this stage is that the performers do not yet have the capacity to respond automatically to a variety of situations that they can distinguish, they require to take deliberate decisions; use maxims and detached rule, which was a forte of novices. Enow and Goodwyn (2018) found that at this stage teachers use internal planning and that it might occur both during planning and during teaching as the aim here is to ensure deep learning (Hattie & Yates, 2014) or long-term benefit of the learners (Enow & Goodwyn, 2018, p.128). The difference between the proficient and expert performer, according to Dreyfus (2004), is that the latter not only sees what needs to be achieved but also sees how to achieve that; 'exhibit automaticity that allows for constant spontaneity and fluid performance,' have planned ideal lesson, which they 'constantly adapt and adjust in real time' (Enow & Goodwyn, 2018, p.129).

Sternberg and Horvath (1995) drew upon Rosch's cognitive psychological research to develop a prototype view of teacher expertise. The view provides a way of thinking about expertise as something that captures both standards developed through similarities across expert teachers as well as allows scope for differences in their expertise. Their view is based on three assumptions: (a) there are certain standards that all experts meet, and which distinguishes them from non-experts and experienced practitioners. The standards also provide scope for variability among individual experts; (b) experts bear a family of resemblance with each other, and it is this resemblance that forms the category "expert";

and (c) convenient way to talk about such categories is in terms of prototype that embodies 'the typical exemplar of a category and, as such, serves as a basis for judgements about category membership' (p. 9). The judgments are made 'by computing the similarity between the object in question and the prototype of the category. The higher the similarity, the higher the subjective probability that the object belongs to that category' (p. 10). Sternberg and Horvath identified three features of expert teacher that make them different from novices: knowledge, efficiency and insight. In terms of knowledge, expert teachers differ from novices in terms of both quantity and organisation of knowledge (Leinhardt and Greeno, 1986; Livingston and Borko, 1990). Efficiency includes automatisation and executive control which involves speed and accuracy used in planning, monitoring, evaluating efforts in problem solving, and are reflective in disposition (Schön, 1983). The third feature, insight, includes the selective tendency of expert teachers in terms of encoding what is relevant and what is not, combining the information in ways that is useful for problem solving, and comparing and applying information from one content to another. The study, deriving from previous research, clubbed different cognitive functions of expert teachers to create a prototype view of teacher expertise. The implications of this approach are that it acknowledges a difference between expert teachers from non-experts in two ways: Firstly, it acknowledges diversity in the population of expert teachers. For example, a teacher who displays highly organised content knowledge and who displays generating insightful solutions may be both categorized as expert teachers, but their resemblance to each other is weak. Secondly, it refutes the set of individually necessary features of an expert teacher. For example, a teacher whose resemblance to expert prototype is low will be judged as a poor example of an expert teacher.

Another model that offers an alternative perspective of expertise derived from studies of student learning in various academic domains, such as history, science, reading,

physics and biology is Alexander's (2003) Model of Domain Learning (MDL). Alexander acknowledges the previous research on expert teachers but argues that it failed to translate its findings in educational practice as the research failed to harness the dynamic nature of formal schooling. The MDL model concerns not with the dichotomy between novices and experts but with a journey from novice to expert and is, therefore, in this regard, comparable to Dreyfus (2004) five-stage acquisition model. The three aspects are critical to the model, and these are based on the interrelation of subject matter knowledge; everyday domain-related activities and professional interest; and surface-level or deep-level processing strategies. A learner uses surface-level strategies when unfamiliar with the content or when the task demand is complex. On the other hand, deep-strategies allow the learner to be critical and more analytic. Interest in domain works as a catalyst to gain more knowledge and assist in strategic engagement. As individuals progress from one stage of expertise development to another, initial stage (acclimation) to proficient stage, they configure the three aspects – knowledge, individual interest and strategic processing – differently at each stage.

While the above-mentioned studies refer to how expertise is developed or captures teachers' learning journey (Alexander, 2003; Dreyfus, 2004) or might be categorised (Sternberg & Horvath, 1995), there are studies that connect teacher expertise to learning and their beliefs about students' learning (Sfard, 1998; Meyer, 2004; Traianou, 2006; Alterator, Deed & Prain, 2018; Männikkö & Husu, 2019). In studying the difference between novice and expert teachers, Meyer (2004) found that it was the differences in their conceptions of students' prior learning and their subsequent use of such knowledge in making instructional decisions (Meyer, 2004) that were the key to reaching expertise. Meyer identified that though novices took account of their students' general life experiences and informal learning experiences such as watching TV as prior knowledge, they strongly believed that previous

instruction formed the strong base for students' prior knowledge. On the other hand, expert teachers considered everyday life experiences that their students observed of which they possibly have partial explanations as their students' prior learning. She further identified that their beliefs have an impact on their subsequent instructional decisions. The novices were defined by the construction metaphor, that is, they added new knowledge to the already acquired knowledge of the students. Expert teachers, on the other hand, were defined by the connection metaphor, whereby they used students' prior knowledge as a way to connect one idea with another, moving from informal experiences to scientific knowledge.

Traianou (2006) demonstrates the connection between teacher expertise with teachers' beliefs about students' learning. In examining teacher expertise, Traianou cited evidence from her observations and interviews with a primary school science teacher over a period of two years. She demonstrates that the teacher's expertise was visible while the teacher under observation was in action and during which the teacher made choices according to the learning needs of the students. The teacher drew from a range of learning perspectives – Piagetian stage idea; her own beliefs that 'learning occurs when children are intrinsically motivated in the task at hand' (p. 74); derived from sociocultural perspectives of teaching and learning that treat a student as knowledgeable and requires to be challenged. The teacher included procedural nature of knowledge along with discussion based on students' reflection on evidence to form a scientific understanding of the subject content. The teacher was involved in moment-to-moment decision making about 'making rapid assessments of where events are leading and what can be done to guide them in productive directions' (p. 75). Traianou (2006) concludes by arguing that teacher expertise is not simply based on scientific and research knowledge but depends on 'experience, wisdom, local knowledge and judgement' (p. 76). She does not underestimate the value and contribution of research in informing practice, however, stresses that teacher expertise evolves over time

through participation in communities of practice, as a student and as a practitioner, through engaging with universal or political standards and competencies of teaching and learning that one engages with as a student in school, on the one hand, and making practical decisions as a practitioner, on the other hand. The study demonstrates the relationship of teacher expertise with students learning in classrooms and is inclusive of both past learning experiences and present teaching experiences.

Alterator, Deed and Prain (2018) also argue that teacher expertise is connected with teachers' metaphoric encapsulation of students' learning. They captured a casting metaphor for teachers deriving from Sfard's concept of student learning that involves two dimensions, factual knowledge to knowing, from positivist to socio-critical perspectives. They argue that the two accounts of student learning, namely an acquisition metaphor and a participation metaphor (Sfard, 1998), enjoin a different kind of teacher expertise. The acquisition metaphor defines expertise in terms of designing learning experiences that promote student absorbing predetermined knowledge and guide students towards success at exams. However, the problem is that it does not acknowledge unanticipated learning opportunities that might arise due to teacher-student dynamics or the use of technology and tends to be prescriptive for teachers and students alike. The participation metaphor, on the other hand, shows teacher expertise as involving teacher engagement in extending student participation in class, valuing their shared contribution towards a guided inquiry in learning the subject content, working through unpredicted or improvisation of strategies that might lead to new forms of knowing. It democratises a learning process, leaves scope for negotiation and accommodates different goals for different students. Such a form of expertise is adaptable and agile in both problem finding and problem solving. Despite the problematic implications of acquisition metaphor, Alterator et al. (2018) present a case for both the forms of encapsulations in the form of casting metaphor as a solution to view student learning and

teacher expertise. The casting metaphor involves two situations: casting angler and associative meaning of casting. For anglers, casting involves engaging with an assembly of unpredictable factors and, at the same time, involving routines, traditions, specialised knowledge and local knowledge; the combination possibly increases the chances of success. Just as the angler might hook a fish that might follow its own pathway, teachers are broadly advocated to hook students' interest, each of whom seek their own trajectory. The second form of casting involves associating meaning to students, like role play. Such associations take into perspective students' need for a community and involve their identity formation. Associations might also consider the use of global networks, for instance, cell phone, blogs, and podcasts, in the changing dynamics of classrooms and the teacher-student relationship. Such global networks provide space for teacher and students to negotiate research topics, share problems and solutions; however, these require both teacher and students to become experts in using these forms of networks for meaningful transactions, echoing Engeström (2018). The metaphor thus views teacher expertise in action in acknowledging the demands that curriculum places on teachers, multiple purposes that teachers have for learning, and their role in learning processes.

Yoon et al., (2015) derived from traditional research on teacher expertise and presented three case studies demonstrating characteristics of adaptive expertise in teachers' integration of complex systems in the teaching of high school biology. The three levels of adaptive expertise that they used as a model for analysis as well as suggested as a basis to frame adaptive expertise were: flexibility (Tsui, 2009), deeper level understanding (Berliner, 2001; Sato et al., 1993; Hattie, 2003) and deliberate practice (Berliner, 1986; Livingston & Borko, 1989; Bereiter & Scardamalia, 1993; Tsui, 2009; Hattie & Yates, 2014). The findings revealed that teachers showed variation in each of the characteristics; however, the findings did not reveal evidence of expertise for each of the three teachers at every level. The teachers

showed low to moderate level of expertise in flexibility and deeper learning, and moderate to a high level of expertise in deliberate effort to reflect on their lessons. They showed relative adaptive expertise to one another. Where one teacher showed no flexibility to incorporate project activities into teaching, the other teacher showed a high level of flexibility in the use of technology but was not consistent. In terms of deeper understanding, one teacher rarely moved from the teachers' guide and asked simple questions, while the other teacher contextualised the lessons so that science was accessible to students, but his efforts seemed superficial. Though all the three teachers shared reflections on their lessons, only one went further to seek feedback from project facilitators and use that to reflect and improve his practice.

Beltramo (2017) studied the potential of cogenerative dialogue as an intervention strategy to develop adaptive instructional practice. The study included two US high school science teachers in dialogue with their respective students (4 students in one case and 10 in another consented to participate) belonging to marginalised communities. The teachers selected one of their lessons on anatomy about which they wanted to learn more. Though the researcher initiated and led the early dialogue sessions out of a total of eight sessions, he gradually contributed less once the teacher and students became comfortable with the format and facilitating their conversations. The study found that through cogenerative dialogues, teachers gain insight into students' social and learning needs, and they use this information to shape classroom practice. The teachers were observed to use both macro- and micro-adaptiveness. Macro-adaptiveness was explicit in their responding to students needs as emerged during the cogenerative dialogic situation, while micro-adaptiveness involved the teachers' involvement with their students by responding to their emerging curiosity during the lesson.

Moving beyond a single site of practice, Edwards (2010) views expertise as key in the kind of work that takes place at sites of intersecting practices (Edwards, 2010) and refers to it as relational expertise. She refers to bringing a change or leading to the development of an identified object of activity that will require the expertise of individuals from various backgrounds and practices to come together into discourse whereby individuals negotiate with other people, bring their expertise to tasks, are able to respond to the needs of others, and are flexible to invent new solutions and procedures. Such form expertise might work both ways, in bringing specialist expertise of certain people on board to bring improvements in an object of activity, for example, university-school partnerships; and in developing the expertise of those in question, for example, mentor-student teachers. In relation to classroom situations then, expertise will explicit itself in relations between teacher and students, not in terms of 'containers' (Freire, 2000, p.72) to be filled but in terms of relating to their thinking, experiences and emerging thoughts. Such a relationship requires to learn – Where they (students) are yet in their learning? Finding ways to getting them to understand the concepts; and knowing how to engage them.

From the above discussion, conclusions about the conception of expertise and implicit meanings and contradictions can be made. Firstly, over time, there are changes and also some overlaps in the conception of teacher expertise: (a) from viewing teacher expertise as something stable to viewing it as continually working on problematising daily routines (Bereiter & Scardamalia, 1993), as stagewise learning over time (Alexander, 2003; Dreyfus, 2004; Enow & Goodwyn, 2018) and as embedded in teachers' beliefs about their students' learning (Meyer, 2004; Traianou, 2006; Alterator et al., 2018), teacher expertise has been linked not just with teachers' learning but also with the way they conceptualise their students' learning; (b) deriving from the traditional research on expert-novice continuum to inform a more recent concept of adaptive or routine nature of teacher expertise (Yoon et al.

2015), the recent research partially connects teacher expertise with the time period view of expertise. After a certain period of time, a teacher might have reached expertise, but the teacher might have reached proficiency and not expertise. The former because the teacher does not think of novel ways of dealing with problems (not reached expertise or not an adaptive expert) that arise in teaching and learning, rather uses past experience to solve new problems (proficiency, routine expertise). Alternatively, at the cusp of the proficient stage, being able to distinguish between situations and identifying problems, the concern might be what to do with these and how to respond. Such times might require to create new rules, go back to where they started – think like a novice (who seemed to be lacking in contrast to the superior knowledge of an expert), and think of the ways through one's past experiences and use imagination to meet the new needs and the present demands; and (c) expertise might be seen as relational, where practitioners collaborate and negotiate to address the challenges identified and work in relation to each other's expertise (Edwards, 2010; Engeström, 2018).

Secondly, there is an inherent contradiction in thinking about developing expertise. On the one hand, expertise is considered to be developed over time and, on the other hand, research has indicated that experience might not be synonymous with expertise. Thirdly, there is a slight problem with loosely using the phrase 'over time' when referring to sociocultural contexts as it implicitly refers to changing political contexts and education policies (Griffiths, 2013) or generally refers to a passage of time, apart from describing these as classroom contexts related to students' emerging needs in their learning. What the phrase enjoins is that as individuals gain experience over 10-15 years of teaching experience, during which they might have worked with almost all situations of teaching and learning in the classrooms and thereby gained expertise in teaching to have reached routine expertise. Lastly, there is a proposal that expertise might not be seen as an end product of a long

journey. Instead, it might be considered that all teachers have the expertise, which might be low in some cases or high in others as long as they resemble a set of identified traits.

2.5 Chapter Conclusion

This chapter has offered a review of the literature in order to situate this study in a historical context. The review examined research which focused on teaching subject content from sociocultural perspectives and discussed the role of teachers in mediating learning in classrooms; focused on the fluid concept of teachers' knowledge and their expertise. In the next chapter, I will present theoretical perspectives that have steered this study.

Chapter 3 Sociocultural Theoretical Perspectives

I have employed both sociocultural and sociological analysis as a theoretical approach to explore teachers' classroom teaching and learning. In this chapter, I will examine the theoretical underpinnings that support my examination of both the micro and macro processes involved in classroom teaching and learning. The concepts that I will outline and which are central to my study are: Holland et al.'s (1998) concept of figured worlds; Rosenblatt's (2005) theory of transaction; Vygotsky's concept of mediation; Bernstein's concept of recontextualisation; and the concept of reflective practice drawing from Schön's (1993) concept of reflection-on-action and Connelly and Clandinin's (1988) notion of personal practical knowledge. In particular, I will focus on interrelation among the concepts and their usefulness in guiding me towards forming an understanding of subject content transformation.

3.1 Core Concepts

3.1.1 The Concept of a Figured World

Dorothy Holland, a sociocultural anthropologist, studies global activism and social movements in the United States and Nepal. Influenced by Vygotsky's developmental and Bakhtin's dialogic notions, Holland and her colleagues, Lachicotte, Skinner and Cain (1998), developed the concept of figured worlds, which forms a part of Holland's theory of social change and the possibility of human agency. Vygotsky and Bakhtin are both concerned with identity formation, which is central also to the concept of figured worlds. Vygotsky (1978) is interested in how human psyche is shaped from the outside through the use of psychological tools. Figured worlds assume both material and conceptual aspects of

psychological tools, as Cole (1996) describes (explained in section 3.1.3), and function in forming daily as well as collective memory (Holland et al., 1998). Conceptually, figured worlds provide with an understanding of contexts within which a tool is used; it provides people with an opportunity to gain new perspectives of the world in the context of the tool used; and thereby accords them with the cultural means as a way to modulate their own behaviour. In doing so, people ascribe new meaning to their action in a given context and favour certain practices over others. The figured worlds in this sense provide them with a space to perform an agentic function in bringing changes in themselves. Materially, figured worlds reveal themselves in everyday action and practices of people through which they create the relative position of influence for themselves. In a classroom teaching and learning situation, children learn to control their emotions through the use of signs or psychological tools; they use the tools to engage in a dialogue, compare and reflect on their ideas, negotiate their positions; and form self-identity. They thus reflect on self and are emotionally involved with learning. Bakhtin (1981), a Russian philosopher, addresses the social and continual nature of dialogism through his concept of 'heteroglossia' (p. 324) which gives prominence to context over text. In any given situation, there will be a set of 'social, historical, meteorological, physiological' (p. 428) conditions that will render a different meaning to utterances than they would have in a different situation. These conditions specific to a situation form the background against which a person's 'own voice' (p. 278) is authored by giving meaning to the situation in which people find themselves. The concept had its influence on Holland et al.'s (1998) introduction of the concept of the 'space of authoring' (1998) which means making sense of self through transaction with others. During the transaction, a person accepts, rejects or negotiates with others, and, hence, makes a choice and responds to a situation. Holland's concept also echoes the essence of Rosenblatt's

concept of transaction, which includes a reader's selective attitude and views reading and writing as a continuous process.

For Holland and her colleagues (1998), the idea of the role of culture in shaping the identity was central. Influenced by their work, the concept of figured world in this sense is about self-formation: it provides a space for an individual to participate in the culture in which he or she is positioned in order to turn it around to make way for oneself as a knowledgeable and committed person; it calls for higher order organisation of one's thought; and it involves processes by which human beings as both collective and individual move from one social and cultural reality to another in which everyday regularities are transferred into expectations of how things should be or how events must unfold. In short, the figured worlds provide a landscape of human agency:

> 'a capacity of people to act in a purposeful and reflective manner in complex interrelationships to either reiterate or recreate the world in which they live, to create alternative courses of action in circumstances' (Inden, 1990, as cited in Holland, 1998, p. 23).

People at once become both 'social producers' and 'social products' (Holland et al., 1998, p. 42).

3.1.2 Theory of Transaction

Rosenblatt (2005) credited her background as preparation for developing the theory of transaction. Her appointment as the Commission on Human Relations of the Progressive Education Association brought her in contact with schools where innovative ideas had been introduced and that led her to compile her own experiences in *Literature as Exploration* in 1938. Later, her academic career gave her the opportunity to observe and reflect on the relationships between readers and texts. During the years, she was influenced by Peirce's triadic concept of language (1994), Dewey's notion of transaction (2004), and James (1981) and Vygotsky's (1987, 1997) defining of psychological processes.

Pierce, James and Dewey developed a conception of experience based on the ongoing experiences in human life. They rejected the claims that all knowledge comes from sensory experiences; from physically experiencing the world. According to Pierce (1994), experience 'is that determination of belief and cognition generally which the course of life has forced upon a man' (Chapter 2, para. 138). It is the 'sum of ideas' whose 'authority cannot be resisted' (Chapter 7, para. 437). In this sense, the experience is external, the outer world. However, the constraints that one experiences are one's own; and, in this sense, experience belongs to the inner world as well. Hence, according to him, '[e]xperience is double' (Chapter 7, para. 440): it considers what it senses on the outside and, along with that, forms concepts inside; it thus involves cognition and is relative. Such a notion of experience as a continually evolving process, which is both 'relative and conditioned by the limited capacities of fallible beings' (Smith, 1985, p. 542), can be explained in terms of Pierce's triadic sign system which involves the three elements of sign process: sign, object and interpretant. Pierce defines a sign as

> 'A *Sign* is anything which is related to a Second thing, its *Object*, in respect to a Quality, in such a way as to bring a Third thing, its *Interpretant*, into relation to the same Object' (Chapter 2, para. 92).

In short, the sign – a written word or an utterance– is determined by the object to which it is attached and is relative to the interpretant. Two things happen in a triadic relation: the interpretant relates to the sign and the object, and mediates between them; the interpretant also, at the same time, brings itself into interrelation with them. Hence, the meaning of a word is not the object that it designates; instead, the meaning is the effect that the word has on the interpretant as understood by the interpretant and within the social context in which it is used. Like Pierce, Dewey also acknowledges that experience involves inference and continuity. It involves a continuous transaction between a living organism and environmental conditions. He further adds that experience can be understood as a flow or a

connection in which ‘one part leads into another and as one part carries on what went before, each gains distinctness in itself’ (Dewey, 1934, p. 43). James (1981) also refers to the continuity aspect of experience in his concept of fringe and stream of consciousness. Referring to the former, James says that there is always more to the experience that one might be attending. When giving attention to one aspect, something might have been ignored as attention is selective. However, this does not imply that ignored experience does not exist. Thus, indicating that there ‘is far more in experience than is presented at any time since it has sub-conscious depths which may surface only on certain crucial occasions in the life of an individual’ (Smith, 1985, p. 545). James’ (1981) notion of a stream of consciousness characterises ‘the stream of thought, of consciousness, or of subjective life’ (p. 505) as a flow, as unbroken and continuous. By continuous he meant lacking in any interruption or breach. Despite the time gaps between the content of thought, the changes in the thoughts from one point in time to another are continuous; the changes are never absolutely abrupt, and there exists connectedness between the two thoughts as each blend with the other. Returning to Dewey, another aspect that gains prominence is his notion of experience as ‘the transformation of the quality of experience’ (Dewey, 2004, p. 10). The focus of such transformations is not on the finished product but on the transaction in which an organism works towards overcoming challenges or resistance. All the three thinkers, Pierce, Dewey, and James, focus on the kind of experience that can be considered as knowledge.

Rosenblatt was influenced by the ideas of the three and that of Vygotsky in framing her theory of transaction that involves reader and text. The text is a set of signs to which a reader assigns a semiotic object and, at the same time, interprets that relationship for construction of meaning; and in this process, the reader is challenged by the situations that they interpret within the understanding of their own sociocultural situation, and also within

their situatedness in which they participate. For her, the works of Pierce and Dewey emphasised the following:

> 'There is always a personal and a social context within which reading event occurs. The individual internalizes, draws on, a socially produced language presented by the family and society. We have not only a particular moment in the personal life of the reader, but also a particular social and cultural environment' (2005, p. xxii).

According to her, there is always some kind of transaction that goes on during the reading event in which meaning is constructed through the back and forth relationship that occurs between the reader and the text, between the individual and the society. What readers bring to the text depends upon what they bring to the text in relation to their life experiences, their linguistic experiences and their assumptions about the world. The transaction between the reader and the text involves the sign, the object and the interpretant: a sign that appears on a page or is like vibrations in the air until some mental association, some idea, links the sign with what it points to. The triadic sign system emphasised for Rosenblatt that literature is grounded in human context. Drawing on James's ideas of selective attention and the stream of consciousness, she explains the reading event further. She says that the text stirs up a stream of emotions, thoughts and feelings in the reader; and, as a result, some elements are brought to the centre of attention, while some are pushed to the periphery or background. This entire process involves the spiralling influence of the reader and the text on the emerging meaning as possibilities are considered, and new signs become the focus of attention.

Thus, Rosenblatt's theory of transaction (2005) views the process of reading a text as reading and writing. The process of reading a text involves a reader in taking a particular stance, deriving from the reservoir of past experiences as well as from their present situation and finding cues on which to base future expectations. The text is not excluded but involved in this process of transaction in the sense that it is a verbal pattern and becomes dynamic in relation to the choices, regarding diction, syntax or literary conventions that the reader

makes. The marks on the page or an oral collection of words evoke elements that the reader goes through the selective process and tries to organise understanding or consciousness. According to her, writing involves the same processes as reading. The only difference she points out is that reading involves some textual pattern, while during writing, the writer faces a blank page and might have to start with a vague idea. However, this vagueness comes from some selective attention, as in reading, towards some tentative choice and synthesis.

Hence, when seen from the lens of Rosenblatt's theory, I view teaching as a meaning making process which includes teachers as readers and writers, reading the classroom dialogue as text and writing that as an understanding derived from such a reading as an internal text.

3.1.3 Concept of Mediation

Vygotsky was working during the rule of Stalin, under whom all scientific work was impossible and Marxist psychology had come under political criticism because of the perceived focus on individual development without social contexts. Apart from such stressful times, his health had taken a toll on him. He was suffering from tuberculosis and knew that either way his days were limited. Vygotsky was in his early 30's, around 1928, when he had started to prepare books that were often 'disconnected and unfinished chapters which could not see the light of the day for 50 years' (Blunden, 2010, p. 87). He was mainly concerned with human freedom in the sense of how human beings can 'subject their behaviour to their own control' (Blunden, 2010, p. 87). The answer to which, according to Vygotsky (1978), defines the difference between elementary functions and higher functions in human beings. Elementary functions are directed by impulse, determined by direct stimulation from the environment and follow the course of natural memory. The higher functions, on the other hand, are shaped by 'self-generated stimulation' (p. 39) that comes

from intention, from a symbolic representation of a purpose, which might also be a cultural need.

In contrast to a stimulus-response order, which is an elementary order, Vygotsky (1978) described the higher order pattern in which human beings are 'drawn into' (p. 39) creating an 'intermediating link' (p. 39) that acts as an 'auxiliary stimulus' (p. 40) and leads to an indirect reaction. It is important to note that the link does not just improves reaction or acts as a link, it also reverses the action. That is, instead of an action directed towards the stimulus, it can be directed towards a human being as well. The auxiliary stimulus helps in modifying and controlling human behaviour, and hence, acts as an external element in controlling behaviour:

> 'Because this auxiliary stimulus possesses the specific function of reverse action, it transfers the psychological operation to higher and qualitatively new forms and permits the humans, by the aid of extrinsic stimuli, to control their behaviour from the outside' (Vygotsky, 1978, p. 40)

Vygotsky thus introduced the idea of a psychological tool that could be used for realising a psychological operation; the use of which has the potential of restructuring the cognitive structures; using which human beings learn to control their own behaviour. He described psychological tools as devices for mastering mental processes and considered these to be of artificial and social origin rather than organic and individual (Daniels, 2001).

For Vygotsky (1981), there existed an essential connection between the material tool and a symbol or sign or psychological tool despite the fundamental difference. The point of difference between a tool and a sign for Vygotsky (1978, 1987) is that the tool is directed outwards, it is 'the means for man's external activity directed toward subjugating nature' (1987, p. 62). In other words, things that people use to act on other things according to their purpose. On the other hand, as the sign is directed inwards, it is 'a means of psychological action on behaviour, on one's own or another's, a means of internal activity directed toward mastering man himself' (1987, p. 62). However, he explains that

the tool and sign are mutually connected, ‘when man changes nature he changes the nature of man himself’ (p. 63).

According to Cole (1996), psychological tools are infused with two things: the cultural practices and advancements over the generations that generated them; and the intentionality or the motive of an individual in introducing them. These serve as cultural, social and historical devices. Cole (1996) refers to such tools as a subcategory of artefacts. He explains that in anthropology, an artefact is treated as a part of the study of material culture; something created in material form by human beings. In that sense, an artefact is considered as a tool; the image conveyed is that of an ‘artifact as object’ (p. 117):

> ‘an aspect of the material world that has been modified over the history of its incorporation into goal-directed human action. By virtue of the changes wrought in the process of their creation and use, artifacts are simultaneously *ideal* (conceptual) and *material*. They are ideal in that their material form has been shaped by their participation in the interactions of which they were previously a part and which they mediate in the present’ (p. 117).

The understanding of artefacts as both material and ideal, a means that at the same time is directed outside to some purpose and also shapes the inside, presents that human interaction with the world through the use of artefacts is dialectical. It involves a process of shaping and being shaped through culture (Daniels, 2015).

Wartofsky (1973) distinguished between three-level hierarchical notions of artefacts: primary, secondary and tertiary artefacts. Primary artefacts are those that become an extension of the human organ, for example, axes, needles and bowls. These are used directly in the making of things and, in the process, involve achieving a skill. Secondary artefacts are the products of direct outward action and not representations in mind; are modes of action using primary artefacts. For examples, rituals, dances, chants, visual symbols, traditions and beliefs. Tertiary artefacts are ‘imaginative constructions’ or ‘mental artifacts’ (p. 209). These imaginary worlds provide ‘an opportunity of practical alternative’ (p. 209)

which, Wartofsky suggests, has the power to change perceptions and reorganise the world by living in it.

The point to make here through the discussion of artefacts is that Vygotsky was thinking of developmental or genetic method when analysing mediation. He was focusing on qualitative transformation rather than quantitative advancement such as speed or accuracy (Wertsch, 2007) through the use of psychological tools or artefacts. Vygotsky's thoughts on the nature of mediation changed during the course of his writings (Daniels, 2015; Wertsch, 2007). Wertsch describes Vygotsky's two perspectives on mediation: explicit mediation and implicit mediation. The former is explicit in that

> 'an individual, or another person who is directing this individual, overtly and intentionally introduce a "stimulus means" into an ongoing stream of activity…in the sense that the materiality of the stimulus means, or signs involved, tends to be obvious and nontransitionary' (p. 180).

In contrast to this, implicit mediation

> '…does not need to be artificially and intentionally introduced into an ongoing action. Instead, it is part of an already ongoing communicative stream that is brought into contact with other forms of action. Indeed, one of the properties that characterizes implicit mediation is that it involves signs, especially natural language, whose primary function is communication. In contrast to the case for explicit mediation, these signs are not purposefully introduced into human action and they do not initially emerge for the purpose of organizing it. Instead, they are part of a pre-existing, independent stream of communicative action that becomes integrated with other forms of goal-directed behaviour' (pp. 180-181).

Both the forms of mediation, share the common features despite differences and are a part of Vygotsky's major conceptual framework stated in his basic maxim, 'sign meaning develops' (Wertsch, 2007, p. 186). Vygotsky, thus, highlights the relationship between a sign or psychological tool and behaviour, or between word and thought and asserts that the relationship undergoes change. This notion has a serious implication for instruction which is to assist students in becoming fluent users of signs (Wertsch, 2007): cognitive development and learning is inherent in the mastery of symbolic tools, in students' appropriation of 'tools-mediators' (Kozulin, 2003, p. 28). Another thing that Wertsch (1993)

highlights is that when Vygotsky wrote about psychological tools, he did not explicitly view it as an 'organic whole' as a 'tool kit' (p. 93). A tool kit, Wertsch states, are a variety of items available to an individual for mediational means. With reference to teaching, Gueudet, Pepin and Trouche (2013) have referred to the term 'resource systems' with teaching mathematics proficiently. A tool kit or a system of resources function as accessible resources of mediational means using which or selection from which has the capacity to shed light on the individual choices manifested in the use of a particular resource for a particular purpose (Wertsch, 1993); might provide information about individuals perception of their work (Gueudet, Pepin and Trouche, 2013); or might provide knowledge about their beliefs and practices (Pepin, Xu, Trouche & Wang, 2017).

According to Kozulin (2003), there are two faces of mediation, 'one human, the other symbolic' (p. 19). Both focus on enhancing the child's performance, one by human assistance, and the other by introducing mediating tools. The role of the human mediator is defined in Vygotsky's Genetic Law of Development (1978):

> 'Every function in the child's cultural development appears twice: first, on social level, and later, on the individual level; first, between people (interpsychological), and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All higher functions originate as actual relations between human individuals' (Vygotsky, 1978, p. 57).

Two aspects are inherent in Vygotsky's concept of mediation: that human cognition is inherently social; transformation happens when other-regulation is changed to self-regulation. The former involves activities mediated by other people or cultural artefacts, while the latter involves appropriation and reconstruction of the cultural artefacts to regulate or own activities (Johnson & Golembek, 2011, p. 3).

3.1.4 Concept of Recontextualisation

Vygotsky's work, as discussed above, was concerned with the micro teaching and learning processes. However, it does not refer to how institutions (schools) regulate learning, shapes the way in which individuals (teachers) work within them, something which Bernstein addressed through his body of work. Bernstein (2000) was concerned with 'the general principles underlying the transformation of knowledge into pedagogic communication' (p. 25) through the process of recontextualisation, which he suggested,

> 'selectively appropriates, relocates, refocus and relates other discourses to constitute its own order' (p. 33).

The first level of recontextualisation attends to the question, who owns and creates knowledge? At this level, the knowledge stays in the hands of intellectual communities, like universities, that create disciplinary rules and procedures. Such knowledge is abstract and context-independent (Bernstein, 2000). The second level of recontextualisation attends to the question, what is taught and how it is taught? At this level, the context-independent and abstract knowledge, developed in the disciplines, is altered or recontextualised in the form of curriculum and enters in the educational arena of the schools. This alteration is done by the state and its agents who produce dominant principles that generate guidelines about school organisation and management, curricula and evaluation. Such guidelines are a result of the ideology of the state and provide the potential for the relative autonomy to the schools (Bernstein, 2000). The schools have the autonomy to shape their own curriculum but under the guidelines provided. The school hands down the curriculum to the teachers in the form of Scheme of Work (SoW), but this comes along with the guidelines of their ideology of teaching and learning in the form of the theory of instruction (Daniels, 1987), defined as:

> 'The various kinds of learning outcomes and the ways of analyzing learning requirements are combined in a rational and systematic manner' (Daniels, 1987, p. 92 as cited from Gagne, 1985, p. 243).

The teachers are thus handed down with a "manual" which suggests to them what "good teaching" looks like. Wertsch (1998) argues that Bernstein's account of pedagogic discourse focuses on

> 'the power of institutionally organized discourse forms to shape individuals' lives and identities… that there is little room left to explore the impact of the active agent or subject' (1998, p. 259).

He points out that Bernstein focused on the 'unidirectional transmission of influence from institution to individual' (p. 259) that ran the risk of obviating the active agent from the process. Thus, taking from Wertsch, in the case of teaching and learning, teachers are the active agents. However, this one-directional transfer of influence puts us in danger of overlooking the contributions of the teachers in the process of teaching and learning as key role players in the institution with a specific role in the classrooms and in taking the guidelines forward. Thus, as Wertsch suggested, it is useful to consider how active agents shape the process.

3.1.5 Theory of Reflective Practice

I have discussed the notion of reflective practices in the previous chapter. In this section, I will add more detail to the concept.

Reflection is a way to regulate one's thinking by its purpose, that is, by what one wants to achieve; it is '[f]inding one's way' (Dewey, 1997, p. 26). Schön (1983) refers to the two notions, reflection-in-action and reflection-on-action, in relation to knowledge in a given practice. He argues that the former, reflection-in-action, is context-bound, 'bounded by the "action-present"; it is the zone of time in which action can still make a difference to the situation' (p. 62); and it 'hinges on the experience of surprise' (p. 56) and a sense of astonishment by the 'sense behind a student's mistake' (p. 68).

> 'In each instance, the practitioner allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomenon before him, and on the prior understandings which have been implicit in his behavior. He carries out an experiment which serves to generate both a new understanding of the phenomenon and a change in the situation' (p. 68).

In the context of teaching and learning of particular content, the process involves testing of theories, drawing from previous experiences, generating new ways of developing responses and further moves while in action. The latter, reflection-on-action, involves drawing from experiences after the action is over. The practitioners, he says (1983),

> 'think back on the project they have undertaken, a situation they have lived through, and they explore the understandings they have brought to their handling of the case. They may do this in the mood of idle speculation, or in a deliberate effort to prepare themselves for future cases' (p. 61).

This process enables them to explore and analyse the situation, and build 'a *repertoire* of examples, images, understandings, and actions' (p. 138).

In both situations, whether during or after the action, the possible objects of reflection are varied (Schön, 1983). Reflections could be on the norms that underlie a judgement: judgement on their interpretations of the students' responses; on the strategies used; how the problem was framed; or the role one plays in the larger institutional contexts. Dewey (1997) provided five distinct steps in reflection on a situation:

> '(*i*) a felt difficulty; (*ii*) its location and definition; (*iii*) suggestion of possible solution; (*iv*) development by reasoning of the bearings of the suggestions; (*v*) further observation and experiment leading to its acceptance or rejection' (p. 98).

Such reflections become part of the personal practical histories of teachers (see section 2.2.1) that shape their beliefs, and have the possibility of informing their future course of action in the classroom (Connelly & Clandinin, 1988).

Thus, in my research, I draw from these concepts – figured world, transaction theory, mediation, recontextualisation and reflective practice – as discussed above. The concepts are interrelated and, in combination, have the potential to throw light on the

complex teaching and learning processes in the classroom and in explaining the professional learning of the teachers.

3.2 The Interrelation among the Concepts

There are three points of overlap by means of which the concepts discussed above might prove advantageous to the study. Firstly, there is a connection of the use of symbols or artefacts or psychological tools in the concepts. Holland et al. (1998) propose the concept of figured worlds or imaginative worlds into which people enter through the use of games, watching sports or even by imagining a situation. Wartofsky (1973) proposes the use of imagination for entering or participating in a particular situation *via* his concept of tertiary artefacts. These artefacts have a developmental history as they have a past and mediate the present; are manufactured and produced; have intentionality in their use; are attributed with some meaning; are used to convey feelings, thinking and behaviour; and are both a material and a concept (Vygotsky, 1978; Wartofsky, 1993; Cole, 1996; Holland et al., 1998). The artefacts are means of both dialogic and dialectic interaction with the world, involving 'a process of shaping and being shaped through culture' (Cole, 1996, p. 103).

The second point of overlap is the connection between Rosenblatt's theory of transaction and the human form of mediation. Vygotsky defined the role of human mediation through his genetic law of cultural development. In a classroom situation, the teachers create tasks that they use as artefacts and introduce these to the students. Both the teacher and students engage with the tasks as texts. Both are involved in the process of reading and writing the texts or tasks: reading the text by being involved in a transaction, in a dialogue with others, in making meaning with others. For the students, reading involves regulating their own thoughts and moving towards abstraction. For teachers, reading the text refers to reading the responses of their students. This process requires them to interpret their students'

responses or make sense of those responses to further their students' learning by assisting them in their merging of the abstract and concrete concepts and by providing more opportunities to the students to move from being other-regulated to being self-regulated.

The third essential point of overlap is the connection between classroom transaction and reflection. The entire classroom teaching and learning experience that involves a transaction between the teacher and students could be taken as a psychological tool itself. The teachers utilise the classroom transaction as a tool for their own learning, that is, for their professional growth of practice. This could be done in three ways. Taking from Schön: (a) within the classroom when the action is going on, in which the teacher interprets and responds to emerging situations; and (b) from outside the classroom after the action is done, by which the teacher pays selective attention to the things that might have gone well or might not have; to the learning difficulties of the students; to review some of the decisions taken that might have been taken on the spur of the moment or might have been ignored, and might require further probing. Taking from Connelly and Clandinin: (c) reflect on the 'critical events' (Webster & Mertova, 2007, p. 71) from their past teaching experiences and derive from those to inform their future aspirations and role as a teacher. Critical events are specific events that people recall as memories from their life experiences which lead them to 'adopt strategies and processes to apply to new situations' (Webster & Mertova, 2007, p. 71).

3.3 The Usefulness of the Concepts in Classroom Pedagogy

3.3.1 Place of Figured Worlds and the Creation of Tasks in Classroom Pedagogy

Teachers utilise their past experiences; they have a concept, a socioculturally embedded idea of how a classroom functions through implicit norms that they might have acquired or

observed. For instance, through their dialogue with others in the school in which they work or through a universal understanding of how the school functions and what happens in the classrooms, or from their own experiences as a student. They also have a formal idea of what they are required to teach to which classes using a Scheme of Work (SoW) or syllabus provided to them by their schools or departments. They use the SoW to draw from the reservoir of their knowledge and experiences of subject content, selectively attend to what they want to teach and how they would go about teaching it. In doing so, they create tasks that serve as artefacts, both material and the concept, to introduce these to the students for learning the subject content.

Using the tasks, teachers plan a structural or conceptual framework of the way in which to steer the teaching of the subject content. It allows them to create expectations, sequence tasks, anticipate problems and their solutions, and thus run an imaginary situation or a figured world that they would encounter or enter into in a very near future.

3.3.2 Mediation in Classroom Situation

Teachers enter into the figured world in the classroom and attempt to transform a plain reality into represented reality and transfer the situations or tasks into expectations of how things should be or how events must unfold. These expectations are interpreted in accordance with past experiences, extracting from the past and reaching out to the new (Holland et al., 1998).

In a classroom situation, teachers and students are actors or characters who act as agents (subject) involved with tasks, meaningful situations (psychological tools) towards an outcome (object) (Vygotsky, 1978). In this involvement, the actors gain recognition as their actions gain significance which leads to valuing certain outcomes more than others (Holland et al., 1998). It could be argued that the students could use the tasks or artefacts directly,

without any assistance from the teacher, to make sense of the subject content. However, this has the possibility of developing a spontaneous understanding of the concepts and forming misconceptions. The primary purpose of school education is forming of the scientific concepts in which the teacher plays a significant role of the knowledgeable other in mediating learning through the use of tasks in the development of culture and scientific understanding of the concepts.

The classroom teaching and learning situation also works as a tool for reflection. I have already discussed this point in the third essential point of overlap of the concepts in section 3.2 in this chapter.

3.3.3 Potential in Combination of Sociological and Psychological Theories

The lacuna in Vygotsky's sociocultural theory is complemented with the social theory of Basil Bernstein who argues that 'the inner logic of pedagogic practice as a cultural relay is provided by a set of rules and the nature of these rules acts selectively on the content of any pedagogic practice' (Bernstein, 1990, p. 63). In relation to this study, it implies that the functioning of teachers in the classrooms that involves teaching and learning in a social relationship with the students has some form of institutional constraints or regulation. According to him, this inner logic is not the code. The code is revealed by the rules, in the sense that how these rules position "interactions, discourse and contexts" (Bernstein, 1995, p. 6). Both the theories in combination have a potential to understand the relation between the micro practices of the individual teachers and the macro institutional practices, and 'to make significant contribution to the theory of the social formation of mind in specific pedagogic modalities' (Daniels, 2012, p. 45). Wertsch, del Rio and Alvarez (1995) draws the relationship between the micro, that Vygotsky addresses, and the macro, that Bernstein forwards, forms of interactions by referring to mediation as both 'empowering and

constraining' (p. 25). They argue,

> 'We can never 'speak from nowhere,' given that we can speak (or more broadly, act) only by invoking mediational means that are available in the 'cultural tool kit' provided by the sociocultural setting in which we operate…this does not mean that we mechanistically determined by, or are mere puppets of, the mediational means we employ, but it does mean that constraints of some kind always exist' (Wertsch et al., 1995, p. 25).

This study thus endeavours to use the potential of the two theories in combination in order to investigate and explain the processes involved in the transformation of subject content.

Drawing from the discussion of the core concepts, I argue that a teacher is both the subject and object in a teaching and learning situation in the classroom. Though teachers' eventual aim is to support students in their learning, in doing so, they themselves act as an object. I propose that teachers are both the 'subject' as they are the doers of transforming the content by framing it into tasks, by giving intentions to the tasks and introducing these to students in the classroom. They use classroom dialogue around tasks with their students as a psychological tool to regulate their own thinking and action both (a) in-the-moment and (b) after classroom experience. In this way, they become the 'object' themselves because it is they who learn about their students' progress in learning and use that knowledge as a springboard to inform their subsequent pedagogic actions in order to assist the students in their learning of the content or skill at hand.

3.4 Chapter Conclusion

In this chapter, I have discussed the concepts that influenced my thoughts as a former English teacher and the reasons I believed that those concepts could be of relevance in shaping classroom teaching and learning contexts. I have also discussed through previous chapters how my understanding moved toward more clarity about what was the focus of my study and, then, how through further reading I frame the situation within both psychological

and sociological paradigms combined. In the next chapter, I will discuss the research design detail.

Chapter 4 Research Design: Recruitment, Design, Method and Analysis

In this chapter, I will start by providing an overview of and the rationale for methodology. I will then present the methodology section in two parts: (a) the process for recruitment of the participant teachers, and (b) the main research design, which will include the details of how the research aim was addressed and the research questions answered; detail of data sampling, means of data collection; details of data analysis, which will include a description of the schools in which the participants taught; followed by discussion of data reliability, ethics and confidentiality.

4.1 Overview

An inherent argument in the sociocultural theoretical approach is that cognition develops through social learning (Vygotsky, 1987). Interpreting the phenomenon of teaching and learning from a sociocultural stance, the overarching question that the study attempted to answer is: *How do 'expert' teachers transform the subject content in order to support student learning in classrooms?*

The study involves an in-depth understanding of how 'expert' teachers do teaching and learning in the classroom, their in-the-moment decision-making and the growth of their own professional knowledge. The aim was to gain an insight into 'how' and 'why' (Yin, 2014, p. 10) questions related to teachers' roles in transforming content or mediating learning. Therefore, having defined the case to be studied, a multicase study as a research design was employed.

However, to move forward with data collection, the first step was to recruit teachers with expertise. The questions considered at this stage were: how to identify them? Will the characteristics of teachers that were identified from the literature on expert teachers help in gathering data required for analysis? Therefore, before entering into the main data collection, a small study to identify and recruit ‘expert’ teachers was conducted.

4.2 Multicase Study and the Focus of the Present Study

A multicase study, a qualitative approach, has been recognised to allow a researcher to examine several cases in diverse settings, referred to as several ‘bounded’ systems (Stake, 1995, p. 443; Merriam & Tisdell, 2015, p. 38). Miles, Huberman and Saldaña (2014) defined a case as a ‘phenomenon of some sort occurring in a bounded context’ (p. 28). In the present study, the ‘cases’ were participant teachers bounded in different school contexts. However, the main interest of this study, the ‘quintain’ (Stake, 2006, p. 4), was not the phenomenon as ‘cases’, but the phenomenon exhibited by the ‘cases’ (Stake, 2006, p. vi). Stakes (2006) stated, ‘the quintain is something that we want to understand more thoroughly (the ways in which the teachers mediate learning for students’ understanding), and we choose to study it through its cases, by means of multicase study’ (p. vi). The word “quintain” is derived from medieval jousting practice in which an object is mounted on a post and used as a target in tilting exercises.

As explained in the previous section, before proceeding with the main data collection and analysis, the first step was to identify and recruit participant teachers.

4.3 The Process for the Recruitment Teachers with Expertise

Criteria to identify expert teachers were derived from the literature on teacher expertise, discussed in detail in section 2.4. The criteria included the following: An 'expert' teacher is

- a subject knowledge expert;
- involved and engaging;
- interactive and responsive;
- a contextual thinker;
- adaptive and reflective;
- and identified as an expert by senior staff in their school consistently over a period of three years.

The criteria were sent along with an invitation to participate in the study to either the Heads of Schools or to the Heads of the Departments (HoD), depending upon whose email was available on the school website. The criteria were sent as a tool for them to screen teachers and assist them in finding 'expert' teachers, from observation of whose practice I developed further criteria for 'expert' teachers. The developed criteria were later sent to the headteachers, teacher educators and HoDs to recruit participant teachers for the main study.

Development of the criteria was critical to the study in order to explore the phenomenon of interest from the sociocultural lens. Classroom dialogue was a necessary requirement to be able to draw inferences from the data and be familiar with the classroom teaching and learning processes.

In the first phase of teacher recruitment, the data were collected from five schools in Oxfordshire, England. A total of twenty-nine teachers, both English and mathematics, participated. Two lessons from mathematics teachers were not documented as the students were given tasks to do among themselves in groups, and therefore the interactions were unintelligible. The situation highlighted the necessity of explicit whole class dialogue for analysis of classroom subject pedagogy. A total of twenty-nine lessons – sixteen

mathematics and thirteen English teachers – from twenty-seven teachers were observed. Two English teachers provided a further lesson observation.

The data were collected in written form in a quadrant model construct (Edwards, 2015), as shown in Figure 1, which is a heuristic device and consists of four quadrants: Q1 to Q4. A teacher does not have to start the sequence of activities with Q1 and follow it through Q4. Instead of moving from Q2 to Q3, the movement might also be backwards as that helps students to deal with misconceptions. A direct move from Q1 to Q4 is a sign of poor teaching (Edwards, 2015). The structure, as proposed, allows students to take increasing control of their learning of the subject matter and to develop as learners (p. 21). The quadrant is based on Vygotskian notions of learning, on the concepts of ZPD and mediation, and was helpful in revealing the support that the teachers provided to their students in their agentic engagement with the content that was introduced to them.

Q4. Demonstration of the grasp of key concepts and ways of enquiring	Q1. Introduction of key concepts and modelling of ways of engaging with key concepts
Q3. More open tasks which enable learners to apply key concepts and ways of enquiring	Q2. A tightly structured task which demands engagement with key concepts and ways of enquiring

Figure 1. Quadrant Model: A model of task sequencing to promote learning

The quadrant model consisted of four quadrants (Q1 to Q4): in Q1 the teacher introduced the key concepts to the whole class, made an assessment of students whether they had drawn a connection between prior and present learning; in Q2 the students worked through tasks with the knowledge they met. They worked in pairs, groups or individually.

The teacher was highly active at this stage; she/he assessed learning; in Q3 students began to take control of their knowledge of concepts which they had begun to grasp and used it to solve problems. The teacher worked as a knowledgeable resource and intervened when students experienced difficulty; and, finally, Q4 was where the students demonstrated their newly acquired knowledge.

The quadrant model not only served a tool for data collection as discussed but also as a tool for analysis. It assisted in identifying the kind of lessons where maximum teaching and learning was happening and, therefore, in the identification of the characteristics of the kind of teachers specific to take this study forward. Some of the characteristics of the identified 'expert' teachers aligned with the characteristics of expert teachers provided in the literature. However, some idiosyncrasies emerged from the observations that contribute to the field and add to the existing literature.

The criteria – FACTOR – developed through observations provided with six characteristics to identify teachers with expertise for the main study (see Table 2): F refers to focus on content, and focus on student learning; A refers to asking many questions, asking for an explanation and adjusting according to students' understanding; C refers to connecting the past and present learning with future learning demands; T refers to task sequence, tasks that help students think, tasks that engage and involve them, and tasks that help students take decisions; O refers to setting of objectives and providing options; and, finally, R refers to responding to misunderstandings. In short, the criteria revealed the nature of teacher involvement and engagement with students' learning.

Table 2. FACTOR: Criteria to identify an 'Expert' Teacher

Criteria to identify an 'Expert' Teacher: FACTOR		
F	Focus on subject content Focus on student learning	Helps students think within the context of the content. Helps a teacher recontextualise learning.
A	Ask many questions Ask for explanation Adjust according to students' understanding	Helps in making students' thinking and understanding explicit to the teacher and other students. Helps a teacher take decisions during the lesson.
C	Connect past, present and future	Helps in bringing students' prior learning to support their present learning, and in helping them utilise this relationship in thinking about future demands.
T	Task sequence Tasks that help students to think Tasks that engage and involve students Tasks that help students make decisions	Helps in initiating a dialogue of a student with the task, between student and teacher and among students. Helps students internalise new learning. Helps in restructuring students' thinking. Helps in establishing new learning.
O	Set Objectives Give Options	Gives direction and clarity to students. Helps students achieve learning goals set for them. Gives a sense of achievement to students after having completed the objectives. Challenges the students and helps them assess their learning.
R	Respond quickly to misconceptions	A teacher does not let misconceptions settle. Helps students to reflect on their prior knowledge and adjust that in relation to new information.

The first criterion, focus (F), aligns with Sato et al.'s (1993) claim that expert teachers are 'contextual thinkers' (1993). The teachers were active and involved in the situation and gave attention to the content of the students' responses. The observation also aligns with Livingston & Borko (1989) who stressed that expert teachers excelled in 'impromptu thinking' (p. 104). This also links to the second observation (A), with the teachers' action of asking questions, asking for explanations and adjusting according to their students'

understanding, and aligns with the findings of Schempp et al. (1998) and Píšová & Janík (2011). The fourth observation on tasks (T) and the purpose to which these are used align with the findings of Berliner (2001) and Hattie (2003) on teacher expertise in the sense that expert teachers provide challenging tasks to their students. However, the research in this field calls for more evidence. Doyle (1983, 1986, 1988), and Doyle and Carter (1984) argue about the use of tasks (T) in teaching and learning, as to whether they promote higher order thinking; Dewey (2004) and Vygotsky (1978) explain how the use of tasks performs the reverse action. The discussion is very useful in understanding the relevance of tasks in classroom pedagogy, understanding how teacher mediates learning and in being implicitly aware of teacher expertise. However, task design as a research topic is neglected in research in many subject areas, except mathematics and foreign language, and there is very little empirical evidence that focuses on how tasks are appropriated by the teachers for students to perform an agentic function in their own learning (Thompson & Wittek, 2016).

The third observation, drawing connections (C), partly aligns with Meyer (2004), who argues that expert teachers make connections between the students' prior learning and their present learning (Meyer, 2004). However, they also assisted their students in connecting their present learning with future demands. The sixth observation, responding to misconceptions (R), is missing as an attribute in the literature on teacher expertise. The teachers responded to the student misconceptions of the content immediately. They did not allow the misconceptions to linger and addressed them with the whole class. The teachers also set objectives and some also provided options (O). Setting objectives is one of the suggestions for good teaching strategies (Lemov, 2015) and also a policy guideline for many schools.

The FACTOR criteria were sent to the headteachers, teacher educators and HoDs. It was meant to serve as a tool in order for them to identify teachers, with consistent performance over three or more years, who might participate in the main data collection.

I deem it necessary here to restate my intention for the study that influenced the way I engaged with the selection of the participant teachers for this study. The selection of participants for the study was one of the main concerns. First, the very nature of the study, in order to examine how teachers transform the subject content for student learning to take place, required selection of teachers that were not inconsistent in their performance and not at a low-level of expertise. Secondly, though research on expert-novice continuum overlooks the impact of sociocultural influences that shape teaching, the research was important as it highlights the cognitive dimension of knowledge storage and recall, and aligns with a more recent research on routine expertise or routine experts whereby teachers resort to previously established patterns in order to address issues that might arise in classroom teaching. Thirdly, as research on teacher expertise has evolved, the researchers have started to link expertise with sociocultural influences on teachers over time, thus shifting the fixed perspective of experts or expertise with a more fluid conception of it. As a response to the ongoing dialogue on teacher expertise, the study aimed (a) to select teachers with consistent performance over a period of three years or more and recognised for their exemplary work by their school community (bridging the expert-novice continuum and sociocultural aspect of expertise); (b) to derive a new criteria of features on the basis of which a new set of teachers were recruited for the main study by observing the classroom action of the teachers selected in the first phase and used a sociocultural construct, quadrant model, for the analysis of the lessons observed. The model made explicit teachers' responsiveness to students emerging learning needs that, as a consequence, made their students move away from dependency upon teacher to self-dependency over the subject content; and (c) the teachers

selected for the main study were situated within their respective contexts by framing their socio-historical institutional contexts and classroom contexts, and connections between their contexts and classroom pedagogy were drawn. By observing and interviewing the selected teachers, how teachers mediate the transformation of subject content and, thereby, the nature of teacher expertise will be discussed.

4.4 Research Questions

The review of the literature has suggested that teaching and learning occur around a particular content and involves a teacher and the students as participants in a classroom situation. It is not just the teacher who enters the classroom with prior experiences and knowledge, but also the students who enter with prior experience and previous learning. It is within such dynamics that meaning construction around the subject content takes place.

The overarching research question was: **How do 'expert' teachers transform the subject content in order to support student learning in classrooms?** The following sub-questions were identified to understand the main research question:

1) *What are 'expert' teachers' conceptions of the subject they teach or of teaching and learning, or of their students' learning?*
2) *What conceptual frameworks do 'expert' teachers utilise to explain the content to be taught and initiate a dialogue with the class?*
3) *What tasks do 'expert' teachers assign for students' understanding of the concepts introduced?*
4) *What understanding do 'expert' teachers make of their students' learning from the classroom interaction?*
5) *What understanding do 'expert' teachers make of their own learning from the classroom teaching and learning experience?*
6) *What knowledge bases do 'expert' teachers draw on to reflect on their thinking for teaching and learning in classrooms?*

In order to explore these questions, data were gathered by requesting the recruited teachers to record their lesson plans on a Dictaphone, which was provided to them. The lessons were

observed and video recorded, and later used for stimulated recall and semi-structured interviews. The process allowed the teachers to reflect on their thinking and on the actions taken in the class to justify why they engaged the way they did in the act of teaching.

1) *What are 'expert' teachers' conceptions of the subject they teach, of teaching and learning, and of their students' learning?*

Everything that people experience is in relation to something and has meaning associated with it. From this point of view, life becomes a 'metaphor' and 'a story we live' (Connelly & Clandinin, 1994, p. 149), and hence life becomes a powerful way to imagine who we are, where we have been and where we are going in relation to a larger sociocultural context with which we constantly interact. Teachers' beliefs, thus formed, are closely related to their pedagogic decisions, in terms of how they function in classrooms or the kind of teaching and learning culture they promote. Therefore, when the question was framed, it was thought that their metaphors of the subject they teach or of teaching and learning or their students' learning might reflect their thinking.

The recordings of the lesson planning, the interviews and even the classroom observations, depending upon which part of data collection the teachers stated or used their metaphors, provided data for exploring how their beliefs inform their pedagogic decisions.

2) *What conceptual framework do 'expert' teachers utilise to explain the content to be taught and initiate a dialogue with the class?*

The question relates to the lesson plans that teachers frame in relation to the content to be introduced or extended in the lesson, and the concepts or skills within that. While planning, they scaffold the lesson on the basis of tasks or concepts; they structure their action plan and create an intentional imaginative world, which they utilise to engage with the students in the classroom.

The think aloud lesson planning audio recordings and interview questions were examined for evidence on any framework used by the participant teachers.

3) *What tasks do 'expert' teachers assign for students' understanding of the concepts introduced?*

This question relates to the second question. The tasks teachers create allows students to understand the concepts and ingrain those concepts into their thinking. The aim here was not merely to know the tasks assigned but mainly to understand how the participant teachers design tasks, the kind of thinking that goes into them and the things that are considered when designing them.

Recordings of lesson planning and video recording of classroom observation were utilised to examine the concept of task design.

4) *What understanding do 'expert' teachers form of their students' learning from the classroom interaction?*

In the classroom, the interaction between the teacher and students takes place around tasks. From the start until the end of the lesson, the teaching and learning of the content progresses through the use of tasks that serve to initiate dialogue or introduce the subject content to the students. It is through dialogue that students' understanding and their progress in learning of the content becomes visible to the teachers. The question, thus, relates to teachers' understanding of their students' learning in the classroom.

The question was explored through the video recordings of the classroom observations and recordings of the interviews. Both showed how the teachers assessed progress and interpreted students' responses for further questioning or action or recontextualising the content for their understanding.

5) *What understanding do 'expert' teachers form of their own learning from the classroom teaching and learning experience?*

Teachers' own learning serves as a resource for their students' learning. Teachers' learning of the students' understanding, and the subsequent actions they then take; teachers' learning from the classroom experiences that they encountered, and the subsequent action

they might take in the next lesson with the same group of students or an action they might reserve to consider for the future with the same group or another group or another academic year.

Evidence for all subquestions relates to the findings in Chapter 5 on individual lessons of English and mathematics teachers, and in the specific themes that emerged and are presented in Chapter 6.

6) *What knowledge bases do 'expert' teachers draw on to reflect on their thinking for teaching and learning to happen in the classroom?*

The hypothesis explored here is that the pedagogic decisions that teachers take do not come out of a vacuum. Their experiences, both in the past and ongoing, serve as intellectual resources that inform their decisions. These might include their own schooling, or their own learning experience, their previous teaching experiences, their prior knowledge of the students, prior learning of their students and their future learning, or the demand of the exams, for example. Such a knowledge base could be used both during lesson planning and during the ongoing lesson.

The recordings of lesson planning and of the stimulated recall and semi-structured interviews generated the data to explore the knowledge bases that teachers utilise to reflect on their teaching. The data were examined for evidence for the kind of resources they bring to bear on their thinking about the action that is to take place and the action which is going on.

The finding chapters are structured according to practice in the multicase study approach which involves presenting within-cases followed by cross-cases. The former will provide detailed findings from individual lessons of participant teachers, while the latter will deal with comparison among the lessons and will provide emerging themes in the thesis.

4.5 Multicase Sampling

The study, as explained, used multiple cases to investigate the phenomenon as exhibited by the cases (Stake, 2006) within different contexts. The main reason to use multicase sampling was that it 'adds confidence to findings' and strengthens 'the precision, validity, stability, and trustworthiness of findings' (Miles et al., 2014, p. 33) by looking at a range of similar and contrasting cases, and thereby offer an in-depth understanding of a given phenomenon.

The original plan was to observe twelve teachers, six each of English and mathematics. Out of five teachers that were recruited from two comprehensive schools at the start of the data collection phase, there was attrition of three English teachers from the same comprehensive school. Two mathematics teachers from different schools continued. Then, five more teachers from an independent school were recruited. These were three English and two mathematics teachers. Two more mathematics teachers from another comprehensive school and two English teachers from yet another two different comprehensive schools were recruited. Thus, in total, eleven teachers – five English and six mathematics teachers – from six different schools were recruited to allow variation (Stake, 2006; Merriam & Tisdell, 2015) in the sample. Two to three lessons were observed per teacher. The details of the lessons are mentioned in Table 3. Data from only eight teachers were used in the study. The data from one of the mathematics teachers were not utilised as it was incomplete. Narrative analysis of the data from another mathematics teacher and an English teacher indicated repetition in findings and hence were not used for thematic analysis. Therefore, from eleven cases, only eight cases were used for the study. Out of these eight cases, four cases will be presented to demonstrate detailed analysis of teaching and learning classroom experiences in Chapter 5, while all the cases will be used to present findings from the thematic analysis in Chapter 6. The aim is to provide the reader with the vital aspect of most of the teachers, that is, how they mediated learning for students'

understanding of the subject content. In Chapter 5, I will present lessons of individual lessons, two each of English and mathematics to present teaching and learning of both English and mathematics which took place in different school contexts, in both comprehensive and independent school contexts.

4.6 Data Collection and Credibility

In a qualitative study, the primary tool of data collection and analysis is the human researcher, and reality is interpreted directly through observations and interviews. Thus, it becomes paramount that the research results are trustworthy (Merriam & Tisdell, 2015, pp. 240-242). Since reality is multifaceted (p. 242), validity needs to be understood from something beyond reality, something 'credible' as Lincoln and Guba (1985, p. 296) put it. Understanding that it is difficult to capture reality and that the formed reality is subjective in nature as it brings along the experiences, beliefs and perspectives of the researcher in building it, it is pertinent to see if findings are congruent with reality and are making sense. In the study, the credibility of the findings and interpretations was established by triangulation: triangulation through data (Merriam & Tisdell, 2015) and triangulation through cases (Stake, 2006). Data were triangulated through multiple methods, which included verbal reports (think aloud), classroom observations and stimulated recall and semi-structured interviews. Data from several cases from different school contexts were collected over a period of nine months. Collecting data from each case took two days to a week, except in one case that took a month (as shown in Table 3).

Table 3. Lesson observation details

Name	Institution	Subject, Teaching Experience	Class	Lessons (L) and Topic	Date of Lesson Observation (LO)	The gap between LO and Interview
Lisa	Spring Hill School	English, 4 years	Year 9	L1: Reading a non-fiction text L2: Grammar	L1 & L2: 2 December 2016, with a half-an-hour break in between	L1 & L2: next day interview Part of L1: same day interview
				L3: Structure	L3: 6 December 2016	L3: same day interview
Jeffrey	Forest Lake School	English, 25 years	Fifth Form (Year 11)	L1: *Great Expectations* L2: A poem based on prejudice	L1 & L2: 4 October 2016	L1 & L2: same day interview; general interview after a week
Tyler	Forest Lake School	English, 7 years	Lower Sixth Form (Year 12)	L1: *The Great Gatsby* L2: Three poems on immigration	L1 & L2: 7 October 2016	same day interview
Linda	Lakewood School	English, 4 years	Year 9	L1, L2, L3: Critical analysis of poems	L1: 5 December 2016 L2: 7 December 2016 L3: 23 January 2017	L1 & L3: same day interview L2: interview after a month
Justin	Whitewater School	Mathematics, 3 years	Year 8	L1, L2, L3: Three-dimensional representation	L1: 5 May 2016 L2: 9 May 2016 L3: 11 May 2016	L1 & L3: same day interview L2: next day interview
Alex	Forest Lake School	Mathematics, 35 years	Upper Fourth (Year 10)	L1: Area of a triangle	L1: 13 October 2016	same day interview
				L2: Area of a triangle in three dimensions	L2: 19 October 2016	
Steve	Valley View School	Mathematics, 8 years	Year 7	L1, L2, L3: Base Numbers	L1: 10 October 2016 L2: 12 October 2016 L3: 14 October 2016	same day interview
Lauren	Valley View School	Mathematics, 4 years	Year 8	L1, L2, L3: Bearings	L1: 31 October 2016 L2: 3 November 2016 L3: 7 November 2016	same day interview

4.6.1 Verbal Report

A verbal report is a framework used for 'human information processing' (Ericsson & Simon, 1980, p. 215). There are different kinds of verbalisations: a concurrent Think Aloud Protocol (TAP) and a retrospective reporting of an event. For this study, I was interested in the former. For the purpose of the study, the participant teachers were required to record how they planned a lesson that would be later observed and video recorded. They were asked to concurrently think aloud while undertaking the task of planning the lesson. The process allowed the merging of cognitive processing and verbal report of the lesson planning (Ericsson and Simon, 1993).

I had reflected upon my past teaching and learning experiences and framed a few questions which the teachers were requested to consider while planning a lesson. The teachers were asked to explain their thought processes, their decisions around the selection of tasks, their expectations for the lesson and their expectations from the students while planning the lesson (See Appendix A). Providing specific instructions have been shown to improve metacognitive performance (Hagafors and Brehmer, 1983; Stanley, Mathews, Buss & Kotler-Cope, 1989) by setting the participants to focus on the task of lesson planning at their hands, helping them in understanding that they were required to provide a rationale for the choices they would make, and think metacognitively while performing it. Hence, giving instructions assisted in overcoming one of the drawbacks of the method and which is that participants use their short-term memory (STM) while reporting concurrently. An explanation of thoughts, ideas or motives was required in order for teachers to go beyond the STM, and link the information collected from the STM 'to earlier thoughts and information attended previously' (Ericsson & Simon, 1993, p. 79).

Apart from the methodological problems in considering TAP, Ericsson and Simon (1993) also expressed their basic doubt in the method: whether the participants'

verbalisations could be considered as scientific data. They proposed that researchers should consider the following questions: firstly, how the transforming of the data that has been processed would be transformed into data which is objective, that is, it is not tampered with, and compiled as 'hard' data; and, secondly, would the processes allow going backwards from the data to the behaviour to make inferences of the participants' thought processes.

The participant teachers were asked to, with their consent, record their verbal reports of the lesson planning at their own space, time and pace. This decision was taken due to time constraints and uncertainty of where the lessons might be planned. I made use of technology and provided the teachers with Dictaphones to record their planning. The recording was handed to me by the teachers on the day of lesson observation. These recordings were then fully transcribed. The reports were not interfered with, in the sense that neither these reports were paraphrased nor was anything omitted as unimportant.

The transcripts of verbal reports were then used in two ways: some parts were added to the Narratives of Teaching and Learning (NTL); the remaining parts and NTLs were coded for themes using NVivo. Both these ways were used to infer the teachers' thought processes and in understanding the "how" of teaching and learning in classrooms. NTL refers to a narrative of a lesson by an individual participant teacher inclusive of the reasons behind their actions or decisions taken in teaching subject content. I will provide more detail of NTLs in the data analysis section.

Lastly, taking warnings from Ericsson & Simon (1980) that verbal reports carry the risk of being considered as merely introspections or verbalisations, I did not completely rely on TAP as a single method of data collection to explore my research interest. I triangulated TAP with the other methods, classroom observations and video recording of the lessons, and video stimulated recall (VSR) and semi-structured interviews.

4.6.2 Classroom Observation and Video Recording of the Lessons

Wilkinson and Birmingham (2003) stated the conditions in which observation can be used as a research instrument. These conditions resonated well with the conditions of this study and these were:

a) When the ways in which people behave and interact with one another in a social setting are important to your research.

b) When you are interested in researching social settings and what happens in them.

c) When the best way to research what you want is to experience it for yourself.

d) When the context of the events you are researching is important.

e) As a useful supplement to other research instruments.

f) When a flexible approach to research is needed (p. 118).

Observation as an instrument of data collection provided an opportunity to observe and video record the teachers in their classroom contexts as a sociocultural setting of teaching and learning. This decision was influenced by Shulman's 'Wisdom of Practice' (Shulman, 2000, p. 134) in which he explained that when one does not have a theory that explains how someone understands what to do to achieve a particular thing then one must follow the experts and 'have them talk to us about what they were doing' (Shulman, 2000, p. 134). He advised that one could learn by 'watching them work, talking with them, videotaping them, engaging them in a stimulated recall' (Shulman, 2000, p. 134).

According to Wilkinson and Birmingham (2003), the 'observational focus' (p. 122) must be clear. They explained that a researcher must be clear about what was to be observed and how to record it. It is in these questions that the problem lay. Though I was clear on what to observe, the second part of the question led me to combine both classroom observations and video recording of the lessons. Doing such a combination aligned with the qualitative approach (Wilkinson and Birmingham, 2003) as the aim here was to explore meanings of classroom teaching and learning incidents. As a researcher, I took the role of a

non-participant observer involved in overt observation (Lincoln & Guba, 1985, p. 274) and video recorded the lessons; I positioning myself in the corner of the classrooms. The teachers and their students in the classroom were aware of my presence as a researcher and of the use of a video camera to record the lessons. The only drawback of keeping the camera fixed was that during the process of transcribing the lessons a compromise had to be made on the quality of the shot of the ongoing task from the Interactive Whiteboard (IWB). The whiteboard screens were not clear at times due to the position of the camera in the room, and it was not possible and even ethical to move around with the camera in hand and disrupt the lesson. The shots were relevant as evidence of teaching and learning in the lesson. The fixed position of the camera, however, necessitated to jot down notes in flashcards. I made written notes of my observations of the lessons on flashcards and focused on the tasks assigned and the dialogue around them. The strategy helped me immensely during the stimulated recall interview, especially when the teachers forgot what had happened around a certain task or what dialogue ensued. It enabled them to recall and connect with what had happened and explain their decisions. Hence, the use of both classroom observation and video recording as instruments of data collection were vital to the study. The former, if used separately, would have led to the reconstruction of the classroom teaching and learning narrative by joining the 'isolated fragments' (Wilkinson and Birmingham, 2003) as not all the incidents might have been recorded. Combining observations with video recordings, provided an opportunity to record what happened in its original setting. The recordings helped in two ways: providing the basis for stimulated recall with the participant teacher; and for transcribing the data, which, along with observation notes, were then used for creating Narratives of Classroom Observation (NCO). NCO refers to a narrative of a lesson from start to the end of it as was video recorded; it did not include any reasoning from teachers for their actions and decisions.

Video recordings had an added advantage as they provided ‘a permanent record of fleeting and transient situations’ (p. 119), and I was able to revisit and review the data as and when I required in the course of data analysis, and hence ‘move back and forth in time’ (Lincoln & Guba, 1985, p. 274).

4.6.3 Video Stimulated Recall and Interviews

Video stimulated recall (VSR) which is a method to access thought processes acted as a stimulus to help the teachers recall the lesson, revisit their interaction with the students and think of the in-the-moment decisions that they took. The method involved a video-recording of a lesson and then replaying it to the participants so that they could ‘comment on matters of interest’ (Rowe, 2009, p. 427). In addition, the technique provided the context for semi-structured interviews (Merriam & Tisdell, 2015) that allowed me as a researcher ‘to respond to a situation at hand, to the emerging worldview of the respondent, and to the new ideas on the topic’ (p. 111).

While the use of VSR has its own benefits, there were some limitations in using it and those required to be considered. The potential problems related ‘to the issues of memory and retrieval, timing and instruction’ (Mackey & Gass, 2005, p. 75). The recall procedures must occur as soon as possible after the task is completed (Mackey & Gass, 2005; Schepens, Alterman, & Van Keer, 2007; Do & Schallert, 2004). The distance between lesson completion and VSR impacted the teachers’ retrieval of information, such as the decisions they might have taken or even their recalling of the classroom teaching and learning incidents; the impact of the distance was evident in this study. To minimise this distance, I had requested the teachers to give the interview on the same day as lesson observation, within an hour or a few hours if possible. Most of the teachers managed to do the interviews on the same day, except for two teachers. One of these gave the interview for one of the

lessons observed a month after the lesson observation. By then, the teacher had forgotten the lesson and the decisions she had taken. Even though I showed the video to the teacher, the gap of a month had led to 'memory decay' (Mackey & Gass, 2005, p. 85). Another teacher gave the interview for one of the lessons observed the next day of observation and was able to recall the lesson as well as the decisions he had taken and why. At the start of the interview, clear guidelines (Schepens et al., 2007) were provided to the teachers to help them understand how VSR and observation notes would be used during the interview. Providing guidelines made the teachers aware of the interview process and which led to the smooth functioning of it.

These interviews were transcribed later and thus formed the data using which analysis was possible. The transcribed data was used in two ways. Most of the part that suggested the teachers' decision making during the lesson and for the lesson was used to write Narratives of Teaching and Learning (NTL). NTLs are narratives of complete lessons created from the data gathered from all the three methods used for data collection: TAP, lesson observation and VSR. NTLs recorded teaching and learning of the content during a lesson from start to the end of it; these included any reasoning that the teacher suggested for their actions taken during the lessons. In this way, the NTLs were different from the NCOs, which did not document any reasoning given by the teachers for the actions taken. NTLs and the remaining data were coded for themes using NVivo. I will discuss this in detail in the data analysis section.

Fuller and Manning (1973) pointed out that teachers' viewing of their lessons on a video 'is a stressful, anxiety-provoking experience' (p. 473). To minimise teachers' anxiety and stress, they were first made comfortable by asking a few general questions about the lesson while keeping a display of the recorded video before them on a laptop in order for

them to get familiar with it. It was observed that doing so made them feel comfortable and prepared them for the interview when VSR was used.

Another concern raised by Calderhead (1981) was whether tacit knowledge could be verbalised. He explained that tacit knowledge of teachers develops with experience and of which the 'sizeable part' might be used in 'teacher's everyday cognitive activity and could not be spontaneously verbalised during a stimulated recall commentary' (p. 213). He added that the teacher might also have reached a level of 'automatisation' (p. 213) and, therefore, might not be aware of the rationale for behaving in a certain manner. Coupling the use of VSR with semi-structured interviews increased the opportunities for the teachers to go beyond their short term memory (STM) and think about how and why of their daily teaching practice. It enabled them to engage and 'disclose' (Rowe, 2009) that which might have remained in their 'low level of awareness' (Calderhead, 1981, p. 213).

4.6.4 The Selection Process of Research Design

Before deciding on using a multicase study utilising the three methods discussed in detail above, I had considered using narrative inquiry as a method of inquiry. The process would involve asking the teachers about 'critical events' (Webster & Mertova, 2007, p. 73) which people recall as memories of past events that involve their struggle in adapting an idealised world view to the reality of their experiences and lead them to adopt strategies to overcome those struggles. Thus, the teachers would be required to share the critical events from their teaching and learning experiences that might have changed the way they thought about a particular situation and how that might have influenced the way they teach. The method would have required several sittings with the teachers to build a narrative which would emerge through questioning them about things from the events that they would have narrated and would require further probing. In this way, the narratives are developed in small parts

which are later combined to form a whole. Doing so would have required, I believe, a high level of trust between the teacher and myself. I was aware, at that point of decision making, that I was an outsider then, not someone from their present teaching community. Even if I were from their community, the process of data collection would require much time from the teachers which, considering their daily school schedule, could have been difficult. Moreover, reflecting upon the main research question, I realised that I wanted to understand how they teach the way they do and why. I wanted to explore in detail the process of teaching and learning as it happens in the classroom. Also, reflecting upon my prior experience with utilising narrative inquiry as a method for my research in my Master's Dissertation, helped me conclude that using Narrative Inquiry as a method would not tell me about how do teachers do teaching and learning in the classrooms about the subject content they teach. The process might shed light on some the situations or events that might have impacted in shaping the teachers' beliefs or their teaching practice. However, this would not provide me with how teachers transformation the subject content, which is the key research question of this study. Hence, I would not be able achieve my aim which was to understand the micro and complex processes of classroom teaching and learning. However, I did not discard the method fully. Having engaged with the method in detail in the past, I knew the importance of metaphors in understanding teachers' beliefs. Using metaphors helped in triangulating the data, which I was not aware of when I thought of using it and understood that during the data analysis phase. There could be a possibility of discrepancy or consistency in what teachers believed and their actions in the classroom. I used my understanding of metaphors from narrative inquiry to frame one of the mandatory questions for the teachers to respond to during think aloud protocol, one of the methods I used in this research. The question was: What is your metaphor for teaching and learning or for the subject you teach?

4.7 Data Analysis

Multiple case study involves ‘collecting and analysing data from various cases’ (Merriam and Tisdell, 2015, p. 233). I engaged with the types of data collected in several ways. The first level of engagement lay in preparing the document in order to be able to organise the data to analyse it and derive from it. I transcribed the three types of data – verbal reports of lesson planning, video recordings of the lesson, and stimulated and semi-structured interviews with the teachers. Transcription of the classroom observations included the teacher and the students’ interaction that formed the whole class discussion or teacher talk. Group discussions were not within the scope of the study and not even possible to record as the camera was fixed in the corner of the classes observed and could not capture these discussions. It was observed that group discussions were used as tools for the whole class discussion or teachers’ assessment of learning that took place in the groups. The transcriptions of the types of data were organised into a single document consisting of two or three complete lessons per teacher; this was the first stage of data analysis, the data preparation stage. A complete lesson means the entire lesson that was constructed utilising the transcriptions from the three types of data.

The document for each teacher was then used for further analysis. This involved five more stages to study each case in depth, to be able to make sense of it, to be able to study across cases and to derive uniformity or disparity (Stake, 2006) between the cases. Different stages of data analysis, as shown in Figure 2, provided the scope of seeing the data differently, and hence recontextualised the data (Richards, 2009) for my understanding.

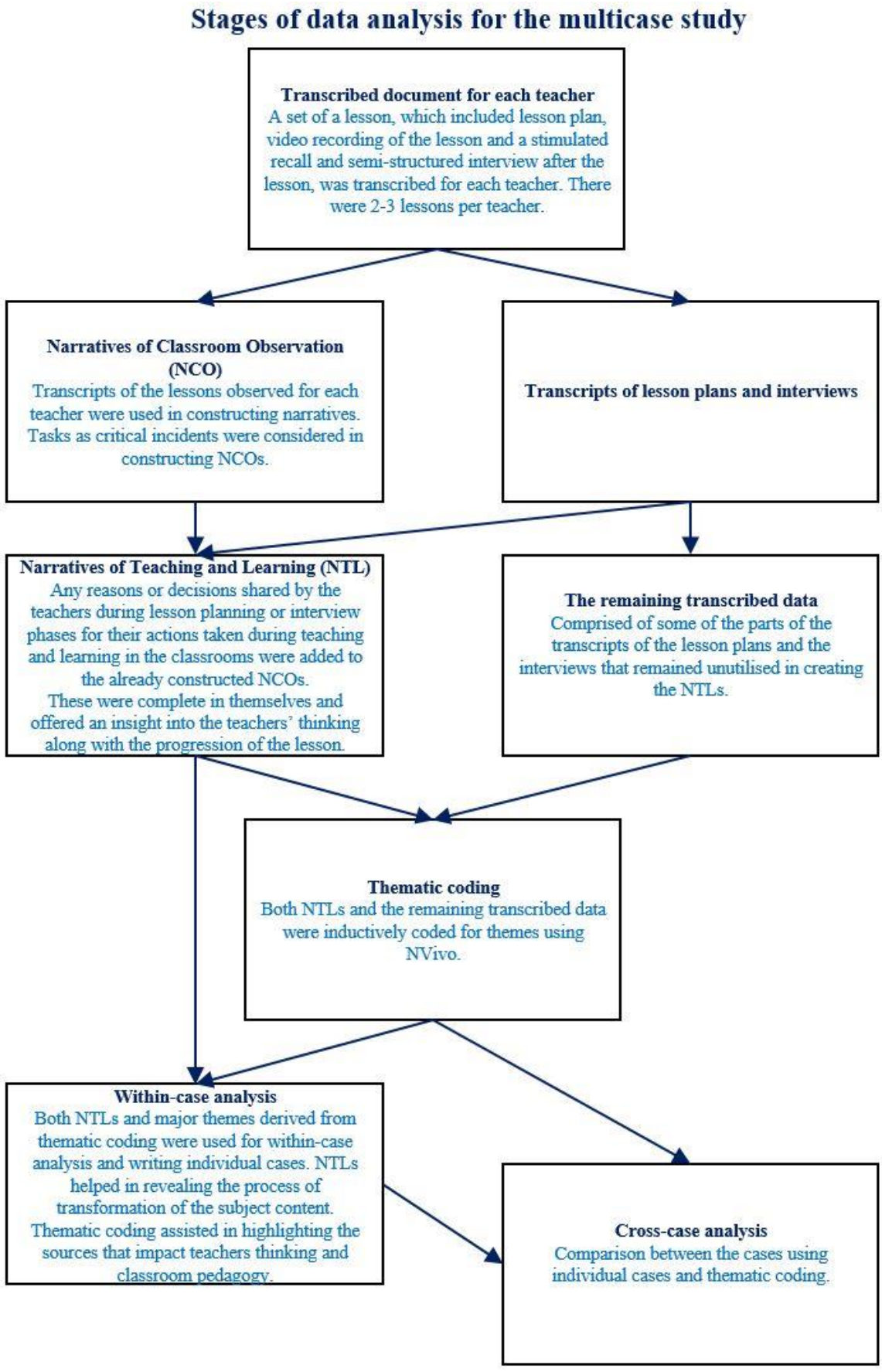

Figure 2. Stages of multicase analysis

The second stage involved writing a Narrative of Classroom Observations (NCOs) for each lesson observed and video recorded. These narratives were constructed using the transcripts of classroom observation for each teacher, for every lesson. In constructing these, tasks were used as critical incidents (Tripp, 1993). A critical incident refers to some situation that marks a turning point in the life of a person or an institution (Tripp, 1993). Using the tasks as critical incidents highlighted the action that took place in the class, in terms of dialogue between the teacher and students, instructions given, explanations provided or questions raised during the lesson around the tasks assigned; and therefore, made explicit the progression of a lesson from a task to task and the process of transformation of particular content for teaching and learning.

The third stage of analysis involved converting the NCOs to Narratives of Teaching and Learning (NTLs). These were created by adding to the already constructed narratives any reasons or decisions shared by the teachers during the lesson planning or interview phase for the actions they took or their interpretations of their students' responses or actions during teaching and learning in classrooms. NTLs were complete in themselves because these demonstrated the action that the teachers took and offered an insight into their thinking along with the progression of the lesson. Writing NTLs was essential in the process of making sense of the data. Narratives have the power to capture the process of something in its fluid state, from its birth to death (Vygotsky, 1978); in the case of a lesson, from its beginning to its end. NTLs helped in understanding the processes involved in teaching and learning in the classrooms to answer all the sub-research questions. It is important to note here that having used the transcripts of the lesson plans and interviews to construct the NTLs, some parts of the transcripts still remained unused yet essential to understanding the phenomenon of teaching and learning. The remaining transcribed data along with the NTLs were then inductively coded for themes, using NVivo. The software was used as a tool for undertaking

analysis in terms of managing, deriving themes from and visualising data. Coding for themes formed the fourth stage of analysis and provided the ground for both within-case and cross-case analysis.

Before any data was imported to NVivo, one of the lessons was hand annotated to get the idea of emerging codes. It also gave me an idea to use a keyword before describing an excerpt. For example, if an excerpt highlighted the teacher's intention for a task, I wrote, Task-intention. The strategy later assisted in merging the themes under keywords. In NVivo, eight cases were created, each case representing a participant teacher. Documents were imported for each teacher separately as a complete set which included transcripts of lesson plans, lesson observations, interviews and NTLs. School descriptions were also imported and related with the corresponding teacher. After this, the sets were coded for themes teacher-by-teacher.

In NVivo themes are referred to as nodes (I will use the word "themes" for consistency). I used the three-thematic structure: minor themes, major themes and broad themes (Creswell, 2012) while coding. First, line by line coding of the NTLs and the remaining transcript was done for each teacher. The meaning was assigned to excerpts of the text that led to a proliferation of minor themes which were then refined. The process of refining involved editing the title of the themes, renaming some of them and merging some themes, as shown in Figure 3. It also included writing down emerging thoughts in order to review those later during the process of analysis.

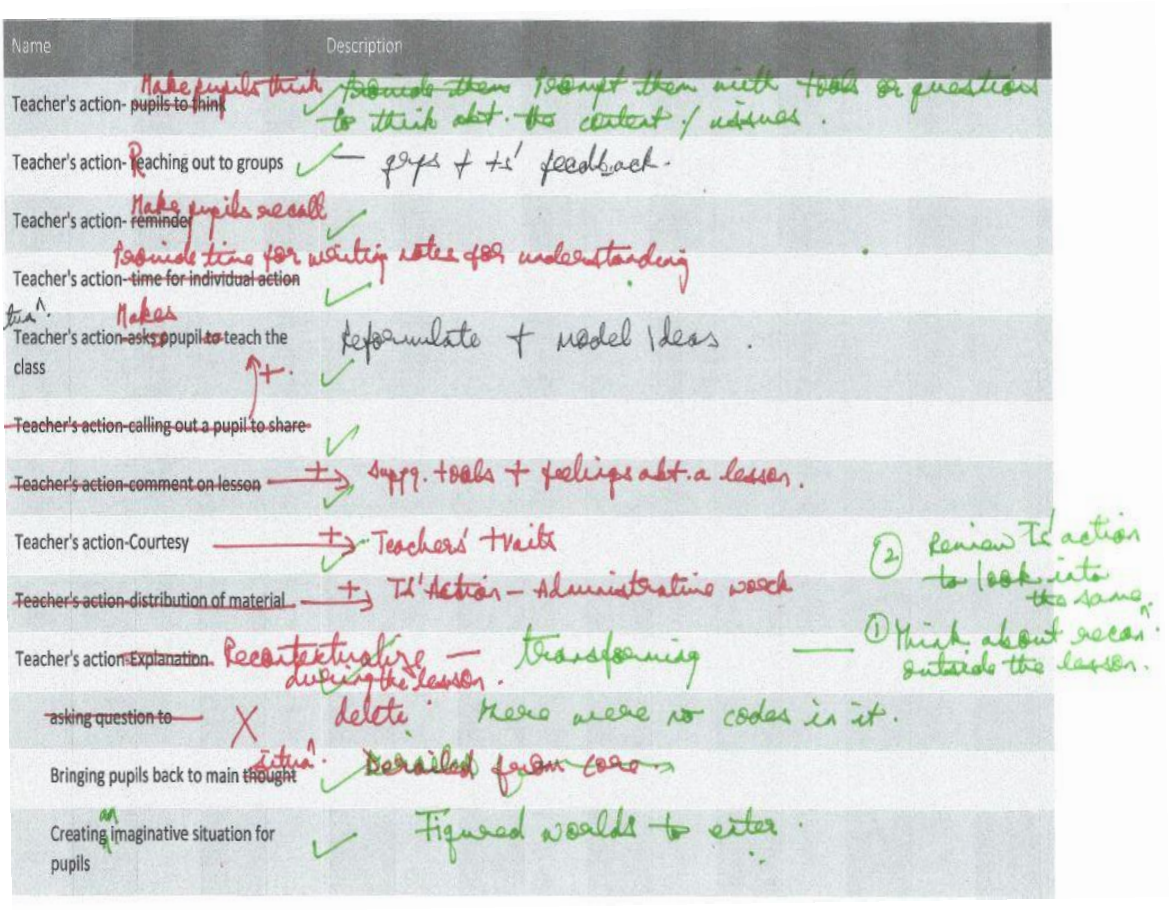

Figure 3. Refinement of minor themes: Editing and renaming

Refining the themes also included documenting the description of the emerging minor themes in the "description" section in NVivo. A few themes were self-explanatory and therefore required no description. The description included the meaning of the theme that was assigned to the extract or the line/s that were coded under it. It included setting up a boundary and documenting any emerging thoughts while coding in relation to the themes, as shown in Figure 4. Some themes were similar yet different, and, therefore, describing a boundary was helpful in deconstructing the data and managing it.

Name	Description
Planned but not could not implement	Teachers planned to do certain tasks or utilise a strategy or bring something to the students' notice but did not use that.
Prior knowledge of concepts or things	Refers to students' prior knowledge of content or skills as pre-requisites for present learning.
Students action	Refers to different actions that students take during the lesson in relation to their learning with their teacher or their peers or the task.
Forgetfulness of students	
Helping others	
Individual work	
Open a dialogue	Responses from the students that initiate discussion. This might be either at the start of the lesson or at the beginning of a new yet related task.
Pair or group work	
Students comments	Refers to the comments that the students make in response to the discussion or tasks they are doing in the classroom.
Students creativity	
Students interpretations-discussions	Students' interpretations of the situation or question asked. Two or more students expressing their views. Or building upon the interpretations of the others.

Figure 4. Refinement of minor themes: Description of a boundary

Note: Circle in blue show minor themes; green circle shows the minor themes clustered into a major theme

The process of refining assisted in clustering several minor themes into categories that formed a major theme, as shown in the figure above. The major themes that were generated started to work as broad ideas or concepts, either in themselves as major themes or in combination with other themes by drawing association between them, or by reflecting on a large major theme which further generating broad concepts. For example, the theme of *Teacher's action* was one large theme. From there two broad concepts – *Formative Assessment* and *Recontextualisation* – emerged. Adding to these two concepts were also minor themes that were clustered under the major theme *Students action*. The theme of *Knowledge Base* is an example of a major theme that itself worked as a broad concept, as shown in Figure 5. Minor themes under it were assigned a keyword – knowledge base; these were refined and edited before these emerged as one broad theme.

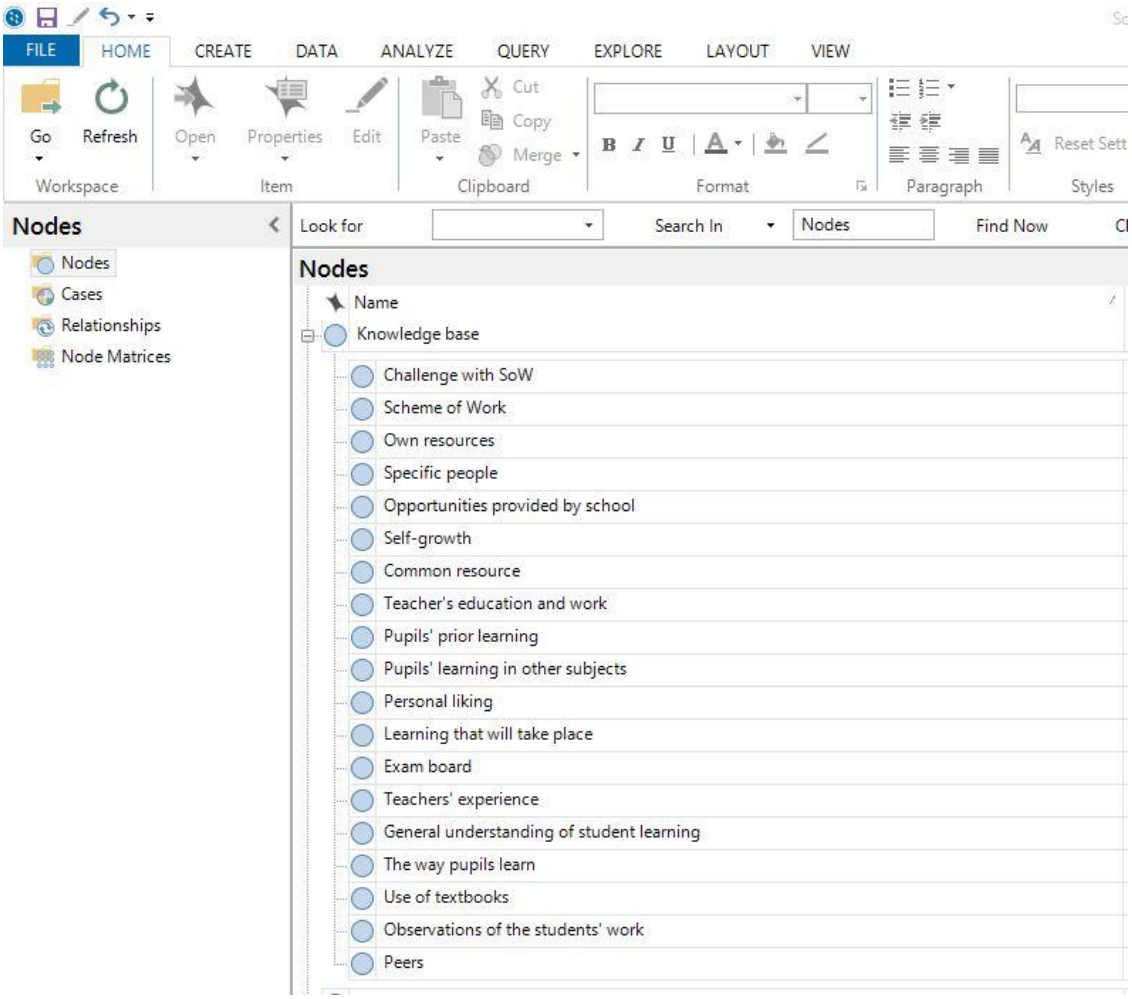

Figure 5. Example of a major theme that worked as a broad concept

Clustering minor themes into major themes assisted in visualising and reflecting upon the broad ideas that were emerging from them or manifested in them. Some of the names of the themes that emerged might have been influenced by my reading of the literature of the field of teaching and learning and related fields. The entire process helped in providing conceptual clarity and identifying patterns (Bazeley & Jackson, 2013, p. 97).

The fifth stage involved utilising the NTLs and the thematic coding for analysing each case and writing individual cases. NTLs helped in revealing the process of transformation of the subject content. The thematic coding assisted in highlighting the sources that impacted teachers thinking and classroom pedagogy. Lastly, the individual

cases and thematic coding assisted in the cross-case analysis. I will discuss the last two stages, within-case and cross-case, in detail in the following sections.

The various stages of analysis mentioned above benefitted me as a researcher in stepping back from working with the data, taking stock of progress with it and reflectively reviewing further possibilities in preparing to move forward again (Bazeley & Jackson, 2013). All the steps of the journey from data collection to analysis, which involved observing lessons and interviewing the teachers, transcribing the recordings, writing narratives and coding the narratives and the remaining data, helped recontextualise the data in terms of seeing it differently. Engaging with the data repeatedly allowed me to see the processes of teaching and learning from different peripheral angles and generate from the data the concepts and association among them.

4.7.1 Within-Case Analysis

This research focuses on teachers' understanding of teaching and learning. In other words, it focuses on teachers' functioning in the classrooms that involves both students' learning from the perspective of a teacher and teachers' own professional growth of knowledge, their learning. I have already discussed, in the previous chapters, my choice of viewing the phenomenon of classroom teaching and learning, and the role of teachers in it from a sociocultural perspective; and have also argued the reasons for combining the social and psychological process from both Vygotskian and Bernsteinian theoretical perspectives. Hence, in light of the discussion, on the matters just mentioned, at the time of thematic coding, attention was given to any contextual evidence. The texts, NTLs and the remaining transcribed data, which were imported to NVivo, manifested the institutional and classroom contexts. These contexts were considered as boundaries of schools, a concept which is drawn from the principles of classification and framing (Bernstein, 1995). Classification refers to

the boundary strength between what is classified. Framing refers to a message system of pedagogy, in other words, how interaction that takes place in a social relation will be regulated; and the degree of control that teachers and students have over selection or sequence of material received. Thus, a framework for the description and an analysis of school contexts were constructed (presented in sections 4.7.2 and 4.7.3); the latter refers to the schools' historical context. In the framework, boundaries of schools as institutions and classroom practices were considered, and also the teacher who works within a school and plays a key role both in the ways in which they interpret their institutional context and their role in the classroom. Thus, the school, the teacher and the classrooms will require description.

4.7.2 The Framework of Description and Analysis

The framework of description (as shown in Table 4) was divided into three parts with further subparts. The three parts were Institutional Context, Teacher and Classroom Practice. Institutional Context will be discussed under the sub-headings: theory of instruction; Scheme of Work (SoW); length of the lesson; class sets; discipline in school; and teaching resources. Classroom Practice will be discussed under three sub-headings: instructional practice that includes selection, sequence, pacing, and criteria (of evaluation) as sub-divisions; instructional context including the division of tasks, division of students; regulative practice involving visible and implicit practices. Apart from the three categories mentioned under this section, another aspect of classroom culture which came to my attention from the classroom observations was the element of trust between the teachers and the students. Trust between them seemed to shape the "everydayness" of their classrooms. This feature was added under this section on Classroom Practice. The section on Teacher will include a "vertical axis" that refers to the teachers' hierarchical position in the school.

Bernstein in his analysis of discourse referred to horizontal and vertical discourses (Bernstein, 1999). The former is common knowledge that is accessed by all but 'segmentally differentiated' (p. 159) implying that contradictions might arise across contexts. The latter is hierarchically organised and has strong distributive rules that regulate access, transmission and evaluation. The data showed instances of vertical discourse that reflected the teachers' hierarchical position, implying its relation to the degree of control that a teacher might have.

Table 4. Framework of description

Institutional Context	
Theory of instruction	Refers to a good teaching policy by means of which the school regulates the teaching and learning discourse. It includes expectations from the teachers in terms of teaching and from the students in terms of their own learning.
Scheme of Work (SoW)	Provides a yearly division of the content to teach. These can be long-term schemes covering the schedule for the entire academic year or a short-term which covers a half term unit of 6-8 weeks. It also suggests the number of lessons assigned to particular content.
Teaching resources	Refers to the resources used for teaching the subject as provided by the school or created by the teacher.
Duration of the lesson	Refers to the time allotted for the lessons in a school.
Class sets	Refers to grouping the students according to their attainment.
Discipline in school	Refers to the school behavioural policy that rules conduct for the students before, during and after school, and the responsibilities of the teachers in relation to it.
Teacher	
Vertical axis	Refers to the power dynamics, the influence on social relations and communication among the teachers in the school or within the department.
Classroom Practice	
Instructional practice	These are discursive rules that include selection, sequence, pacing, and criteria (of evaluation).
Instructional context	Refers to the ways in which tasks are distributed and the students grouped within classes.
Regulative practice	These are hierarchical rules that regulate learning in the classrooms. Implicit rules that the students follow and the instructions that teachers give to their students in relation to the task help in managing the lessons.
Everydayness	Refers to the unique culture of the classroom that forms over time.

The frameworks of description for the four participant teachers, two each of English and mathematics, will be discussed in Chapter 5, where the findings from the four case will be presented. The frameworks of description for the remaining four teachers will be provided in the Appendices and which will be useful in reading Chapter 6 that will provide cross-case analysis. Using the framework enabled an understanding of each case more holistically rather than in isolation, and made explicit the fact that individuals shape and are shaped by the social institutions in which they work. NTLs were also taken advantage of and served the same purpose; however, these functioned differently in making explicable the whole lesson inclusive of the three stages – planning, teaching and reflection – which will be discussed in detail in explaining the individual cases and cross-cases.

The main frame of description and its sub-parts emerged from the thematic coding that deconstructed the NTLs and part of the remaining transcribed data in the form of themes. Doing so revealed the parts or the concepts that shape the phenomenon of teaching and learning. When seen separately the NTLs were complete in themselves in the sense that these revealed both the fluid aspect of the action that took place in the class and the teachers' role in mediating learning. NTLs captured the stream of consciousness of teachers' action in the class: they provided an insight into the present action and future intentions of the participant teachers and made explicit the reasons behind their in-the-moment decision making. In a nutshell, the NTLs captured a part of their continued experience. Therefore, analysis of each individual case was constructed from the themes that emerged and from the NTLs. Both taken together helped reach the 'fuller meaning' of the quintain in order to 'carefully review the details of the cases' (Stake, 2006, p. 40).

4.7.3 School Descriptions

The schools

The schools in which the participant teachers worked formed the historical context of their teaching and learning within classrooms. The framework of description, school descriptions and the individual teachers' cases when placed together provided a holistic, rather than isolated, view and understanding of the ways in which teaching and learning takes place in the classrooms, and also an understanding of the relationship between the sociocultural contexts in shaping the individual and classroom subject pedagogy and the *vice versa*.

I will present three schools in which the four teachers, whose detailed lessons I will present in Chapter 5, worked. These schools cover the context of five out of eight teachers except for Linda[2] who taught in Lakewood School (refer to Appendix I) and Steve and Lauren, both of whom worked in Valley View School (refer to Appendix K). For the purpose of this study, the schools will be referred with pseudonyms (refer to Table 3 for detailed information about schools, teachers and lessons):

1. Spring Hill School
2. Forest Lake School
3. Whitewater School

The school visits took place from May 2016 to January 2017. Depending on the number of observations per teacher, whether these observations were conducted on the same day as a double lesson or separate lessons or conducted on separate days and based on the number of interview sessions, the visits ranged from 2-3 times with each teacher. These visits were solely for the purpose of collecting data from teachers in the form of classroom

[2] Pseudonyms are used instead of the names of teacher participants. The choice of names was made according to common names during the participant teachers' approximate year of birth.

observations and interviews. The following school descriptions provide the necessary context for reading the individual lessons presented in Chapter 5.

Spring Hill School

Lisa worked in Spring Hill School which was a secondary comprehensive mixed academy for students aged 11 to 19. The school was an inner-city school located in an area with high levels of social and economic deprivation. It was designated as a failing school and was reopened as an academy in 2008. Following the Ofsted inspection of 2013, the school was subject to special measures. At the time, it was graded 4 for overall effectiveness and teaching quality and that meant that the school was overall judged to be inadequate and required significant improvement.

The report stated that too many students did not make enough progress. The proportion of students achieving five or more GCSE passes at grades A* to C (grades 9-4) including English and mathematics was well below average and standards at Key stage 4 were declining. The Ofsted report stated that: the quality of teaching was too variable and inadequate overall; work in lessons was not always matched to students' needs; and it was too easy for some and too hard for others. Leaders and managers had not given teachers enough opportunities to learn from the best teaching that existed in the academy. It was suggested that to improve students' attainment and progress in English and mathematics, the school had to eradicate inadequate teaching and raise the proportion of good or better teaching in all subjects.

The school had started to make several changes to raise standards and promote improvement. First came the appointment of qualified and experienced staff. Almost all staff of the predecessor schools transferred to the academy when it opened. However, number of staff left the academy during its first year, and the academy had difficulties in appointing suitably qualified and experienced staff. During its first year, the principal implemented a

staffing review. Secondly, the leadership team was restructured. A permanent post of Vice Principal was created with responsibility for teaching and learning that led to more robust and comprehensive plans for professional development for teachers. These plans were linked to the teachers' standards and performance management. A new coaching model was drawn up, using the good and outstanding practice that already existed in the school. New Heads of English and Mathematics were appointed, and more teachers were appointed who were experienced lead practitioners and specialists to support staffing in English and mathematics. Middle leaders were given responsibility for improving teaching and learning and were fully supported by the Principal in their decision making. Sixthly, creative ways of ensuring full staffing were worked out with another successful local secondary school to arrange some shared appointments to increase staffing levels in mathematics and English. Lastly, an alliance with a neighbouring outstanding school made some joint appointments possible, improved recruitment and provided induction and support for the new heads of department at times of instability.

The school emerged to be successful in steering through a period of turbulence; by November 2016, it was Graded 2 (Good) for overall effectiveness and teaching quality, and 1 (Outstanding) for effectiveness of leadership and management.

Forest Lake School

Forest Lake School had a long-standing history as it was into its sixth century. The school was an inner-city school located in an affluent neighbourhood area where a large concentration of residents was degree educated and had a higher level of employability. Jeffrey and Tyler who were both English teachers and Alex who was a mathematics teacher taught in the school. The school was an independent school for boys aged 7 to 18. Since 2016, the same year when the observations were made, it had become co-educational in the

Sixth form. Over the years, the school has maintained its image as one of the leading schools nationally as many of its students have won places at elite universities in the United Kingdom.

Since it was a fee-paying school, parents must be earning a certain amount. Hence, homogeneity was in terms of income rather than necessarily a racial background or the level of parent's education. However, the school guarantees 25% of its places as free scholarships for students based on their performance in the exams, which are held in the school for First, Third and Sixth Form (Year 7, 9 and 12).

The school ran its own teacher training scheme, open to those who were employed as teachers for advertised vacancies and who do not already possess a teaching qualification. The aim was to offer trainee teachers the opportunity to develop their teaching craft and reflect on their professional practice through its own Teacher Training Certificate Course.

According to Independent School Inspectorate (ISI) inspections 2017, the students' academic results were exceptional at both GCSE and A-Level examinations. Students' excellent achievement did not only manifest itself in the exam results but also when observing them engage in discussions during the lessons and contributing to knowledge. They showed a desire to clarify anything that they did not understand so that their progress was not impeded. They had strong linguistic skills; excellent ability to recall prior knowledge; mathematical competence, skills and knowledge – all of which were far above the levels expected of their age and helped them to excel across different areas of learning.

The reason behind students' exceptional performance was credited to high quality teaching. Teachers displayed a high level of expertise and passion for their subject. They communicated their subject knowledge effectively to the students. The lessons were full of challenge and were fast-paced. The school leaders and governors also shared the accolade for being successful in creating a school which strives for the highest academic standards.

Moreover, the students themselves shared the responsibility of their success as they showed a positive attitude, initiative and managed heavy workloads extremely well.

Whitewater School

Whitewater School, where Justin taught, was a co-educational secondary school. The school was situated in a market town located in an area with high levels of social and economic deprivation. It was an academy, a sponsor-led school, which opened in 2007 replacing a former comprehensive school. Most of its students were of White British heritage. It contained a very small number of students from minority ethnic group, and almost all students spoke English as their first language. It was graded 2 both for overall effectiveness and quality of teaching.

According to the Ofsted report, 2013, when students join the school their levels of attainment are below the national average. Examination results over the years have shown improvement with students gaining five or more A* to C (grades 9-4) GCSE grades including mathematics and English. Teachers show good subject knowledge and set high expectations. Lessons were well planned with clear lesson objectives setting out expectations. A variety of activities were employed to engage and motivate the students, who respond well to the opportunities to work in pairs or groups and take responsibility for their own learning. However, in some classes that might be a concern as the practice was not consistent across other subjects.

The Mathematics Department had an overhaul of the teaching staff three years before the observations that took place in 2016. New teachers were recruited, and only two from the previous set of teachers were rolled over. The department had been able to overcome disciplinary issues. As the bell rang in between the lessons the teachers were quick to stand outside of their classes and that seemed sufficient for the students to check their behaviour, walk in the corridors without making noise, follow uniform etiquettes such as not folding

the sleeves of blazers, make a queue outside the class and wait for their teacher to welcome them.

The school served a community that coped with high levels of deprivation. Although the neighbouring villages benefitted from tourism, the White Water town did not benefit from it. Its economic roots lie in industry, with the town serving as a base for the coal industry. In recent times, it became a peripheral low-cost retail centre. Houses were built to accommodate the people who relocated due to work opportunities. As a response to the growth of population, the school that preceded White Water School was built. The school built earned a reputation of a failing school, a reputation that haunted the White Water School that replaced it. The new school continues to serve the community of at-risk families.

According to the principal of the school, 33% of parents of the students have no education beyond Level 2 (primary schooling) themselves. Though the town shows high employability, it is mainly low skill and low pay. The school aims to achieve excellent teaching by means of which the school intends to encourage the ambition and determination of students to aim high and achieve high. With this intention, it started involving the community through literary festivals and providing opportunities for parents to learn and start their education again.

Nomenclature of different stages in schools in England

In this study, I have referred to the different year groups that the participant teachers were observed teaching and also the types of schools in which they taught. Therefore, it is worth mentioning the structure of secondary schooling in England in different types of schools for reference. Comprehensive schools/ academy and the independent school within which these teachers worked used different terminology for their year groups, as shown in Table 5.

Table 5. Nomenclature of secondary schools in England

Age	Year	Comprehensive School/ Academy	Independent School
12	Year 7	Key Stage 3	Second Form
13	Year 8		Third Form
14	Year 9		Lower Fourth
15	Year 10	Key Stage 4	Upper Fourth
16	Year 11		Fifth Form
17	Year 12	A Level	Lower Sixth Form
18	Year 13		Upper Sixth Form

4.7.4 Selection of Lessons

In selecting the lessons to present in the thesis, I had to make some tough decisions. All the lessons observed were valuable in understanding the processes involved in a teaching and learning situation; however, due to the constraints of the structure of the thesis, I had to be selective. My aim here was to present the unique aspect of each case, present each case to the reader and stay focused on the objective of the study, which is, How do 'expert' teachers transform the subject content in order to support student learning in classrooms?

In the following Chapter 5, I will present lessons of individual teachers, two each of English and mathematics, describing the context of their lesson followed by analyses of the lesson. Through each case, I will examine the micro process that the observed teachers used in the transformation of content for student learning in relation to the above discussion. Since each case was considered to have a 'unique vitality' (Stake, 2006, p. 39), each case will be examined in detail. The evidence highlights the idiosyncrasy of each case. I will first present the lessons of two English teachers followed by the lessons of two mathematics teachers. Later in Chapter 6, I will present a comparative analysis of the classroom teaching and learning experiences from eight teachers and present the themes that emerged.

4.7.5 Cross-Case Thematic Analysis

The cross-case thematic analysis provided a ‘binding concept’ (Stake, 2006, p. 39) involving themes that bound the cases together and helped make conclusions about the ‘quintain’ (Stake, 2006). On the one hand, the writing of each case helped in framing the uniqueness of the case (Stake, 2006), and on the other hand, it helped in making assertions about the ‘uniformity or disparity’ (Stake, 2006, p. 40) in the functioning of participant teachers across the cases.

Thematic coding using NVivo provided the basis for cross-case analysis. The imported data which included NTLs and the rest of the remaining transcript (see Figure 2) was thematically coded. The three-thematic layering by means of which many minor themes were organised into 26 major themes which were further organised into five broad themes – Task design; Practices of formative assessment; Recontextualisation; Reflective practices; and Knowledge base – thus helped in moving towards broader level of abstractions (Creswell, 2012).

4.8 Reliability and Validity

Reliability refers to consistency in the process of the study and whether the various parts of the study are congruent and connected. For instance, ‘whether the results are consistent with data collected’ (Merriam & Tisdell, 2015, p. 251). Validity, on the other hand, refers to two things: whether the findings are making sense and are transferable (Miles et al., 2014). Transferability further means the extent to which the findings can be replicated. Hence, the keywords when referring to reliability and validity are ‘dependability’ and ‘consistency’ (Lincoln and Guba, 1985). The concern should not be for outsiders to get the same results

but should be that the results make sense, that is, given the data collected, the results are consistent and dependable.

I have attempted to achieve dependability and consistency through triangulation of methods (Creswell, 2012), wherein I made some observations that were consistent during the verbal report, classroom observation and interview. I documented the tasks assigned, key dialogue around it and important observations during the lessons. It helped in refining the questions to ask the teachers during the interview and to create a narrative of what was happening at the moment to help the teachers recall; and in writing within-cases in a narrative form and the descriptions of findings with 'evidence in the form of quotes, notes or documents' (Merriam & Tisdell, 2015, p. 257). Another way by means of which triangulation was achieved was giving presentations (Stake, 2006). Throughout the journey of this research, I presented my work in seminars, national and international conferences and that enabled to present this research in various stages as it progressed: while deciding on methodology, presenting a theoretical framework, presenting initial findings from two teachers, presenting findings at an advanced stage or seeking expert advice. It assisted me in learning from knowledgeable others in the sense whether the findings were making sense to them or whether there was anything that was lacking in my way of analysis of the data. Thus I was involved in this form of validation throughout my DPhil journey. I struggled and found ways to bring to the fore the contextual elements that I knew existed in the data; to make sense of the experience, which is a profoundly human way of understanding. However, the narratives that have emerged can be read and interpreted in various ways. Therefore, it stays with the reader to infer my interpretations and make sense of those for their own understanding. Overall, writing within-cases helped in achieving the quality of findings and would help others in achieving transferability.

4.9 Limitations and Constraints

The possible constraints in this design are sampling, validity and reliability. The first concern was securing the participation of twelve teachers, six each of English and mathematics in six different school contexts. There was initial attrition of three teachers, which caused some worry. However, I persevered through that phase. The participants were encouraged during both formal and informal meetings of the value of their involvement and time.

There were times when the teachers were not able to recall their interaction with students in the recorded lesson. These were either substituted with other incidents or with an oral account of the incident. For the latter, the notes taken during lesson observations came to rescue at such times.

4.10 Ethics

The principle of informed consent is a standard feature of ethical procedure in social science research. Informed consent means that the participants understand 'fully and meaningfully what the research is about and how it will be disseminated. Participants should be aware of their right to refuse to participate; understand the extent to which confidentiality will be maintained; and be aware of the potential uses to which the data might be put' (Corti, Day & Backhouse, 2000, para 6). The participants were given the right to choose whether or not to participate in an investigation. They were informed of the facts that would influence their decision of participating. Confidentiality was discussed with the participants at the time of data collection. Permission to conduct the research was granted by the Departmental Research Ethics Committee (DREC). Apart from the identity of the participants and the

students, the identity of the schools in which the study was conducted has been kept confidential.

Gatekeepers were informed accordingly. In this study, access was negotiated with the gatekeepers, namely, teacher educators at the Department of Education, University of Oxford, heads of the schools, heads of the department, the participating teachers and the parents of students whose classroom was observed.

Except for two, all parents provided consent for their children to participate in the study. Though the students were not directly observed, they were crucial for understanding the functioning of a teacher. In opt-out cases, one student was moved to another class while the other student sat beyond the focus of the camera. However, the students after the first observation opted in with the consent of their parents. Withdrawal from participation did not have any negative impact on their learning. Both teachers and parents were informed that my role as a researcher was that of a non-participant observer intended to minimise any disturbance, meaning that I would not engage with the students as a teacher or as a supplement.

The data were encrypted and stored on the password-protected drive. The only person aware of the real identities of the participants is me. All participants had their anonymity guaranteed, and all provided information was kept confidential, in compliance with the Data Protection Act 1998 (UK). The names of the participants and the schools were anonymised through the use of pseudonyms. The names of students that emerged during the teacher-student dialogue in a classroom were referred to as “Name”. The data may be referred to only by the researcher or supervisors. Though the main participants were teachers, the students in the classes observed were also video recorded due to the nature of this study. It is imperative that care is taken to prevent disclosing the identity of individual students. Hence, when publishing findings during the process of writing this thesis and even

afterwards care has been taken and will be taken to prevent individual students from being identified. The results have been published at international conferences and seminars at the Department of Education, University of Oxford. I have adhered to DREC's research ethics.

4.11 Chapter Conclusion

This chapter described the research design of a multicase study that was used to conduct the study. It discussed the methodological choices and the constructs used for data collection and analysis; provided the school descriptions of the teachers whose lessons were observed. Please refer to these descriptions when reading the findings, which are presented in the following Chapters 5 and 6. Chapter 5 documents within-case analysis, presenting the analysis of the lessons from four teachers. Chapter 6 provides a cross-case analysis among eight teachers. Please refer to Table 3 for information about lessons.

Chapter 5 Analysis of Lessons: Within-Case Analysis

This chapter presents findings from the analysis of data from four cases, two English and two mathematics teachers. Though each of the eight cases were analysed thoroughly, only four cases are presented in this chapter to demonstrate the quality of teaching and the ways in which the teachers worked towards their students' conceptual progression (Vygotsky, 1997); the way they engage their students in dialogue in assisting them to either shift their thinking or take them towards higher abstraction from which they were at. The four cases presented – Lisa and Jeffrey (English teachers), Justin and Alex (mathematics teachers) – differ in terms of contexts within English and Mathematics teaching, and in the number of years of experience. Lisa and Justin had three years of teaching experience and were teaching in different comprehensive schools, whereas Jeffrey and Alex had 25 years plus of teaching experience and were teaching in the same independent school, though they were teaching different subjects. Data from the other of the four cases – Tyler, Linda, Lauren and Steve – along with these cases are presented in Chapter 6 on thematic analysis across cases.

Cases in this chapter are organised in the form of the context of the lesson/s followed by an analysis of the lesson/s to provide an insight into the teaching and learning processes. The frameworks of description, as described in section 4.7.2, for the four cases presented in this chapter are provided as a demonstration of evidence of the contexts within which the teaching and learning took place. The frameworks for the other four teachers are provided in the Appendices L to O.

5.1 Cases of English Teachers

In this section, I am presenting lessons from two English teachers, Lisa from Spring Hill School and Jeffrey from Forest Lake School (refer to Table 3 for lesson details; Section 4.7.3 for the historical contexts of the schools; and Table 6 and Table 7, which are presented within their cases, for their frameworks of description).

5.1.1 Case of Lisa

> "Teaching and learning is an interaction between the student and the teacher and student to student – like a transaction – where we all share knowledge and try and make connections with the knowledge we already have. I believe that this is only possible when we are all engaging with one another and being open-minded." (Lisa, during the interview)

At the time of data collection, Lisa was studying to achieve a Master in Education. She was working as an English teacher and a mathematics intervention teacher for Year 11 and the Lead Teacher for the high achieving students in Spring Hill School.

She did her PGCE from one of the Russell Group universities.

Lisa's belief that teaching and learning is an interaction or "transaction" as highlighted in the above quote held true in each of her three separate lessons on comprehension skills, grammar and writing. Here, I will present her first lesson on comprehension skills based on the theme of "Colonialism" in detail because of the complexity that it involved, in terms of high resistance on the part of Lisa to what was provided to her to teach and what she did as a consequence. She was teaching this lesson to Year 9, top set. I will start with the context within which she worked and how that impacted her actions in the class. The school description will serve the purpose of understanding the background against which Lisa took some decisions about the teaching and learning of the specific content in the classroom.

5.1.1.1 The Context of the Lesson

A good *teaching practice policy* of the school was displayed on the wall of Lisa's classroom.

It stated that the teachers were encouraged to ask the following questions – What do you want them to learn? How are you going to show them? Which activities will you do to make it happen? How will they show that they have learnt it?

However, it emerged during the interviews with Lisa that the teachers had to follow the lesson plans prepared by the Head of the English Department which, understanding the school's context (see section 4.7.3), might have been one of the regulative strategies to improve teaching quality. The teachers had no voice in it, and that contradicted with the very first question in the good teaching policy. It was also reflective of the existence of a *strict hierarchy* within the department.

The whole Key Stage 3 *Scheme of Work* (SoW) was "built in-line with the English language paper" (Lisa, during the interview). It specified the lessons to be conducted in one fortnightly cycle, "two non-fiction lessons, two grammar lessons, two vocabulary lessons, one language, one structure and then one test" and "one feedback lesson" (during the interview). Teachers had "little freedom" (during lesson planning) in what to do in the lessons and how to conduct them. The duration of the lesson was *one hour*, and it was based on a non-fiction text. The topic, Colonialism, and the tasks were provided to Lisa by her Key Stage 3 (KS3) Head of the Department (HoD). The class observed was a *top set*, based on the exam results from the previous year.

The students sat in a two-layered-horseshoe arrangement, which provided enough space for both Lisa and them to move around freely in the classroom. For the lesson, Lisa divided the students into two groups to bring dialogue between the oppressed and the oppressors.

In the lesson, Lisa gave specific instructions and asked a number of questions to allow the students to reflect. Expression of opinions was encouraged. Lisa was very clear that learning happens socially and not in isolation, something that revealed itself in all the

three lessons. If any student made a mistake, it was welcomed and addressed as a class, and not as an individual. The students trusted their teacher and each other.

There were no discipline issues in the class. She could freely move out of the class for a few minutes and be confident that the students continued with the work assigned. She believed that "learning must happen whether she is there or not" (during the interview).

There were several sources that helped Lisa reflect on her thinking. The *SoW* was one of the main sources. It informed her of the content, the concepts, the skills to teach at various or same levels, and was strictly structured with tasks and questions defined.

Another source for her were the *people* she met and interacted with during her years of education and teaching, "Loads of people have influenced me, loads. I mean the people who taught me PGCE (Postgraduate Certificate in Education). To say that I am where I am purely based of my own mind, no" (during the interview).

Her experience as a PGCE student overlapped with her learning through her interaction with other people. She recalled an incident during her PGCE, "I had a student who read three or four books at the same time, very intelligent boy, Year 8, couldn't write" (during the interview). It taught her that "just because you can speak well in discussion, it doesn't mean your written work is matched up" (during the interview). She further added that she would "be doing those children a disservice to suggest that just because they can talk, that means they know it" (during the interview).

For the first lesson on comprehension, she drew vastly from one of the text that she read during her undergraduate studies that her professor had used to address colonialism in the novel *Untouchable* by Mulk Raj Anand. The constant dialogue between her past and present experiences influenced her thinking while planning the lessons and also her action in class.

For the lesson, Lisa employed evaluation as a conceptual framework, "to say that a text should not be received by the words on the page but by your consideration of it holistically. So, let's understand that writers sometimes only focus on specific elements and not others" (during the interview).

In the lesson Lisa intended to introduce the concept of colonialism through the students themselves through the use of drama:

> "What I intend to do is have a group of them inside and a group of them outside. I'm going to ask those who are outside to stylishly take things from those that are in the class. That might be through questioning, that might be through going up to the table and just taking it, that might be through getting another student to take it. They are going to decide their means of doing so, but my hope is that 10 or 15 minutes into the lesson, the students that don't have things are beginning to question what is going on. That, I think, would be a great way to discuss exploitation and the emotions that the people that were having things taken away from them were feeling but also the emotions that those who were given the power to take things and what they were feeling as well." (Lisa, during lesson planning)

Lisa had imagined what possibly might happen in the classroom as a result of the way she was going to introduce the task to her students.

Also, her resistance to the task that she received for the lesson from her KS3 HoD was highly visible. The topic 'Colonialism' was being introduced for the first time to Year 9 from an economic point of view, but "What about the social and psychological aspects involved in colonialism?" (during planning) she questioned. Lisa had hinted how her identity and that of her HoDs were shaped by colonialism, in the sense that two different people coming from different cultural backgrounds viewed colonialism differently. The HoD was English while Lisa had African roots. Lisa's idea of adding drama was intended to bring in the emotional side of colonialism, while her "boss" (during lesson planning) had framed the questions through which he desired only to focus on the economic side. She added a question on moral stance at the end, "pushing the students to actually evaluate the text as a whole" (during planning). Thus, she created a figured world (Holland et al., 1988), a social experiment in the form of a role play, in which she intended to enter with the students.

Table 6. The framework of description for Lisa

Institutional Context	
Theory of instruction	The school provided teachers with frameworks in which to teach and it expected that its teachers would follow that. Teaching was highly regulated.
Scheme of Work (SoW)	Was provided with a SoW for a fortnight, and it included a total of six lessons: grammar (1), non-fiction (2), vocabulary (1), structure (1) and feedback (1). The tasks for all the lessons, except the one on structure, were given by the KS3 HoD.
Teaching resources	For the lesson on colonialism, she used the task sheet provided, her knowledge from her graduate studies on the topic and lab coats.
Duration of the lesson	One hour lesson.
Class sets	Top set, based on exam results from the previous year.
Discipline in school	There did not seem any explicit discipline issues in the school at the time of observation; there were no discipline issues during the lessons.
Teacher	
Vertical axis	There was a strict hierarchy, which was evident from the discussion that lesson plans were made by the HoD and followed by the teachers. Though Lisa liked him and saw positive in the SoW assigned to them, she felt stifled as she was allowed no voice in the lesson plans and was not even consulted. Across the department, the teachers amongst themselves had started to share material, derive from each other's teaching and discuss their lessons but were not supported for this by their HoD.
Classroom Practice	
Instructional practice	Whole class learning was mediated by the tasks designed by the Head of the Department. It was only in the third lesson that Lisa had a choice. Though the degree of control on overall selection, sequence and pacing of the lesson lay in the hands of the HoD, Lisa approached the tasks and implemented the lesson to suit her motives for the lesson. For this particular lesson, Lisa used questioning and students' responses as a means of evaluation.
Instructional context	There were two layers of horseshoe seating arrangement, which provided enough space for Lisa to move around, observe and interact with each student with ease. It allowed free movement for the students as well.
Regulative practice	Lisa had an established rule that learning happens socially and not alone. The teacher used her rationale to allocate specific time for the students to write their responses. The students followed the instructions given. They are aware that they could ask questions, express their opinion freely, make mistakes, will not be embarrassed before their peers, and that all of them as a whole contribute to each other's learning. They raised their hands to answer or waited for their turn or interpreted the gestures of their teacher well.
Everydayness	The students showed a bit of hesitation at the start of the lesson, however gained momentum with Lisa's assistance; they trusted and respected each other, and their teacher, which showed in their efforts to learn together during the lessons.

5.1.1.2 Analysis of the Lesson

In this section, I discuss the micro processes of teaching and learning involved in the lesson.

Lisa's lesson one: British colonial rule

The students had started with the ten minutes of silent reading of the fictional text prescribed for the term in accordance with a ten-minute routine. Meanwhile, Lisa had distributed and placed the non-fiction text based on colonialism (see Appendix B) for the lesson on their tables. There was a pile of white lab coats placed at Lisa's table. Without much ado, she called out the names of five students and called those "rebellious human beings" to take off their black school blazers and wait for her outside the class. She then gave *specific instructions* to the rest of the students who stayed in the class addressed as "*others*": to keep wearing their black blazers; to say "yes" to anything those five students ask for; and that they were "still involved" even though she was leaving the class to join the students outside for a few minutes. Before leaving she instructed one of the girls to read the fictional text to the class. The students outside were instructed to "stylishly take things" from those that were in the class, "That might be through questioning, that might be through going up to the table and just taking it, that might be through getting another student to take it. They are going to decide their means of doing so" (during the interview). Lisa returned and joined the students in their reading. The students outside, referred to as Lab Coats from now on, returned after her, wearing white lab coats. Lisa had set the scene, metaphorically. She had gotten the others to wonder about what was going on and had filled those outside with excitement about the commotion they would create in the class through their actions.

Lisa waited for the students to finish reading and put their texts aside. Starting with the teaching of the non-fictional text on colonialism, she questioned if anyone had heard of colonialism (an abstract concept), and simultaneously distributed the non-fiction text, a task sheet, to the students. Only one boy said that he had heard of "colony" but not colonialism,

while others kept quiet. This boy was the only Black British student in the class; all others were White British students.

Lisa read the first sentence of the first paragraph from the text – When one country colonises another, it means officials from one country governs over the people in another– and paused (refer to Appendix B for a task sheet). She looked at the students and asked why was she looking at them? The students understood that as a sign to respond and one of them said that she had just read the meaning, which another girl referred to as "definition", a technical word that Lisa was seeking. Though the students had verbalised the definitions of a colony and what it meant to colonise, they had yet to grasp its meaning (starting to move upwards towards the scientific concepts). She then read the first two paragraphs and asked them to do first two questions in the text while she went out for a meeting with the *Lab Coats*. As soon as they left, the *others* were amused with what was happening, and found it to be "stupid". The first two questions were on the meaning of colonialism and why it was controversial? She had wanted them to establish their understanding of it because "they would have experienced it, not experienced actually, but heard about it or known about it in a movie or something" (during the interview). They would have to make some kind of connection in their own minds about what it was and what it meant, thus bringing in their spontaneous knowledge (Vygotsky, 1987, 1997).

The *Lab Coats* and Lisa returned after a minute. She questioned their understanding of the word "controversial". The students started to provide their everyday knowledge (Vygotsky, 1987) of the word: "Some people disagree about if it should happen or not." Lisa paused and started to look around to a parallel scene going on in the class: the *Lab Coats* were in action.

After their first meeting the *Lab Coats* were seen sitting at their seats and doing as others were in the class. However, after the second meeting they had become active. They

started to ask for things such as task sheets, ties, bags or books by either sitting at their tables or by moving around. The thing that started as fun for the *others*, soon started to turn into their discomfort, "I want my tie back" or "Why do you want my tie" or not being able to use the things, such as pen, dictionaries, books, task sheets, that belonged to them as *Lab Coats* had taken those away. The *Lab Coats* had become unstoppable. They were all over the class demanding things from *others*. (The students' were involved in the parallel task, a role play).

After a while Lisa called the *Lab Coats* thrice, signalling them to settle. She resumed their discussion on the meaning of controversy. She paused to check who did not have the sheet to write on, or their books or task sheets, and provided to those who required. She then continued to listen to the responses: "What someone says is true and untrue." "Certain people have many different opinions about." Not happy with these definitions, which represented students' spontaneous understanding, Lisa asked them to check the dictionary. She wanted them to understand "that something that was controversial wasn't just agreeing or disagreeing. It was about emotion. And if two people are talking about something that's controversial, they're not just sitting, talking about it in a scientific kind of disassociated manner. There's passion; there's ideas; there's emotions" (Lisa, during the interview).

Through questioning she led the students to understand that controversy meant "fierce, arguing, debate" that meant "angry" and which further inspired "emotions." They were able to understand that a controversial topic inspires personal opinions and build a scientific understanding of the word. She explained that "a controversial topic inspires an emotional reaction or response from those who agree or disagree with you" and brought the focus to the question, "What makes colonialism then controversial? What causes emotions to run wild when thinking about one country governing another?" She asked them to answer question 2 and gave them one minute (the students' spontaneous understanding moving

upwards towards abstraction; the teacher's learning of the students' spontaneous knowledge and addressing that).

The questions she asked were parallel to the experience the students were encountering through the ongoing drama and their reading of the passage. The *others* had started to emotionally react to the demands that *Lab Coats* placed on them. They had started to get angry. Their things had been taken from them, and they had to ask for help from Lisa, asking for things that were taken away. Though Lisa kept providing the things to the students, she scolded them for getting angry. "Why are we getting angry?" she said. She reminded them that she had instructed them at the start of the lesson and so they must "adhere to it."

Lisa read the third paragraph, and through questioning led them to understand that "the British officials were more powerful than the Indian people" and that they were "exploiting" their "division." She explained to them a brief history of the Indian class system and the disparity between classes. The lower class were mistreated, while the higher class relished in riches which they did not share with the poor. The students were able to relate that to the opposite of a socialist state, where things were shared among all its citizens. She read the next paragraph which portrayed the "British rule as a charitable exercise" and how they brought good to India.

Using the first sentence of the fourth paragraph, "The British view tended to portray the British rule as a charitable exercise", Lisa through her questioning led the students to reflect on the situation and take a stand. The following dialogue took place:

Lisa:	How do we feel about this writer claiming that what the British brought was good government?
Student:	I think it's wrong because although you're making the government, you are actually taking away their freedom to do what they want to do. So even if they had the equipment and everything, they still aren't going to be able to do what they want to do.
Lisa:	Yes, but what does it suggest about the Indian government at the time?

Student:	…they weren't that strong. Because if they would just let another country take them over, without any war or anything like that, they were not strong.
Lisa:	Interesting, so it means that they're not strong because they allowed them to take it over.
Student:	It seems as though they weren't working properly or doing their job.
Lisa:	Possibly, so are we saying then that the government that has been instated is actually wrong?...Or it is better that the British are there? So that they can have a better government. What were you saying? Where are we going with that? Indians aren't doing their job, so then the British should come in, and take over? Is that what we're saying?
Student:	They're taking over, but they're not taking over in the right way, as not to split up their society.
Lisa:	But their society was already divided.
Student:	I don't know.
Student:	They're not really improving their society; they're just keeping it the same.

The students had started to get entangled in their thoughts (contradiction or struggle in their thoughts). They were struggling to frame their thinking. Using the last point made by a student, Lisa started to continue with the reading of the fourth paragraph that gave detail of the British investments in India.

She questioned: How did their reading of the last sentence of the fourth paragraph – "Public health and life expectancy increased under British rule, mainly due to improved water supplies, and the introduction of quinine treatment against malaria" – challenge where they ended in terms of "they weren't making their society better?"

Lisa kept questioning them,

Student:	I think the British…were doing something good…But their end game is not for the people; it's what they want.
Lisa:	So, what's it for?...Why would you go to another country?
Student:	Maybe it's for the resources.
Student:	For the money.
Student:	May be to like feel powerful.
Student:	To get more land so you can work.
Student:	They will make their land bigger by taking over theirs so they can have more people.

She simply repeated their answers and read the second last paragraph about the benefits that India brought to the British, and questioned, "Did India lose or gain?"

The class stood divided. One said fifty-fifty, three hands for “lose” and the rest twenty-four went for “gain”. The ones for “gain” reasoned that the British provided medicines, railway and increased the life expectancy of the people. But then “even though they have increased the life expectancy, they put most of them in the army. So even though their life expectancy is increasing, they still get killed in the army,” said one boy, who was an advocate for “lose”.

Lisa questioned, “Was the end game then army? What does it symbolise? Were the soldiers treated as every other soldier?” “The whole point”, she explained during the interview “was my trying to get them to say everything that they were thinking based on the article, exactly. Like transport, etcetera.”

The discussion continued until someone said, “I think they should be treated well.” “They should, but the question was, do they?” Lisa questioned emphatically. She had tied them in a knot through her endless questioning. The question served as a turning point in their thinking. The understanding of the class had reached a level that paved the way for the scientific concept of colonialism to set in. With further prompting, students were able to come up with the words like “prejudice” against people as a “race”, and that is when Lisa gave them ten minutes to write questions 3 to 7, which were based on the discussion they had so far.

Lisa was circulating in the class. She noticed one boy writing with a pencil, and she questioned him,

Lisa:	Why are you writing in pencil?
Student:	Because Name[3] took my pen.
Lisa:	That’s not a viable answer. You need it.
Student:	[Angrily] What should I write this with?
Lisa:	[Angrily and loud] My blood? What do you think?

[3] In a classroom dialogue situation, the names of students are stated as “Name.”

The class burst into laughter, and Lisa offered him a pen to write with later. The importance of the scene will be explained in the next part. The class continued with writing the answers; and *Lab Coats*, even while at their seats, collected the things.

There were several ways in which the drama and the parallel reading unfolded and made sense. Last ten minutes remained, and Lisa called for the students' attention. First, Lisa read the closing paragraph, "It's difficult to tell for sure, but this perhaps does not answer a more fundamental moral question. Is it ever right for one country to rule over another?" Before the students could think of responding to the question she asked them to *flick their ties.* By asking for this particular action, Lisa had made explicit for the students what they had experienced, both through their involvement in the action that was taking place and their reading of the text; and subtly hinted at the loss of their identity. All the five *Lab Coats* flicked their ties, and only two from the *others*; the rest, upset, stared at what was happening. They were very serious, none laughed.

Second, she urged them to consider what had happened. A student explained, "You got some of the people in their lab coats to rule over us, and we couldn't say no because we have to do what they say." Another added, "They were kind of like the British to us, and we were Indians. So they were, we just have to go by what you're saying because they were governing over us."

Third, the *others* realised that they were the ones who followed the first instruction that whatever the *Lab Coats* asked they had to agree and provide that to them. Lisa questioned them further, "But who first gave you the instruction?" The students realised the role that Lisa had played. She was the one who gave the instruction, and that was how the *others* were deceived as, at all times, she looked like them and stood in front as a leader, who was in charge of them. Lisa explained in terms of questioning them, "When they took your book away, did they give you the paper? Did they care about what you were left with?"

She explained, “The officials of that country are expected to compensate for everything that those people have lost.” The boy, who angrily shouted at her, added, “as a result, you [Lisa] ran out of resources.”

Fourth, they realised what the British did with their power. They were “somewhat equals, but they apparently deserve more, they can just take what I have,” expressed one. “They kind of took advantage of us,” said another, and to that added another, “of our feelings.”

Fifth, though the *Lab Coats* were observed to be enjoying their role, one of the *Lab Coats* had completely taken to the role. He had a huge pile of things before him on the table. He explained that he liked “to annoy people.” The tower before him represented the power he had over people, so much so that he even managed to take away the glasses from one of the others, which raised a safety concern for Lisa.

On being asked what they gained, the *others* responded that they got their things back. Lisa retorted that she still taught them. “But we would’ve been taught anyway,” came back the reply, thus implicitly stating that teaching was insignificant and that they would have learnt anyway. Lisa was quick to respond that medicines, railway and other things established in the country were insignificant “Because, over time, people progress anyway; over time, people gain anyway. You don’t have to go and enforce your own views and your own power on other people to attempt to push them to gain.” She reminded them that she had instructed them to say ‘yes’ and that she said nothing about ‘no.’ She asked them to think about “What does it say about the power of the few?”

The students expressed that “the power of the few” had a psychological effect on the people. Finally, she asked the apposite question, “Who feels like they’re always going to remember the *Lab Coats*?” All hands were raised. The students’ understanding of the abstract concept of colonialism from both psychological and economic points of view was

visible from the choice they made at the start of the lesson in comparison to their response to the last question just mentioned. Before starting to engage them in a dialogue around the text provided to them, Lisa has asked the students, “How many would want their country to be governed by another country?” All the students raised their hands. The students were comfortable with the idea, which “shocked” Lisa (during the interview). Though at both the times the students raised their hands, the action made explicit the shift in their thinking and their reapplying of the concept in the light of new information and experience.

Hence, learning in the lesson was vertical for the students: from not knowing about colonialism to viewing it and arguing about it from the economic point of view and simultaneously experiencing it; struggling between their understanding from the experience of reading of the text and their experience of reading from what was happening around them; struggling with the what they were saying and their experience of disappointment and lack of control; from taking things at face value to understanding that the written word is not fixed and, therefore, knowing to evaluate the text. Horizontally, all Lisa had wanted them to bring to the lesson was to “keep their moral compass intact” (during the interview).

5.1.2 Case of Jeffrey

> "Actually what we're doing here if you're studying English, you're studying decades years' worth of philosophy…These discursive thoughtful subjects give them the chance to learn how to think and how to grow up, so that's what I see English as being partly responsible for within a teaching scheme in a school. If there's an ethos for me, it is also about English." Jeffrey (during the interview phase).

Jeffrey was an English teacher in Forest Lake School (see Section 4.7.3) and was teaching Form Five, Year Eleven. There were twenty-four students, all boys, in his class. The two lessons that were observed dealt with the portrayal of the Victorian society – their values, obsessions, the position of women and prevalent prejudices – and involved a dialogue around these themes through the unlocking of technical language in the texts that the students were reading. In the first lesson, the class did a close reading and analysis of Chapter Eight of *Great Expectations* by Charles Dickens (1861), and in the second lesson, they read the poem 'Oh Who Is That Young Sinner' by A. E. Housman (1937). I present his second lesson.

Jeffrey started teaching in 1991, at a school in a county in England. After that, he did graduate work in a distinguished University and was a tutor there for 15 years. At Forest Lake School, he had been working as an English teacher for six years, with first two years as a part-time teacher.

5.1.2.1 The Context of the Lesson

Jeffrey's choice of the poem in the lesson, came from two sources, a set anthology of poems provided in the *SoW,* and from his knowledge of the *demands that GCSE exams place* on the students. Though the *SoW* required him to focus on the novel that term, he said that he always found time to do something extra, "There is always time to do another lesson with another purpose to keep them aware that they've got more than one thing to do in the exams in the summer" (during the interview). In the coming summer, the students were expected to sit in the exam with unseen poetry on the same thematic range.

Jeffrey was teaching the same poem by A.E. Housman that he had taught to other classes. However, the difference this time was that he was teaching it for the first time to his Fifth Formers. In particular, Jeffrey was looking for a skill of unlocking the poem, in terms of their emotional responses and not merely focusing on its technical aspects. He recalled that in his first poetry lesson with the Fifth-Form students in which the students viewed another poem, they focused on the technicality of the poem. The poem he chose for them this time deliberately sought to explore prejudice, something that might swell them with feelings; it was a poem about a cruel world in which someone was locked up because of the colour of his hair. The poem did not itself reveal the colour of the hair of the man, but Jeffrey recalled his *previous experience with other classes*, "Everything I do is put into a kind of comparative scheme against other teaching experiences" (during the interview). Whenever he had used that poem and asked people, "What colour the hair is?" it automatically unlocked prejudices about hair colour, which he thought was an interesting phenomenon. For him, as a teacher, that was a hurdle that he wanted them to get through. Once that was done, he could then "see how they deal with that" (during planning):

> "I will gradually get them to see that it's actually a poem about prejudice. It's a poem about prejudice to do with homosexuality. It's a poem that asks them to question themselves about their sense of what humanity is and how to be humane towards others who are different." (Jeffrey, during lesson planning)

The roots of his *deriving from his experience* were much deeper *when he himself was a student*. He shared that he was "relatively unconscious" (during the interview) of what he was doing aged 15 or 18. He got "good results" but had "a very unconscious sense of what I was doing…no one made me understand what I was doing…I wasn't really conscious of what I was doing with books or with learning until well into my first degree, or indeed when I was teaching" (during the interview). Hence, for him, the *ethos for teaching English literature* was that he wanted to "give them the chance to learn how to think and how to grow up" (during the interview). The poem gave him a chance to do that.

Table 7. The framework of description for Jeffrey

Institutional Context	
Theory of instruction	The school placed importance to the involvement of both teachers and students. Teaching and learning in classrooms was required to be both teacher-led and student-led. Student outcomes were highly stressed; pushing students towards A* or Grade 9 was the aim.
Scheme of Work (SoW)	Jeffrey received the SoW from the department. He collaborated with his HoD to develop and contribute to the SoW.
Teaching resources	Apart from the SoW, Jeffrey used his own resources that he had developed over a period of time; he also contributed material to the common online portal, a resource sharing platform for teachers within the department. For this lesson, Jeffrey did not borrow material from the portal. He used his knowledge of the GCSE pattern and his personal material from other texts of the Victorian times.
Duration of the lesson	40 minutes
Class sets	Top set
Discipline in school	No disciplinary issues. The students and the teacher took the first five minutes to settle. Jeffrey had set the material prepared and available for the students at their desks.
Teacher	
Vertical axis	Jeffrey enjoyed the position of adjunct HoD, which gave him the opportunity of setting the SoW in discussion with the HoD. Apart from that, he worked just like all the other teachers in the department, in sharing his material on the common online portal as well as maintain his individual lesson plans and materials for his own use.
Classroom Practice	
Instructional practice	Whole class discussions were a key part of Jeffrey's lessons. The students were encouraged to critique the texts that they were reading. Jeffrey well supported his students in terms of sharing the political and social life of Victorian times. The students' critique of the text and drawing connections with each other's thoughts, and their annotations when working in pairs served as a means of evaluation of their learning.
Instructional context	There were three layers of horseshoe seating arrangement. It provided scope for students to discuss in pairs and for Jeffrey to move in between the rows to observe the students work and listen to their discussions.
Regulative practice	Students were encouraged to respond to each other's responses and draw connections; they were provided with extra readings to gain multiple perspectives and more information of the times that they were reading about.
Everydayness	The students were relaxed and trusted each other. They were actively involved in learning as at several occasions during the lesson they added and critiqued the comments of their peers.

5.1.2.2 Analysis of the Lesson

I will now discuss Jeffrey's lesson as a part of the micro process of teaching and learning involved in his lesson. The lesson provides evidence of the students leading their teacher to assist them in their learning, and their teacher providing them with the space to do so. It provides an apt illustration of the way in which the institutional discourse regulates classroom subject pedagogy.

Before reading out the poem 'Oh Who Is That Young Sinner' (see Appendix H) to the class Jeffrey instructed the students to make notes as they went along on techniques that they spot and think about the overall meaning, message and feel of the poem (Jeffrey explained the task). As soon as he finished reading the poem, much to the students' amazement, he questioned, "What colour was the man's hair, anyone?" He, thus, implicitly referred to the abstract concept of prejudice. Some said pink, while some said black, and all laughed in embarrassment (With the use of the question, Jeffrey had, at once, got them engaged with the task). He made them feel relaxed by saying that "it's just a metaphor for who he is really." Feeling confident, one of the boys remarked that it wasn't his fault. He unlocked a mature response for Jeffrey to develop from. Jeffrey urged the students to speak their minds even if it meant talking about sexually-oriented topics. He asked if anyone thought of saying "ginger" which led the entire class to burst into laughter.

One of the boys asked if they could look at that as a metaphor with the skin. Jeffrey gave it a thought and agreed. He was highly pleased with the boy for bringing in the concept of displacement metaphor that did start to unlock a different kind of discussion about other forms of prejudice.

"Did he choose his hair colour?" questioned Jeffrey. "No," said one, while another provided the option that one could dye one's colour. "Yes, you can dye your hair", responded Jeffrey, "if that's the kind of hair colour which in this world could drag one to prison." He

asked the boy to try and do that and then added that the people at those times just found ways to take him to prison anyway (Jeffrey used the student's question to bring in the context of the Victorian society implicitly).

Continuing with the discussion, yet another pupil brought focus to the reference to a *"mention-able shade"* in the poem which implied, according to him, that "his current path, which metaphorically zones out, is unmentionable." The interpretation was a key point, and Jeffrey asked the students to take it step by step. Adding to the point his peer made, another boy said that "he would have been hanged" in those times (the students are actively involved in the discussion, working along with the teacher as knowledgeable others; they are moving slowly from their spontaneous understanding of the abstract situation toward a more scientific knowledge).

Jeffrey took the responses as an opportunity to provide a brief history of hanging in the country. Hanging, he explained, "was not the actual crime" for "buggery" and "sodomy", the words used in the language of the law, but hanging had stopped being the final legal punishment for buggery in the early part of the century. He explained that buggery was decriminalised for about a twenty years window in the middle of the 19th century and then it was recriminalised in 1895. Oscar Wilde was the most famous high profile celebrity who was sent to prison for homosexuality, or 'offences against the male person' as stated in the statues. He was imprisoned in the summer of 1885 (Jeffrey provided the context, this time explicitly talking about it; this also served as scientific knowledge to the students who were not fully aware of prejudices that existed in the Victorian times).

Jeffrey asked them to re-read the poem and find any kind of hidden, encoded language that could help them move through the points the two students had made so far: "what we are born with, we can't help it" and displacement metaphor. He stressed that the poem was about unlocking prejudice.

Even while the boys were reading, one of the boys discovered the fact that the poem was published posthumously, after forty-two years of Wilde's death. This fact was something unbelievable to the boy, and he questioned if that was because it was too controversial. Others also spotted the same. The students guided Jeffrey towards the bottom of the page where it was mentioned that the poem was "written in 1895, but it wasn't published till 1937." Jeffrey confirmed their finding and appreciated them for spotting that.

The students continued reading. However, they could not wait but ask more questions. One of the boys asked what "oakum" was. Jeffrey interpreted the question as simply knowing from the level of comprehension. Jeffrey knew that the boys, had already gotten the framework of *Great Expectations* in terms of manual labour and working-class, images of working-class representations, "they are really switched-on to the other text in terms of looking at what makes a convict, in terms of psychology and behaviour, and thinking about these kinds of punishments" (during the interview). He recited the line "Now 'tis oakum for his fingers", and explained that it referred to "the things the prisoners had to do in the Victorian prisons. They had to shred the ropes from the old navy ships with their fingers, without using any machinery. The ropes were thick with tar and encrusted with whatever from the seawater, and were reused after these were shredded. In pulling those pieces, he informed, "they ended up flaying their own fingers apart and getting the tar deeply embedded." He added that "the prisoners who did that never really got the tar out of their skin even when they left prison. Those marks remained and were a visible marker of imprisonment."

The explanation led to curiosity, and one of the boys asked, "What was the worst punishment without hanging then?" The boys throughout the lesson led the conversation through their curiosity to know, and Jeffrey, on his part, fed their curiosity that served as a teaching strategy he used in both his lessons (teacher assisted ZPD). Instead of him taking

control of providing contextual information, he worked the other way around. He allowed the space for students to think and interpret what they read; and, through their interpretations, he provided them with the contextual information or asked triggering questions that would assist their further thinking and shape their scientific understanding of the concept in context.

One boy referred to lynching as non-legal, non-judicial processes of punishment as a response to his peer. He was right. Jeffrey told how lynching was common in those days of British colonial times. He gave an example of lynching in Jamaica in as late as the 1860s and narrated a story of the Governor of Jamaica, who put down the rebellion led by slaves. The slaves had "smashed up the governor's residence once the rebellion was brought under control. The governor made a whip from piano wires from the smashed up grand piano. He lined up the black women first and whipped them while the black men watched, and then he whipped the black men. He made the black men watch what the whip did to the black women's bodies before he whipped them."

While Jeffrey was sharing the story, he noticed a boy, who was sitting right in front of him, in shock at what he had heard. The boy was deeply concerned and had shown quite openly that he was emotionally affected by the thought that lynching had happened. Jeffrey apologised and acknowledged his shock within a historical context saying that he narrated the facts. He explained that the poem was in relation to Oscar Wilde's trials of 1895. The notorious whipping of those people in the 1860s found its way into all kinds of literature, and poets and writers responded with sheer horror at what had happened in the name of the British Empire.

The whole class was silent; it seemed that they were trying to absorb the horrors narrated. Jeffrey broke the dead silence by asking them to make more notes on the page and circulated in the class. Finally, the two minutes of silent reading, which was extended by a few more minutes, was formally put an end with the whole class discussion. One of the boys

started the talk with reference to "hair" which, according to him, was the reference to having a beard and meant being gay. Jeffrey spotted a misconception (Vygotsky, 1987) and explained that beard was a modern language usage. He told the boy that he was wrong because of what was anachronistic in terms of his interpretation. Hence, unless he found that they already used beards to be a cover for a gay relationship, he could not establish that meaning. From among another pair, a boy spoke of the repetition of a certain line in the poem,

Student:	You [poet] repeat every line at the end –
Jeffrey:	Yes.
Student:	– whereas throughout each sentence he only gets angrier and angrier; each time he'd actually cursing God.
Jeffrey:	Yes, good.
Student:	And in each end of the line other people are doing that – they were saying that they were taking him to prison, that there isn't justice. But on the last line on the paragraph, his cursing is all that made him, so he's taken himself to be God. He wishes he was God.
Jeffrey:	Good, fantastic.
Student:	He is hating himself.
Jeffrey:	So, it becomes more and more intense, doesn't it?

Jeffrey asked them to think of the harsh sounds used in relation to their interpretation, in trying to build evidence to support their interpretation. Another point came forward, "Well, on the last line, he says, 'He does not know.' So, it's like he's going against God." Jeffrey connected the two points of cursing God and going against God, and gave them "a very rough version of theology" (during the interview) by asking them to think of "Why are we here?" in relation to what they understood of poet's relation with God.

The students had started to decode the language. Someone highlighted the use of plosives which Jeffrey explained was an explosive motive, a spitting action and pointed at self-hatred that was going on in the poem. Another student referred to the use of a cluster of words, which lead them back to the theme of the poem,

Student:	In terms of the repetition words, like spells, curse, and shades of human nature, it doesn't only show how it is brutal but also displays some kind of irony and his frustration about the abuse

> of the world because these are all associations with things like evil and the unnatural.

The response led Jeffrey to question if anyone was secretly excited about the thought, "let's punish a few prisoners because they're not like us." He led them to think and draw a connection between what gets unlocked in political discourse to their learning from the poem as a historical tool of information. He cited examples of British political discourse during Brexit or American political discourse during elections, in terms of how people feel being able to speak publicly about punishing others and seeking to doom their way of life. He urged them to link those thoughts with the questions the poem was forcing them to think about. What kind of world do you want to live in? Do you want to live in a world where people feel able to punish to such a degree? He reiterated that it was a poem about prejudice, about civic systems of law and order, a way of challenging and thinking about why people are in prison in current Britain. He stated that the poem would have challenged Victorian readers to think "Why do we let people be put in prison?"

Students became bold in suggesting the use of phallic imagery and heightened sexuality in the use of the phrase "To hide his poll" in the third stanza. Another explained the imagery of slavery, that it was "almost like the person writing stories, almost justifying it by saying [that] it's a motivation for work, like 'the treadmill for his feet'." Yet another referred to the use of syllables with his interpretation about hair, "Instead of fourteen, it has fifteen syllables so it is hypermetrical. "Hair" kind of feels like it's fallen out of place like it's unnatural" (peer-assisted ZPD). Jeffrey kept praising them and adding the contextual information: giving an account of the infamous Oscar Wilde trial, information related to the brushing of hair in Victorian times and an anecdote on Oscar Wilde's hair. Finally, two students commented on the use of the "Oh" in the first stanza, and the outdated language, one after the other,

Student:	…it's supposed to be like for emphasis, but if there was a pause like the last line, "Oh they're taking him to prison", it could kind of show a surprise and kind of say the poem is slightly mocking the fact the fantastic way that they were taking him to prison for the colour of his hair.
Student:	The use of archaic language shows that it's best believed that homosexuality is wrong as an outdated and below the Victorian values.

Jeffrey rephrased their responses for them by explaining that Victorians sang of a progressive age; however, in the poem Housman was saying, "I'm progressive enough that, I think, to fear homosexuality or to put people in prison for it is so outdated that it needs some kind of outdated language to challenge it" (during the interview).

The students had pushed themselves during the lesson in interpreting the poem. After the initial embarrassment, the students started to take control of their own learning by interpreting the poem thematically, structurally and technically; and, at the same time, pushing their teacher to assist them in providing them with information about the atrocities and prejudices of the Victorian Age (Vygotsky, 1997; Smagorinsky 2008). They had often heard their teacher use the analogy of cutting an orange in half and giving an orange a bit of a squeeze to get a bit of juice out or squeezing it more to get all the juice out, the analogy they had heard in the previous lesson. They were able to unlock the poem in terms of prejudices and, through that, vertically learn the context of the times of Oscar Wilde's trials, the societal values, and reflect upon the questions of being and about the world they would want to live in. They learnt horizontally by being able to use their prior knowledge of the times through their parallel reading of the text *Great Expectations* and think about the techniques in supporting their own interpretations with evidence.

5.1.2.3 Teaching Policy of the School

Jeffery was teaching at a school that maintained high expectations of both its teachers and students. The school trusted its teachers to have extremely good subject knowledge and the

students to be enthusiastic. It described "good teaching" in terms of student outcomes. Stressing on the importance placed on student outcomes, hinting at the pressure on teachers to perform, Jeffrey recalled that "One year we had 6 B grades [grade 5] at AS and the challenge then is to say, can we make sure not just how many A* [grade 9] we get, but can we make sure no one gets a B when it comes to A2, so constantly pushing for 100% A*, A [grade 8] was our challenge."

He shared that teaching and learning were "both teacher-led and pupil-led" (during the interview). From the above discussion of his lessons, it can be inferred that Jeffrey's lessons were a combination of both. There were times when he led the students to think and connect each other's thoughts, and there were times when students framed the lesson and led him to respond to their interpretations by providing contextual information, which would help them towards the scientific understanding of the concept (Vygotsky, 1997). The students were, thus, "themselves helping to drive knowledge and drive learning" (during the interview).

5.2 Cases of Mathematics Teachers

In this section, I am presenting lessons from two mathematics teachers, Justin from Whitewater School and Alex from Forest Lake School (refer to Table 3 for lesson details; Section 4.7.3 for the historical contexts of the schools; and Table 8 and Table 9, which are presented within their lessons, for their frameworks of description).

5.2.1 Case of Justin

> Justin believed that "Students learn best when they are enticed by a problem. It is the only reason why maths is interesting; it allows us to solve problems. Multiplying out brackets hundreds of times is neither interesting, fun or of any educational value. I believe that students learn in chunks; I do not subscribe at all to the 'learning objectives' approach used by so many schools [including his own]. It is possible for students to understand nothing from the first few representations of a concept or idea and then suddenly click when the concepts are presented in a new way. I think it is important to be patient with students and understand that learning is complicated." (Justin, during planning)

Justin was associated with the Whitewater School. He had been teaching for three years in the school, and that amounted to his overall teaching experience. He was teaching three lessons as a unit on three dimensions to his Year 8 top set students.

Justin had started teaching in 2013, at a school in the south-west county in England. He did his PGCE training from a distinguished University in England. He was a highly reputed teacher and apart from his teaching duties, he was appointed as the Manager of Teaching and Learning in the school.

5.2.1.1 The Context of the Lesson

The teaching practice policy of Justin's school was driven by its history (see section 4.7.3). The school required its teachers to create interesting and engaging lessons in order to motivate students to learn and to keep the discipline in the classrooms. The lessons in the school were of one hour and ten minutes, of which the first ten minutes were allotted to

routine activity as a school policy. The specified period was a way to control students' behaviour and get them to learning as soon as they entered. In mathematics, the activity included solving questions on basic mathematical skills of multiplication and factorisation, for example, chosen for the level of the class.

A SoW provided to the teachers by their respective departments consisted of the topic to teach and the number of hours allotted to teach it. Justin, like other teachers, took the topic from the SoW and created his own material derived from various sources.

The HoD treated his colleagues with no evident hierarchy. He trusted his teachers. The only thing he was particular about was the routine task, and he ensured that the teachers practised it. Otherwise, teachers had complete freedom to plan their lessons. Justin occupied a special space in the department. He was highly trusted and respected. The HoD showed confidence in him. According to him, Justin knew exactly what the students would learn by which date, and one could test them on that learning.

Justin was appointed as the Manager for Teaching and Learning, a role that required him to observe other mathematics teachers' lessons, provide feedback to them and have conversations with them about the task they did, why they chose that task, how it was going to help, "the kind of questions you are asking me now" (during the interview), and alternative ways in which the lesson could be taught. There were also times when others, senior management and colleagues, observed his lessons and gave their feedback to him. The feedback was based on five different areas: behaviour, presentation of books, marking, assessment, and the last one which Justin could not recall. He explained that there was very little emphasis placed on the lesson as the management believed that whilst anyone could teach a good lesson, it was from looking at students' books that one could assess whether students were making progress over a sustained period of time. The school used the acronym, WAGOLL, which means "What a good one looks like." The school policy was

that the students must have a date underlined, a line in the middle of the page when appropriate, which the students followed strictly, and keywords written down at the beginning of every lesson so that they can learn them and then refer back to them in the lesson.

Making observations gave the teachers an opportunity to learn from each other, and derive and develop ideas. Justin utilised one such experience in his lesson. However, planning and preparing material for teaching was their own prerogative. The hierarchy between teachers within the department existed but was not explicitly strict as it was in Lisa's case.

The students in his class sat in a small group format. The desks were clustered into small groups of four, except for one pair of students. The arrangement allowed student-student interaction. It gave students the opportunity to choose to work in pairs or as a larger group. But whichever way they chose, they interacted with each other within the cluster. Moreover, the clusters were quite close to each other that enabled the students to interact across clusters as well.

Justin distributed the material for learning equally at each table for all to have access and put to a purpose. He gave specific instructions, timed their activity, allowed enough time for the students to work together or individually, and then brought the whole class to the discussion on any particular task.

There were no discipline issues. Justin had high expectations from his students. The students paid attention to their teacher when asked, and engaged with the tasks and with each other at other times. They freely expressed their thoughts while at tasks, expressing their failures, joys, successes, struggles and even mental fatigue.

A culture of trust existed. The students did not have to worry about providing wrong answers. Justin would make explicit that he was not looking for the right answers. He mainly intended to provide an experience of the subject content they were learning.

Justin used the readily available resources – LEGO, multilink and plastic triangles –in his department to plan and conduct his lessons. He used his imagination to help plan his lessons and supplemented that with a few practice tasks from the textbook that the school prescribed. Justin also took advantage of something that he had seen before or something that he would think would work well, either way served him to reflect on his thinking. In his second lesson, he used his subscription to the Association of Teachers of Mathematics (ATM) to bring to his students the experience and challenge of making two different shapes, a regular and an irregular one, which can be unfolded and folded back to another.

His interaction with his colleagues during the observations also influenced him. Within his department, he expressed that "there was a lot of freedom to go and observe each other, people always share their ideas, it's really open SoW" (during the interview). The most important thing for him was students' learning, which came first to him while planning. It was from there that he tried to pick out activities, "which they could do, which could give them a good understanding of that. My training is a big influence" (during the interview). Justin often reflected on his PGCE training. Though he did not derive anything specifically for the lessons observed, he explained that he often looked back to his teacher training for ideas, discussions he had with his tutor at the time and the things he had seen the other teachers do.

He had observed that the students often drew cubes on the last page of their books, and so he tried to use that observation in his lessons.

Also, his reading of the literature from research in mathematics helped him assess the difficulty that the students might face in visualising in 3D, "I have read somewhere about it that when you are eleven years old is when your brain starts to really understand three dimensions. It is more a developmental thing than an intelligence thing" (during planning). Hence, several things influenced his classroom pedagogy.

The figured world that Justin had prepared for himself included another figured world that he prepared for the students in the form of a task, something in which they would enter, with the hope that he would receive responses as he had anticipated. He structured the lesson starting with the problem, getting them to talk about it until they come up with an idea of a map. He would then use the idea to talk to them about 2D and 3D representations, introduce the isometric paper to them and discuss the problems of representations. Through that, using the multilink cubes, he would then introduce them to the front elevation, side elevation and plan view.

In the second lesson, he imagined providing his students with an experience of handling 3D shapes, being able to connect the material – that he would provide – together to make a shape to enable them to think about nets even before they could call them nets. To bring his imaginative world to completion, he used a defined framework to scaffold his lesson. They would start with deriving Euler's formula from the shapes they would make, followed by a whole class discussion on the representation of 3D shapes using nets, and finally come back to making shapes, specifically two different polyhedrons. Thus, he planned to challenge his students in the lesson:

> "give them to explore something mathematically and notice something nice that's going on and also to get used to the 3D shapes and the fact that they have to connect these things together and then build the shape is also helping them to think about nets as well before we even call them net." (Justin, during lesson planning)

The third lesson was an extension of the first two, and the last step into their thinking of 3D shapes. In this Justin decided to teach 3D coordinates. He imagined them struggling with

the idea of the third axis. He structured the lesson by starting with the spider task from the previous lesson that would help them understand how to label the vertices and would give them more experience of visualising a 3D shape. He intended, as part of the spider task, to review their prior learning of the Pythagoras theorem. The main challenge for Justin was to keep the students engaged and interested in their own learning.

Table 8. The framework of description for Justin

Institutional Context	
Theory of instruction	Engage students as soon as they enter the class; make interesting and engaging lessons to motivate them towards learning. Assist them to maintain their books as that will indicate the progress they make, and students might refer to these for self-learning.
Scheme of Work (SoW)	Received SoW from the department that consisted of the topics to be taught during the term.
Teaching resources	Justin developed and used a mix of tasks from his experience, various mathematical websites for teachers and the school's prescribed textbook.
Duration of the lesson	One hour and ten minutes.
Class sets	Top set
Discipline in school	The school had improved over the past three years from the time of observations. The HoD informed that before there was a lack of discipline in the school and which affected classroom management as well. Ten minutes extra were thus added to ensure that the students start with a routine activity as soon as they entered the room, as the school management believed that that would set them to learning straight away. The strategy worked well for the school as a whole. During the lessons, there were no discipline issues observed.
Teacher	
Vertical axis	HoD trusted his teachers and let them work individually on their teaching methods and lesson planning. Justin was the Manager of Teaching and Learning that required him to observe other teachers' lessons and give his feedback. However, he learnt from the lessons as well and even encouraged others to observe his lessons and provide him with their feedback on his lessons.
Classroom Practice	
Instructional practice	His lessons included hands-on experience with shapes in order for the students to get engaged and try to solve problems. The lesson was a mix of group and whole class discussions, interspersed with Justin modelling to solve a problem. Justin was alert to students' responses. He evaluated their learning by visiting the groups and listening to table discussions, which he later used by asking questions during whole class discussions.
Instructional context	The students were seated in eight groups, with four students each, except at two tables, one table with two students (preferred working alone) and one more table with one student (student was new and weak in English, Justin visited her quite often to assist). The seating

	allowed Justin to move around, reach any specific group that he wanted to according to his priority, listen to discussions and probe them further in their learning or query.
Regulative practice	The students were encouraged to discuss the tasks assigned within groups and across groups. Justin supported them to express their thinking freely.
Everydayness	Students worked together, expressed their joy and struggle in learning, trusted each other and their teacher, and demonstrated perseverance through working with their teacher on tasks.

5.2.1.2 Analysis of the Lessons

In this section, I will discuss all three of Justin's lessons as these formed a unit based on the same topic: Representing Three Dimensional (3D) Objects; in order to show the evidence of the conceptual progression of students' learning of the concept (Vygotsky, 1997). The lessons were interesting in the sense that these were very exhaustive and, yet, substantial in acknowledging the micro processes involved in teaching and learning. I will provide critical incidents (Tripp, 1993) from the unit, starting from lesson 1 to lesson 3.

Justin was particular about learning objectives and keywords. At the very start of each lesson, he would display those. The students were expected to write them in their notebooks. It was only after that that he introduced the students to the first task for the lesson.

He told the students, simultaneously displaying the task on the board, that they were going to break into the school at midnight to steal all the money that Mr Emmanuel had in his office. He asked them to think about "What would you need? And what preparation you would need to do?" He gave them five minutes to think and discuss the problem in their groups. The problem immediately clicked with the students, engaged them with the task, and it got them thinking and involved in their learning.

Justin had successfully created a figured world for them to enter. Firstly, they had to imagine entering a 3D space; secondly, to add to their excitement, they had to steal money from their teacher, Mr Emmanuel, who was a disciplinarian. Not everyone initially thought of a room as a 3D space, but they were in some form or the other thinking of the things they

would require entering into the school building or Mr Emmanuel's room. They were indirectly imagining and experiencing entering a physical reality, a 3D shape, and had thus started the initial step of moving towards the abstract concept (Vygotsky, 1997).

After five minutes he questioned the whole class, "What kind of problems did they see when thinking of entering the building?" The students shared their thoughts. Some of the other things said were: the room might be locked as it belonged to that particular teacher, they might need chloroform to put all the matrons to sleep, and they might need a map. Justin listened. He had anticipated there would be much stuff in their suggestions that he would not be interested in, but as soon as someone mentioned the idea of a map, he questioned,

Justin:	Why did you say map?
Student:	Because we need to know where to go.
Student:	I will try and distract the teacher and then ask someone to go get the keys and then just close the doors.
Justin:	And then you just keep it the whole day.
Student:	…we will have a 3D map of each layer of the building and locate the cameras.

Justin had wanted the idea of a map to come from them, and it did. He had planned to use that idea to discuss two dimensions and three dimensions. He gave them a minute more to think about how they would create a map of the school. The important question at this point was to get them thinking about "how will they draw the map?" The following dialogue took place, with the responses coming from different tables:

Student:	What we thought we could do is take pictures of all the doorways and map out using it like the computer generator painter and create a map with it.
Justin:	Ok, to use a computer to do the things in 3D. How do you then use it to make a map, how you use the pictures to make a map?
Student:	Yeah [no answer].
Justin:	It's difficult isn't it?
Student:	I would like to measure all the rooms in the school and then draw them to a scale, but obviously not big.
Justin:	Ok, you will use a scale, but, again, how would you draw them?
Justin:	How will you draw this room?
Student:	It's a square
Justin:	…but then are you doing the floor or are you doing the walls?
Student:	We can just have tons of pieces of paper, and every piece of paper, we can draw a cube and add the details in.

Student:	On isometric paper.
Student:	You can actually build the nets and build the shapes
Justin:	Ooh!

The students were struggling in their thinking and trying to figure out the solution to the problem (moving toward abstraction). They had started to think of the possible ways in which to draw the map. He used the opportunity to model to them an isometric drawing of a cube. The task provided them with an opportunity to work out and visualise the three-dimensional shape on a two-dimensional plane, and thus added a layer of abstraction. Knowledge of drawing shapes on isometric paper was necessary from an examination point of view as well, where they might have an isometric paper to draw the shape provided. It was a skill that they needed to acquire, as suggested in the SoW. He took the idea from there and fed into a project around stealing something from the school. He demonstrated drawing a cube on the isometric paper displayed on the whiteboard and shared that he was not expecting them to know that straight away. He explained to them that on the paper, it seemed like they had three dimensions, but it was just two dimensions, "We can trick our mind."

The students tried their hand at drawing a cuboid on the paper. Some were successful in doing so, while some were not. The former came to the aid of the latter. They were heard using the same steps in helping their peers draw as Justin had demonstrated. The episode, apart from the role of knowledgeable other (Vygotsky, 1997), reflected the classroom culture, their everydayness. Justin had not explicitly requested any such action of assisting others. The students volunteered themselves.

While the above mentioned action was going on, Justin was preparing to set another task. He made a shape with the pieces of Lego and placed it at the centre of the front table for it to be visible for all to see. He had originally thought of using Multilinks and placing a shape on each table. However, he faced a last-minute glitch. A colleague of his, when Justin had gone to receive the students from a meeting point and escort them to the classroom, had

taken the box containing Multilink, not knowing that Justin had intended to use those in the lesson. Hence, Justin substituted that with a single shape using Lego and placed that in the front of the class, which reflects his thinking on the feet (Livingston & Borko, 1989).

He wanted them to draw the shape he had placed on the front table and try doing that on isometric paper. Some of the students walked to the table to have a closer look. Some had successfully drawn the shape on the paper, but some were struggling. Again, those who had finished reached out to others and assisted them in drawing. They were heard using the same logic of counting the dimensions as Justin had explained when demonstrating the same to them on the Interactive White Board (IWB).

At this point, he reminded them of the main problem. In theory, they could think of drawing the school building on an isometric paper, but there might be possible problems that they could face. He gave them a minute to think of those problems. One of the students suggested that there would be a problem of layering, but Justin quickly reminded him that they had just done layering when drawing the shape on the isometric paper a while ago. Another student brought the attention to "a courtyard" that he said, "spreads out in the building," thus suggested that it would be difficult to figure that out. They came to a point where they started to see limitations with isometric drawing. Justin asked them to think how they would show a hidden courtyard on an isometric sheet and used the question as a springboard to explain the problems of representations in the isometric paper. He used the occasion to explain how they could solve the problem by using plans and elevations and thus added another layer of abstraction by making them think of a different way of representation.

He introduced the terms front elevation, side elevation and plan view, and demonstrated that each of those was three separate diagrams of him looking at the shape (as shown in Figure 6) by looking at it from different angles. It is the shape that the students had drawn using the Lego shape placed at the front.

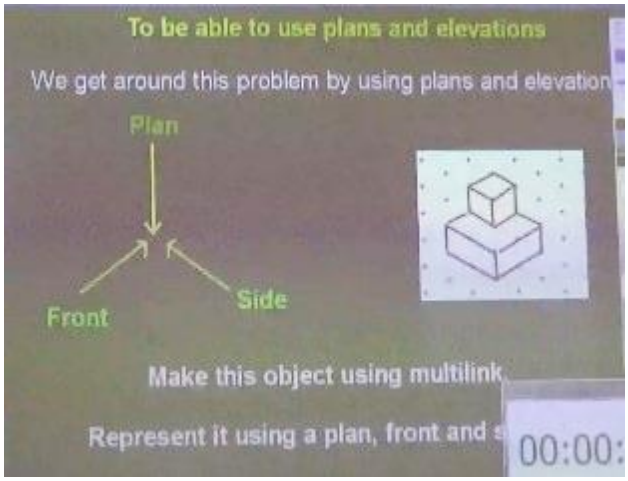

Figure 6. Elevations and a plan view

Justin instructed the students to draw the three shapes, this time not necessarily on isometric paper. He comforted them by saying that it did not matter if they were wrong, but they should have a go and see if they could do it. As soon as he had given the instructions he went straight to the weakest table. The class were a top set. The four students at one of the tables were weak amongst the class though they were not that weak overall because it was a top set. Yet they were highly enthusiastic and responsive, and, sometimes, some of the best responses came from them. As he shared during the interview, Justin's thoughts were that his chances of finding misunderstandings were maximised at that table, and then he could check the same at other tables. It is worth making a note that Justin did not at any time during the observations and in the interviews undermine the ability of the students sitting at that particular table. Justin was right in his thought as he had identified a misconception (Karpov, 2003) that the students did not understand that "if the front view changes, then the plan view will also change." He went around to other tables and observed others were also doing the same mistake, "actually rotated the plan view, so that they can see from the side instead" (during the interview). So, he decided to demonstrate the situation to the whole class. He asked them to imagine facing the shape from the front. He then placed a chair at the front of the shape and stood on it. He then looked down on the shape. He explained that it was important for them to look from the front angle and not from the side,

and stressed that they "need to be standing in front of the front first." He further added that they could select any side as the front, but then they must stick to it to build the plan. Quite coincidently, Justin had observed a lesson of one of his colleagues a day before and had observed that the students there were making the same mistake. He had, hence, anticipated the mistake and looked out for it in his own lesson.

He then asked one of the students to share what he had drawn. To the boy, the front was L-shaped, the side was the inverse of the L-shape, and the plan view was a square. It was a way for others to assess their work. They were fine, and that signalled for Justin that they were aware of the concept of plans and elevations in representing a 3D shape. The students were provided with an opportunity to work and visualise the 3D form on a 2D plane through different representations of 3D, which they would continue doing in the second lesson as well. In the end, Justin re-explained the concept of finding the plan view and explained that the scientific knowledge they had acquired would help them towards representing things or creating good maps.

I will now provide critical incidents (Tripp, 1993) of the second lesson on nets, which was an extension of the students' understanding of 3D representation. Justin displayed the following questions to assist them in understanding how to represent 3D objects using nets. He had wanted them to be thinking carefully, trying to imagine a shape, which was more of an individual reflection. He recontextualised (Linell, 2009) their mental viewing of the shapes by explaining that they were unfolding a 3D shape into a different one, "a 2D shape", an answer which one of the students was quick to add. Justin displayed the following questions on the board:

> What is a net?
> What would the net of a box look like?
> What would the net of a cylinder look like?
> What would the net of a Toblerone look like?
> What would the net of a sphere look like?
> Why do we use nets?

The task was intended to stretch their imagination, to "try and think without any physical thing to play with about what nets are and what they might look" (during the interview). The students were at ease in their discussion of the first four questions mentioned above, but when it came to a net of a sphere, the students struggled. The first two students who were asked to respond were not able to discern the unfolding of a net of a sphere. The third one said that that could be a circle. More responses that came forward made their struggle visible (Vygotsky, 1997):

Student:	What would it be like because you don't have any edges or vertices?
Student:	What do you think if you unfold it, it would go like that (demonstrates his hands as though boom)
Student:	It will be flat.

Justin realised that they were struggling with the shape and that none of their thoughts was representational, "I should have given them longer actually just to talk with each other…I wanted to get it across that it is impossible, is very very difficult to have a 2D net of a sphere" (during the interview). He was not expecting them to know that. He tried to connect their understanding of a sphere with their learning of maps in Geography; he explained the reason why maps usually have a lot of mistakes, as the cartographers try to represent a "3D sphere perfectly into 2D."

Justin had missed one of the responses because the student spoke too softly to be heard. He was able to hear that during a stimulated recall interview for the lesson. Someone had referred to a football. Justin was very critical of himself for having missed that chance and said that he would have alternatively used an example of a football rather than a map into the discussion and would have questioned, "How do you make a football then?" or could have responded with making them think "Actually let's look what a football is?"

Justin helped them connect their learning of unfolding of nets with their learning of plans and elevations in the previous lesson. He wanted them to think of the purpose of using

the different ways of imagining a 3D shape. He explained, "[whereas] plans and elevations just show us what it looks like from different sides, but with a net, we can actually kind of imagine how this is put together." He invited them to make as many different 3D shapes as they could using the eight equilateral triangles he had placed on their tables. He wanted them to practise how 2D objects turn into 3D objects and *vice versa* and, at the same time, appreciate both folding and unfolding of a shape together. He gave them ten minutes for the task as shown below in Figure 7.

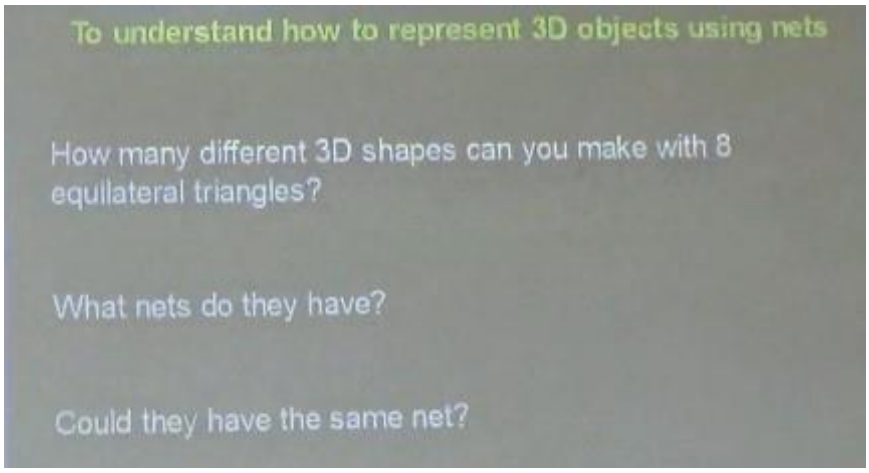

Figure 7. Make any 3D shape

Mainly two types of shapes emerged as shown below in Figure 8 and Figure 9. The students who made the first shape had not made the second, and *vice versa*.



Figure 8. The shape made by students – an irregular octahedron



Figure 9. The shape made by students – a regular octahedron

Justin was confident that the students had seen both types of shapes, though they were able to make only one of them. He explained the two shapes and used the students' present learning of the shapes to review their prior learning of the concept of lines of symmetry to add to their knowledge a similar concept of planes of symmetry.

Justin instructed them to continue with unfolding the shape they had made to fold it into the other one, for example, an irregular octahedron to a regular octahedron. At the point of unfolding the first one, he specifically asked them to draw that net in their books. The unfold-fold combination worked only for one net, called a mystery net, which he explained later during the interview. While he circulated in the class, Justin observed that the students were struggling and trying very hard to unfold and fold back the shape. They expressed their struggle by interacting with the shapes, stating aloud both their joy and their failure that they met in folding and unfolding the shape. Some of the work is shown in Figure 10.



Figure 10. Making the net and drawing it in their books

Justin asked one of the boys, who was successful in drawing the mystery net, to draw that on the IWB (as shown in Figure 11) and asked others to draw that pattern in their books.

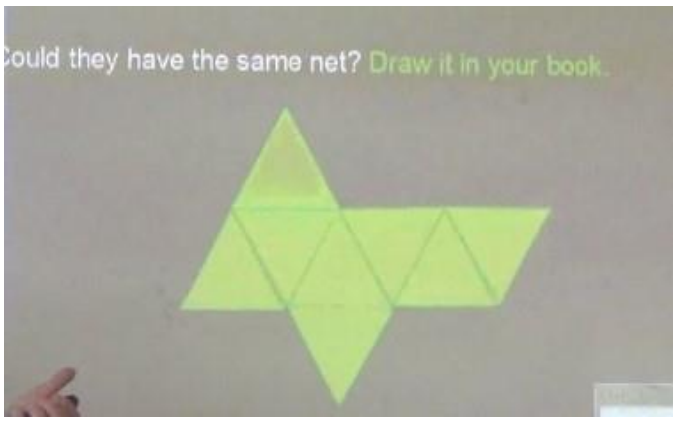

Figure 11. A mystery net

In the remaining few minutes of the lesson, Justin introduced another task, a distance problem, as shown in Figure 12, which he would continue in the next lesson. He explained the task and wished them luck for trying. He circulated the class to gauge how the students were unpacking the task.

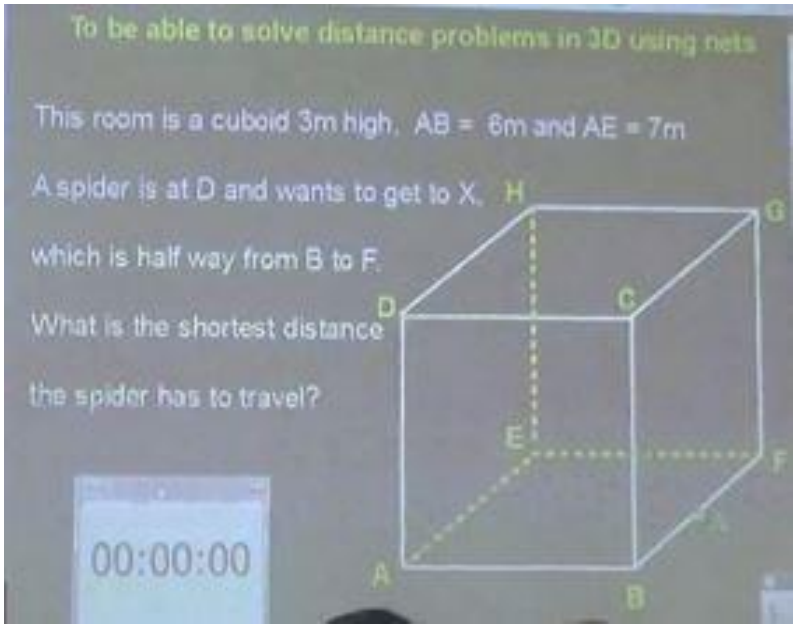

Figure 12. Distance problem

In the third lesson on 3D shapes, Justin brought the distance task back, as shown in the figure above, and cautioned the students to "be very careful about labelling which vertices when you unfold it. Then try and find a distance of going from D to X, and X is the mid-point of that one (BF)." The students started to draw the unfolding of the cube in their books.

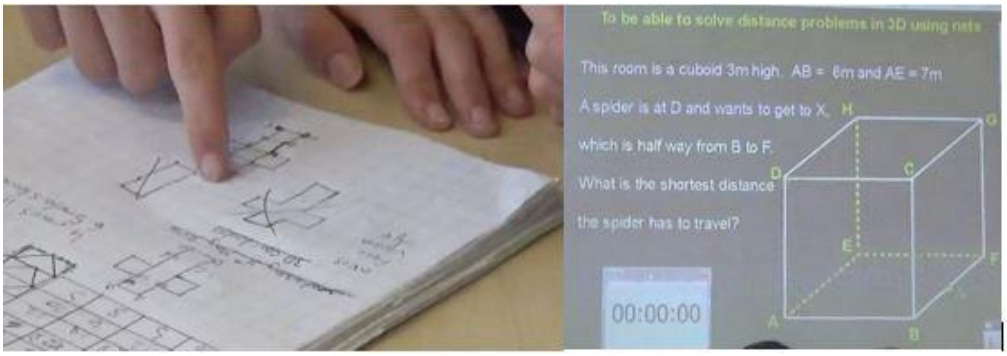

Figure 13 shows the struggle of one of the students and assistance that was given by another (peer-assisted ZPD). Justin had observed them struggling with the task, with which vertices would go where in the previous lesson.

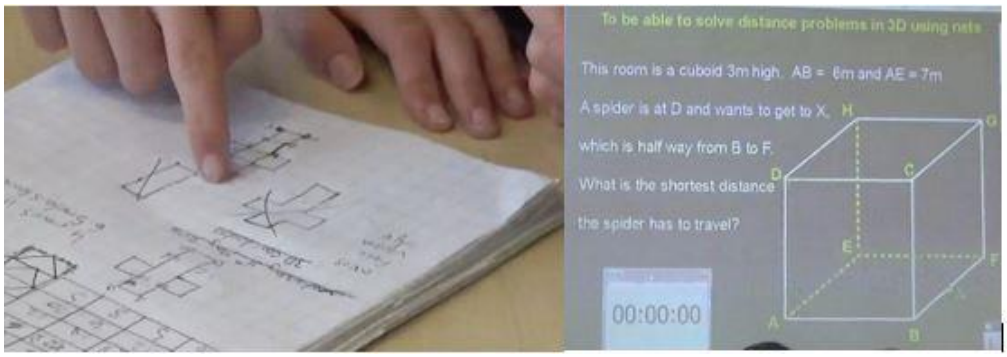

Figure 13. Distance problem and peer assistance

After ten minutes he sought the whole class attention and asked one of the students about which square he had used to start unfolding the box. The boy had started to unfold from the front, ABCD, which Justin said was a strange way to start from. He agreed, however, that "there was more than one way of doing the task." But for him, personally, he said that he would imagine starting from the base, ABFE. He explained that for him it was easier to visualise that way so that he could see how he could unfold it (recontextualising). Many students had visualised Justin's way, while some did differently.

Justin explained which face would go where and which faces would have the same vertices, as shown in Figure 14. The students were able to pick that up and label. With Justin's assistance, the students practised imagining how the box would fall apart and worked "exactly what goes where."

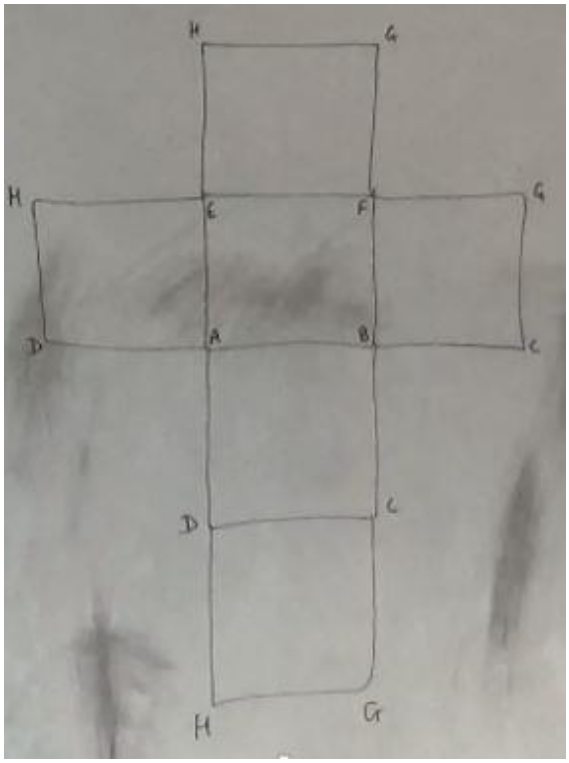

Figure 14. Unfolding of the box and labelling

With labelling done, the only thing that remained was solving the task. It required the further engagement of the students with it. They had to imagine the spider's movement, along the faces, from D to a mid-point of BF, X; and had to calculate the shortest distance that a spider would take to travel from D to X. Justin demonstrated that there were two ways in which a spider could reach X from D: from D on DC edge, or from D on HD edge. Justin marked the two lines (as shown in Figure 15). He had realised that some of them did not understand the physical reality of what was happening in the task.

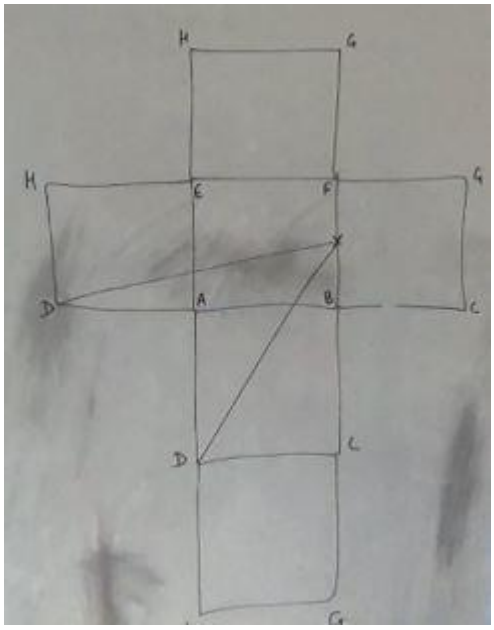

Figure 15. Demonstration of two paths that the spider could take

One of the boys questioned if the spider could go to E and then to D. The boy, according to Justin, was thinking in terms of moving from vertex to vertex and not in terms of moving along a face. He explained that his route would take longer "because the straight lines can be the shortest distance between two points."

He then engaged the students in solving the distance DX in triangle DCX using the Pythagoras theorem. It required the reapplication of the previously learnt concept in a new complex setting. Justin had realised that not all had immediately recognised the situation that it was a right-angle triangle, and they had to find the missing side. Justin explained that it was after a long period of time that the students had practised the application of Pythagoras' theorem. The students were quick to catch up and solved along with him to calculate that DX was 8.9 (see Figure 16).

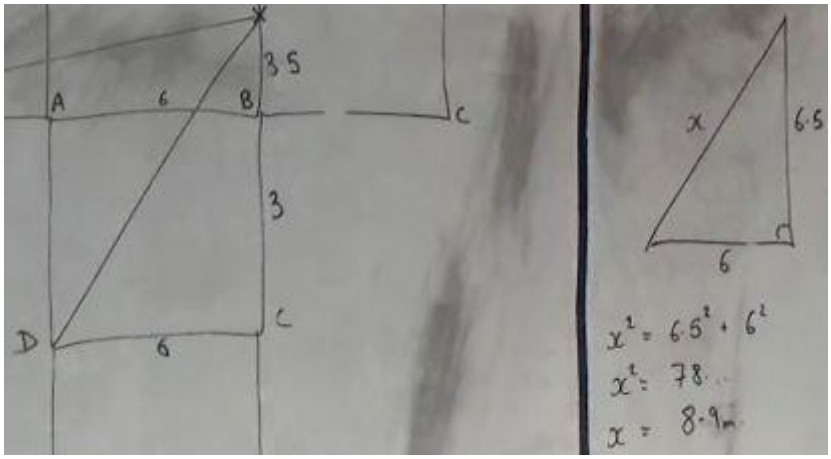

Figure 16. Calculate the distance

Justin used the other triangle DBX as well to calculate the distance but stopped soon. He questioned how he would know straight away, without calculating, that 8.9 meters was the shortest distance. One student thought that question had knocked his brain; another said that "9^2 will be 81, but 6^2 will be [stopped]…". Justin urged the students to think symmetrically. He questioned, "In a right-angled triangle, which length was the longest?" The students responded, "Hypotenuse." Justin demonstrated that the base of the triangle DBX, as shown in Figure 17, was 9, and hence "the hypotenuse is going to be the longer side of the triangle. So, it is going to be longer than 9." He asked the students to calculate and check, and they figured that out themselves.

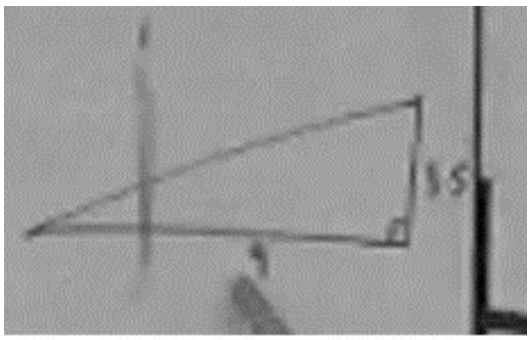

Figure 17. Determine the longest length

The task came to an end. It was relatively a lengthy one and took half an hour of the lesson. Justin praised the pupils for their perseverance, "That's a difficult question, and very well done for sticking with me on that."

After this, all the tasks were mainly those to consolidate their understanding of 3D shapes, reapplying their newly formed knowledge. He gave them another task, as shown in Figure 18, to practise visualising and labelling, "to make something to fold out and thinking about which point is going make which point" (during the interview).

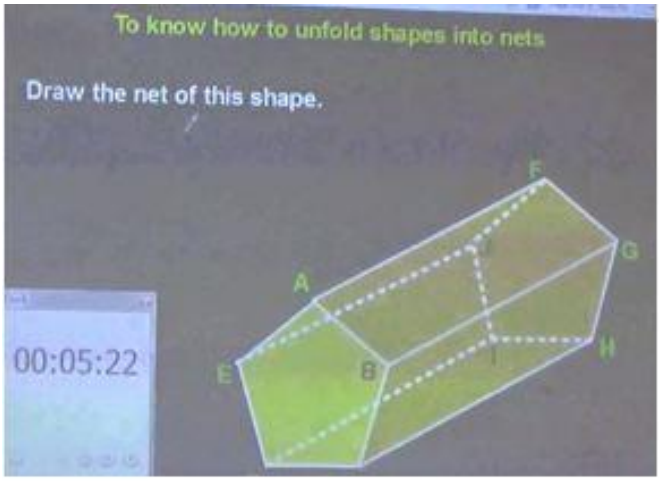

Figure 18. More practice of visualisation and labelling

Some of the students' responses in their books are shown in Figure 19.

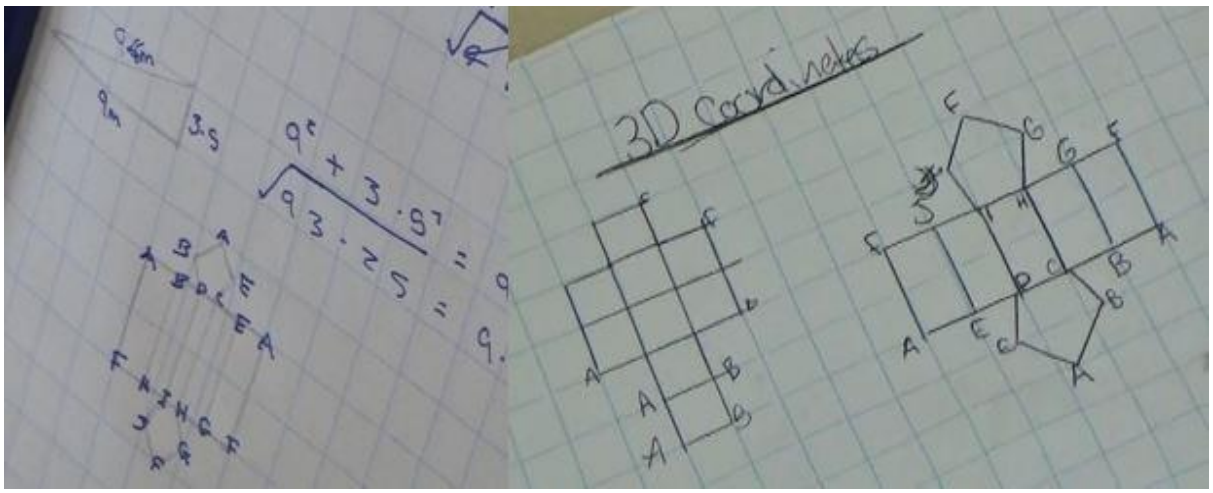

Figure 19. Students' responses

Justin was happy, "It seems we are really getting used to this idea how to make something to fold out" and think about "what goes where."

Justin gave more tasks, as shown in Figure 20, this time from the textbook. The tasks were based on the problems of finding the surface area in which, once again, they would have to imagine unfolding a shape into a net and work out the total area of a net.

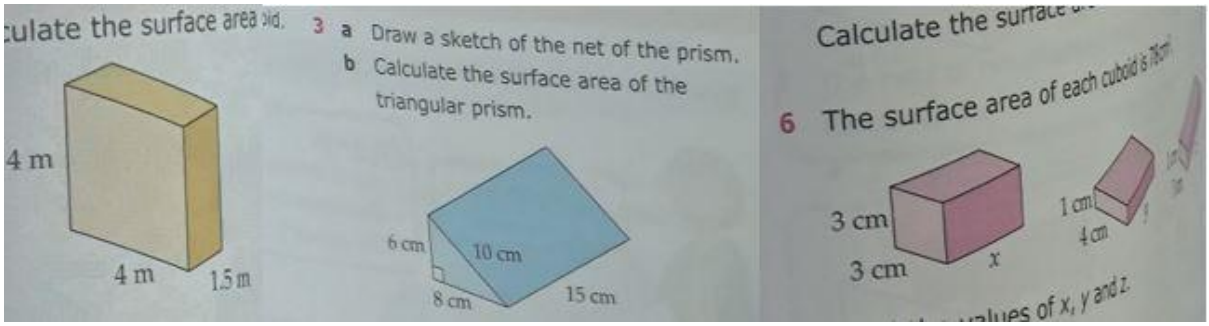

Figure 20. Textbook tasks for more practice

In the first task from the three tasks shown in Figure 20, while moving around and observing each table, Justin identified a common misconception: the students were getting confused with volume and surface area. He brought the attention of the whole class to the definition of the surface area, taking responses from the students. For the last seven minutes of the lesson, he gave them a task as shown in Figure 21 through which he wanted them to apply their understanding of 3D coordinates, and through that, show their knowledge of the three-dimensional representation.

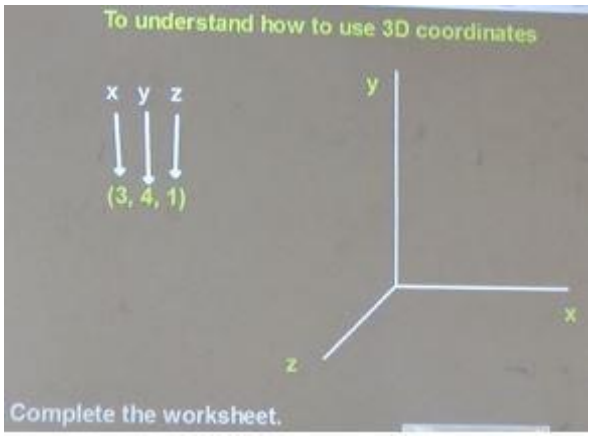

Figure 21. Use of 3D coordinates

All the students successfully solved the problems given in a task sheet as far as they could, within the remaining time.

Overall in the three lessons, the students were challenged to represent 3D shapes in different ways. In the very first task, Justin involved them in analytical thinking by making them think in 3D and help solve the problem of entering into a 3D space. He led them to recognise the problems they might face and how they might solve it. Though they struggled to identify how they could represent a map, with Justin's assistance they gradually made sense of that too. He engaged them with representing a 3D shape on an isometric paper, which made them experience a 3D representation in 2D. Thus, once again, he assisted them in visualising the limitations of such a representation and in learning to appreciate the reason for the need for plans and elevations in solving the problem they had identified. In the second lesson, Justin provided them with more experience of playing with the objects that he had provided them, and with experience of engaging with the tasks to think spatially and gain an understanding of 3D shapes and their nets,

> "Even if their brain is not engaged at all and you are just playing around with them, it still gonna help you imagine how you will put things back together." (Justin, during the interview)

The lesson was more about the students experiencing and mentally constructing the three dimensions as a means to produce abstractive thinking (vertical learning). The last lesson was more about assessment of students' learning and making sure that they can unfold a shape, label it correctly and use their previous knowledge of Pythagoras Theorem in 3D, and solve problems of surface area (horizontal learning). Thus, the students moved towards forming a scientific understanding of the abstract 3D concept, which was introduced to them, through their experience of being immersed in working with different representations of 3D; and moved from their familiarity with 3D space to work their way up to make a conceptual progression (Vygotsky, 1986). In this way, they learnt the geometrical language, problem solving strategies and were immersed in experiencing spatial relationships (vertical learning).

5.2.2 Case of Alex

> "I consider maths as arts, but most people think it's something utilitarian. One of the things am trying to get across to them is that it's not just knowing a method but understanding why it is being used. It's very important that they're good at solving problems. It calls to have an open mind, try and bring in ideas from different directions, so they find a succinct way of solving a problem which they understand. Not just repeating a process." Alex (during lesson planning)

Alex was a mathematics teacher in Forest Lake School (refer to section 4.7.3). He was teaching Form Five, the bottom set of 23 students, all boys. I am presenting his first lesson. He shared the institutional context with Jeffrey.

Alex was a grammar school boy from the 1970s. He went to a university to do a Master's Philosophy in History of Science. It was when he enrolled for a course on Maths Education at the university, which he found easy and straightforward, did he think of looking at maths as a career. He then did his PGCE and Masters from a university in England. For the last 36 years, he has been teaching mathematics at the Forest Lake School.

5.2.2.1 The Context of the Lesson

Alex did not have his own classroom like Jeffrey. He carried a large bag that contained students' books and his teaching paraphernalia and changed rooms to teach different classes. He would quickly prepare the classroom while his students settled. The duration of the lesson was 40 minutes.

Alex used a prescribed textbook as his resource for teaching. The table of contents section of the text served as a detailed SoW, which was the curriculum that he implemented in the classroom. However, he did not follow the contents in sequence, rather moved forward and backwards across the chapters, depending upon what he thought would link the topics in relation to the topics to be covered during the term as defined by his department.

For the lesson, he imagined looking at the more difficult tasks that the students had not covered so far and explained that he thought so because it was "something that they do need to do well, so having it longer to do them it's helpful," and also "to make them feel confident that the A star [Grade 8] material is accessible to them." The concepts or ideas

that underlay the tasks for the lesson were areas of triangles, the trigonometric functions, SOHCAHTOA, the knowledge that the students already had. The SOHCAHTOA is a helpful mnemonic for remembering the definitions of the trigonometric functions – sine, cosine and tangents; sine equals opposite over hypotenuse, cosine equals adjacent over hypotenuse, and tangent equals opposite over adjacent.

The framework he conceptualised was moving from simple to more complicated structures to help students feel secure about the topic introduced. It was then that he intended to develop it further and introduce more abstract parts. He would introduce the algebraic parts halfway through the lesson or earlier, depending on how the response was.

Table 9. The framework of description for Alex

Institutional Context	
Theory of instruction	Same as Jeffrey's. The school placed importance to the involvement of both teachers and students. Teaching and learning in classrooms was required to be both teacher-led and student-led. Student outcomes were highly stressed; pushing students towards A* or Grade 9 was the aim.
Scheme of Work (SoW)	Received the SoW from the department and it consisted of the topics to be taught during the term.
Teaching resources	Used textbook and his own teaching experience as a resource.
Duration of the lesson	40 minutes
Class sets	Top set
Discipline in school	No disciplinary issues. The students and Alex took five minutes to settle in the classroom. Alex was quick to set his teaching paraphernalia and write the task on the whiteboard.
Teacher	
Vertical axis	No strict hierarchy. Each teacher on his own.
Classroom Practice	
Instructional practice	Selected, sequenced and paced his lessons according to connectivity between the topics provided in the SoW. Alex moved backwards and forwards in the textbook, not following the sequence of topics or questions in the textbook. Used questions and students' responses as evaluation criteria.
Instructional context	The students were seated in rows of three columns. Alex did not have his own classroom; he was allotted someone else's room, and hence did not make changes in the seating arrangement. He used different screens of the whiteboard to write students responses to the problems that the class collectively solved.

Regulative practice	Alex gave short durations for the students to solve the problems and engaged them in whole class discussions.
Everydayness	The students were comfortable with the format of solving problems collectively while individually working on them. They trusted the teacher, which included that they could also show their resistance to accepting new information to him.

5.2.2.2 Analysis of the Lesson

The lesson serves as a stark contrast to Justin's lesson in terms of the duration of the lesson and the choice of material, and how within such a context, Alex worked his way through his intentions for the lesson.

Alex utilised every bit of time he had at his hand. He wrote the tasks on board so that the students did not get distracted by their texts, and also it enabled whole class discussion on the task. In his first lesson, which I discuss here, he started with something that required the students to bring in their prior knowledge of the concepts, and then, later on, he demonstrated to them, seeking their responses, doing the same thing differently that would save their time in the exam by avoiding lengthy calculations. They reached a formula that could be applied to the kind of tasks they were doing, but to create that formula was complex thinking and required the students to shift their way of thinking by thinking differently of the situation, and thereby recontextualise their learning (Linell, 2009).

The first task, as shown in Figure 22, that Alex introduced was to find the area of a triangle with two sides and the angle between them given. The intention for the task was "to recognise how they might solve the problem without having to learn a new formula," so that they could apply their "old knowledge to divide the triangle up into two right-angle triangles" to get the height of the triangle (during the interview).

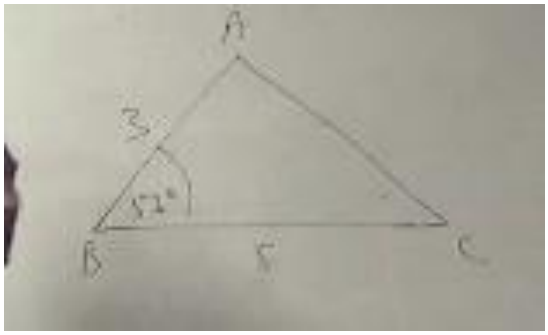

Figure 22. First task: Find the area of a triangle

The first question Alex asked in relation to the task was whether they could figure out the kind of triangle that it might be. One of the boys suggested that it could be a right-angled triangle. Alex questioned, “What happens if this is not a right-angled triangle?” The boy suggested that they could make one, followed by suggestions from others on the possibilities of making a right-angled triangle. “May be draw a line, bisect it,” responded another boy. Alex named the vertices of the triangles, A B C, and probed where they thought to bisect: “From A to halfway” or “sort of line is gonna come up from BC.”

Alex was looking for an appropriate word for that line. Words like tangent and chord surfaced. Alex suggested they should think of the angle the line would make at BC. Finally, the students got the right word, “perpendicular”. Alex also picked on a common misconception (Karpov, 2003) of using the term “bisect”. He explained that they did not have an angle given at A, and hence it could not be bisected. He further said that it also does not mean dividing the bottom line into halves. However, the issue returned a few minutes later.

The whole class discussion then went forward to work on the area of a triangle. The students were aware of the area of a triangle as “half base times height.” Alex explained that the perpendicular drawn was “h” for height and that they were given the base “a”, which was 5. One of the boys suggested that they must find the length from B to the point where the perpendicular was drawn on BC, which he had calculated as 2.5. Alex rephrased the

student's response, "BC is 5, so B to mid-point is 2.5", to draw their attention to where they might have gone wrong. He assisted them in recognising what might be happening in that situation. One amongst them suggested that they could use the Sine rule $\frac{a}{\sin A}$.

Someone else suggested that they could find h, but that did not require them to apply the Sine rule. Alex tried to remind them of the little mnemonic that they had used in lessons. However, a suggestion as before came forward of doing $\frac{h}{sin\ 53°} = \frac{3}{sin\ 90°}$. The students, as Alex interpreted, were trying to use the right angle that was created by drawing the perpendicular. He felt that "they were in a mindset of using the Sine rule, but what they actually meant was SOHCAHTOA, which is using Sine function." Alex went forward with the calculations, seeking the steps to solve the problem from the students. The students solved the height as 2.396, which rounded as 2.4, by placing the values to the equation formed $\frac{h}{sin\ 53°} = \frac{3}{sin\ 90°}$ and used it to calculate the area of a triangle.

Alex explained that in the triangle, which they used to find the area, they had the opposite (h) and the hypotenuse (3). He drew a small triangle with three sections SOH, Sine Opposite Hypotenuse, to remind them of the "little mnemonic", as shown in Figure 23, which they have used in the past. He suggested that they could utilise their methods, but there were "simple methods" as well.

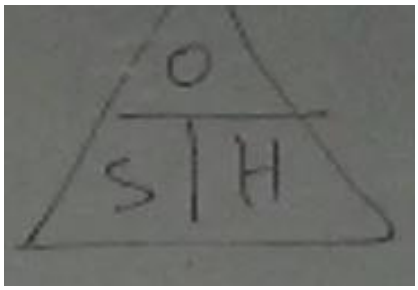

Figure 23. A mnemonic

He then assigned them the next task, a mirror image of the first one, as shown in Figure 24. It was the same problem, which just required them to see it from a different angle. The students simplified the task using the same method $\frac{h}{sin\ 37°} = \frac{4}{sin\ 90°}$.

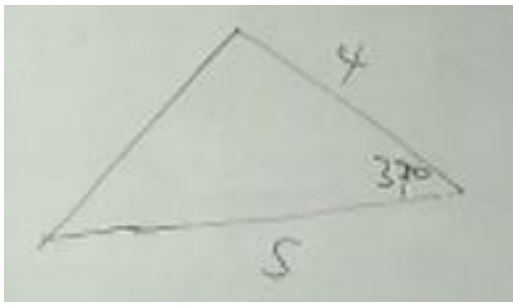

Figure 24. A mirror image of the first task

Alex once again explained that all they had to use was SOHCAHTOA and did not need to complicate it. The base of both the triangles was the same and so was the height as one of the boys suggested after doing the calculation and suggested that the triangles were similar. Accepting the response, Alex questioned again, "These two are similar triangles, but what sort of triangle is this?"

The important thing that Alex wanted then to confirm was whether the triangle had the sides 3, 4, and 5, and how would they check the shape of the triangles, how would they confirm that the triangle was right-angled. This time the students responded with that they could use Pythagoras theorem to find if the equation, "hypotenuse square is equal to the sum of the other two sides square [$5^2 = 3^2 + 4^2$]", was true.

Since the two triangles were mirror images of each other, the three sides of each of the triangles, as proved, were 3, 4 and 5. At this point, Alex took the students' attention back to the first problem, as shown in Figure 25.

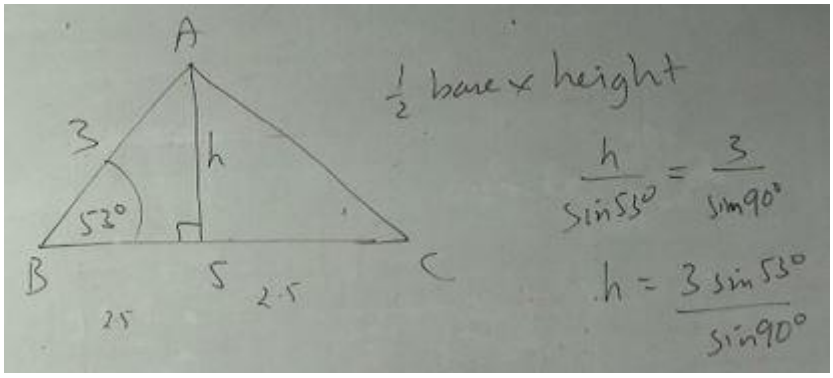

Figure 25. Back to the first task

He explained using SOH, which he had been urging the students to focus on, but they kept relying on the method they were more comfortable with for solving the problems. He explained that if the side AC was 4, then $sin\ 53\ °$ was $\frac{4}{5}$. He drew a right angle at A and explained the task again. BC was hypotenuse, the angle at B was 53º, and the side as someone answered was the opposite of the hypotenuse. He asked what ratio would they use, which someone said was Sine. He went on to explain that if he substituted 53° with theta (θ), then Sine of theta (θ) would be $\frac{4}{5}$ and, therefore, $\theta = sin^{-1}\left(\frac{4}{5}\right)$. He asked the students to pull out their calculators and find out what the angle should have been? The angle was 53.1°. Alex explained that 53.1° was what the angle at B should have been, and that was the reason that they had a slight error in the values of height and area they had found.

He then said to look at how they might simplify that. He explained that "h" actually came from $3\ sin\ 53°$. The area of the triangle to the left side of the perpendicular drawn in triangle ABC was five times $3\ sin\ 53.1°$, with the value of theta as it should have been, and then halve it. He explained the same for the second triangle taking responses from the students. Hence, they were looking at the two sides, sides of 4 and 5, with an angle in the middle. In the above one, the left-side triangle, they were using sides 3 and 5 and angle 53° in the middle. He wanted them to think about how they might use the two triangles in relation to the sides and angles used (adding a layer of abstraction).

He continued to explain and stressed on the area of the two triangles in the two problems so far. In the first one, as shown in Figure 26, the area was half of 5 (base) times 3 Sin 53.1° (height), that value of theta as it should have been. In the second triangle, as shown in Figure 27, the area was $\frac{1}{2} \times 5(base) \times 4\ sin\ 37°(height)$.

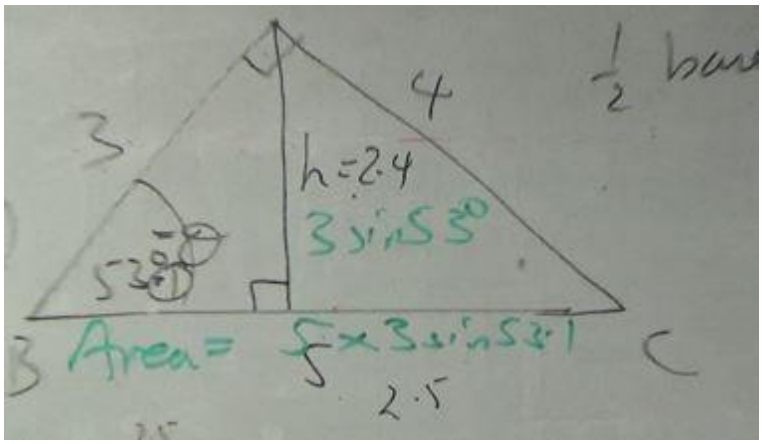

Figure 26. The first triangle

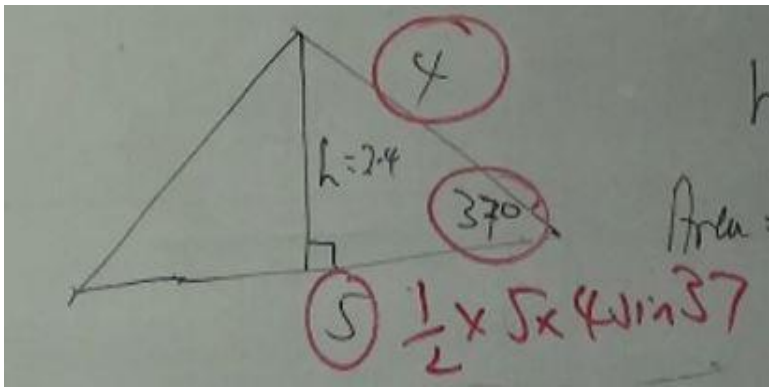

Figure 27. The second triangle

He asked them to describe how they might be able to translate that mathematics of the areas of the two triangles into a relationship between those two sides and the angle (a point of struggle). He gave the first hint and wrote on the board, "½ times by" for both the areas. The second common element was the base, one of the boys suggested. For the third thing, some suggested angle, while some said height. Alex, taking their responses, suggested them to divide the third thing, "to separate the Sine bit in 3 sin 53° and 4 sin 37°, and just think of 3 and 4." He urged them to think of "where were the sides in relation to both the

angles." He wanted them to recognise that the third thing was the other side that was next to the angle. He wanted them to realise where it was coming from, "Because that was the key thing and if they're going to memorise it properly, then they need to have that visual idea that it is the two sides and the included angle" (during the interview). He wanted "a visual understanding of what they're doing, not just a written rote learnt formula" (during the interview).

One of the students responded that the side was opposite to the right angle. Alex pointed out at the right angle to show that that was not the case. Another student then said that both the sides in different triangles were adjacent to the angles. Alex confirmed whether the students knew the meaning of the word "adjacent" and wrote the word "between" that came as a response from yet another student in relation to the angle. He then explained that the angle theta was between the two sides a and b, which were adjacent to it.

Alex then wrote the equation as $\frac{1}{2} \times a \times b \times sin(\text{angle between})$ to find the area of a triangle, as shown in Figure 28.

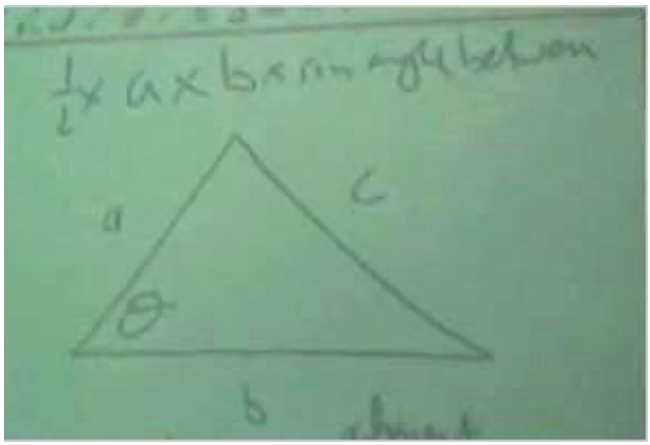

Figure 28. The equation to find the area of a triangle

He stressed that the equation might work for any triangle, not only a right-angled triangle, and gave them an example to solve and work out the area of the triangle with sides 4 and 7, and the angle in between as 30°. The formula worked. The students were then instructed to solve two questions from the text. Alex explained that the questions were

straightforward and also served to give the students a break from his talking. He observed that the students were still trying to divide the triangle and solve. Though the students engaged with deriving the formula, they were not confident in using it to solve the tasks assigned. Alex realised that they were struggling; they did not find the formula straightforward, it was confusing for them, and hence resorted to something they understood and broke the triangle into parts. He drew one of the questions he had assigned, see Figure 29, from the text. He instructed the students to pull down their books and focus on the problem.

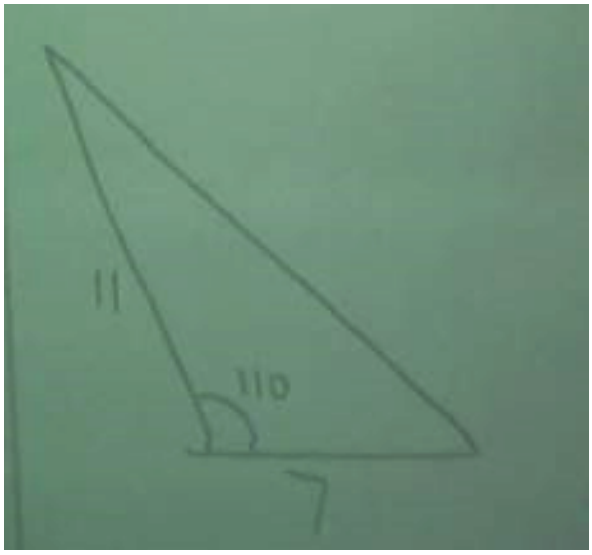

Figure 29. A question based on the leaning triangle

He then questioned, “How we will find the area of a triangle which is leaning over like that” (returns to their prior knowledge). A suggestion came that they could find the altitude. Another boy, among the few who used the formula, suggested they could use the formula. However, Alex wanted them to think why that formula would work? He questioned them to provide him with one piece of information that he could add to the triangle. Several students agreed to add angle 70°. Alex drew the altitude outside, see Figure 30, and wrote the angle. What was height equal to, he asked. It was $11\ sin\ 70°$, a student answered. He wrote the area of a triangle as the students spoke, $\frac{1}{2} \times 7 \times 11\ sin\ 70°$.

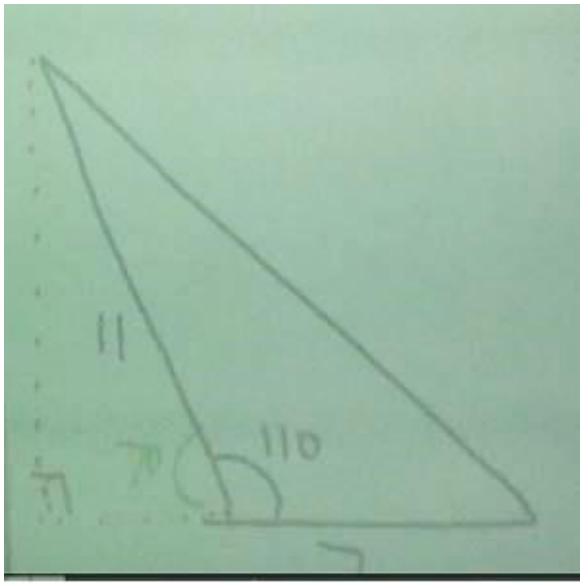

Figure 30. Find the altitude of a leaning triangle

Alex wanted to draw their attention to the two triangles in the above figure: the triangle which was given as a task; and the triangle they formed outside. He wanted them to notice any difference. To bring their attention to that, Alex drew a graph and questioned if they remembered the “Sine wave” (moving toward abstraction). He asked one student to draw the wave on the board. Alex then drew a line in the middle of the upper wave, as shown in Figure 31, and questioned what they could tell him about the two parts of the curve on either side of the line of symmetry (engages them in reasoning, a move towards abstraction).

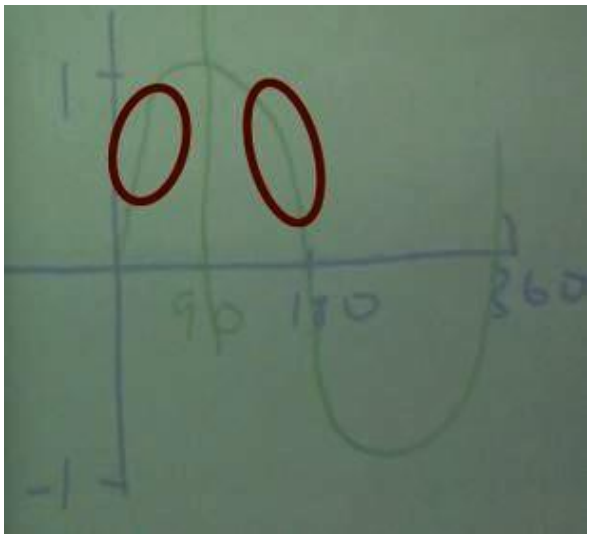

Figure 31. Two parts of the curve on either side of the line of symmetry

The student said that those were same, and later corrected himself to that those were symmetrical, using the appropriate mathematical language as Alex insisted. He drew another line within the upper wave, on the right side of the line of symmetry, which was at 110°. He questioned how far was that from the line of symmetry? A boy answered that it was 20° away. How much was 20° back from 90°? It was 70°, replied the students. He again questioned, "What could you tell me about the Sine values of those?" (marked in a circle in Figure 32).

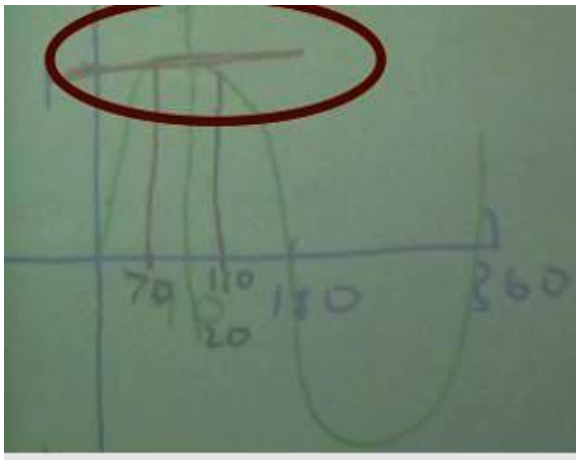

Figure 32. Sine values

The values were the same, said the students. Alex explained that it meant that instead of writing $sin\ 70°$, he could write $sin\ 110°$, and "get exactly the same numerical answer." He added, "[that] is why it [the formula] works because of the symmetry of the sine curve. When we put in this a 110, it gives us the 70, a value for the height, automatically. So, it will work at any triangle."

In the end, he summed up the lesson for them, "what we take out today is there is a rule for finding the area of a triangle which is if you do half of sine of the angle between the two sides multiplied by the two sides, you get the area." He asked them to write the formula, $\frac{1}{2}ab\sin\theta$, where θ is the sine of the angle between sides a and b and reiterated that they could use that formula, "it saves from having you split the triangle to find the height because

you are automatically finding the height." The understanding of the symmetry of the sine curve was "a discrete piece of information they needed to work with to understand how it [the formula] works and why it works" so that "with that in the background they can operate it with confidence."

The lesson involved revisiting of prior knowledge of the area of a triangle, trigonometric functions and SOHCAHTOA (horizontal learning), and using this knowledge to move toward further abstraction. The process involved students' use of their previous knowledge of a traditional way of finding the area by finding the height to deriving the new formula by which they find the area of a triangle using the given sides and the angle in between; and made them struggle in making way for their new learning (Vygotsky, 1997).

5.3 Chapter Conclusion

In this chapter, I have examined the role that participant teachers of both English and mathematics played in mediating their students' "vertical learning" and "horizontal learning"; the ways in which they used their expertise in assisting their students form the scientific understanding of the abstract concepts (Colonialism, Prejudice, Representation of three dimensions and Area of a triangle) that they engaged with (Vygotsky, 1997). Bernstein (1999) used the terms – vertical and horizontal – in relation to pedagogic discourse at the institutional level. I am using the terms in relation to the structure of students' learning in a classroom teaching and learning situation.

To conclude, in this chapter, I illustrated the participant teachers' individual way of functioning in the following ways: (a) the impact of the socio-historical context of the institutions in which they work and the demands that these place on them, in some respects, regulates their thinking, by means of which classroom learning culture is shaped; (b) how, through the use of tasks, they create a shared learning space, make dialogue possible, and

shape their students' learning experiences; (c) use everyday knowledge of the students to build their understanding of more abstract concepts and engage them with that, which adds to their vertical learning; (d) learning of the content by the students and learning about the students' learning by the teachers takes place simultaneously; and (e) teachers not only manifest the institutional demands in their teaching and learning situation in the classrooms, but, by doing so and by incorporting their interpretion of the demands with their personal sense of their experiences, they establish the norms for the kind of teaching appreciated within the contexts in which they work as well.

Chapter 6 Thematic Analysis: Across Cases

In the previous chapter, I presented detailed lessons from four teachers demonstrating their role in the conceptual progression of their students' learning. This chapter deconstructs the process of conceptual progression into processes through which all the participant teachers supported their students in their learning. Five broad themes have emerged from the cross-case analysis of the lessons from the eight teachers: task design; practices of formative assessment; recontextualisation; reflective practices; and knowledge base. The frameworks of description for four teachers – Lisa, Jeffrey, Justin and Alex – were provided in Chapter 5 and the frameworks for the other four teachers – Steve, Lauren, Linda and Tyler – are provided in Appendices from L to O. Please refer to section 4.7.3, and Appendices I and K for school descriptions. Table 3 provides the lesson details for all the participant teachers.

6.1 Task Design

Task design assisted the participant teachers in their thinking about teaching the subject content and prepared them for classroom teaching and learning action. This section presents the way in which several components come into play in designing tasks. I have grouped these components into six elements of Task Design: Context; Intention; Figured worlds; Selection of artefacts; Learning objectives; and Task distribution, instruction and time management. The description of each element is presented in Table 10.

Table 10. Elements of Task Design

Six Elements of Task Design	
Context	Refers to teachers' repertoire of knowledge that supports them in their thinking about creating learning situations. It includes teachers' knowledge of institutional demands that regulate teaching and learning in classrooms and therefore, the nature of talk; teachers' awareness of their students' prior learning of concepts; knowledge of Schemes of Work provided by their departments; and their past pedagogical experiences including their education and training.
Intention	Gives direction to the teacher. Refers to teachers' thinking about what they want their students to learn and why they want that.
Figured world	Refers to teachers' imagining and organising a near future classroom experience in bringing about a change or shift in students' thinking; deriving from their intentions.
Selection of artefacts	Use of resources as both material and concepts for teaching and learning. These artefacts can be drawn from teachers' own collection of resources, derived from websites, borrowed from colleagues or handed to the teachers by their departments. These resources can be used either as a direct resource for the task or as a supporting material that the students might use to reflect upon their own learning.
Learning objective	Serves as a guide to students. It refers to what teachers want their students to be able to do as a result of learning. This is closely related to intentions but becomes explicit during the teaching and learning situation. Teachers' intentions are presented to students in the form of a topic to learn or as clear set of guidelines, both verbal and/or explicitly written, about what they should be able to accomplish.
Task distribution, instruction and time management	Refers to teachers' division of tasks among students accompanied by information about how they are expected to carry out a task; gives students direction and sense of time; helps teachers organise learning in an allotted time.

The six elements mentioned above might be seen as three phases involving inquiring, organising and managing. The inquiring phase includes context and intentions. It involves what is it that the teacher is seeking and why. Given the awareness that teachers have of their institutional demands, the content that they are required to teach, prior knowledge of students and their interests, and their past educational experiences, teachers make their intentions for teaching and learning clear to themselves. The next phase involves organising intentions which includes imagining a near future classroom situation and selection of artefacts. Teachers imagine how they will navigate teaching the subject content with the intentions that they have for students' learning and the ways in which they will engage

students with academic concepts. Teachers also think of organising artefacts that serve as both teaching material and concepts that help them to conceptualise the pedagogical approach and activities with which to engage the students. The third phase is an extension of the organising phase as it involves the management of task execution and becomes explicit during the teaching and learning situation. It includes making learning objectives known to students either explicitly or implicitly; and includes task distribution, instruction and time management. Teachers state learning objectives either as explicit two or three written objectives on a whiteboard or by stating the theme that the whole class will work towards or by writing a topic on the board. By doing so the teachers give a sense of direction to the students about what is it that they are learning and what is it they should be able to do or know in a lesson duration. What students will do and how they will engage with the learning of concepts through tasks assigned in groups/ pairs or whole class discussions will assist them in accomplishing the objectives.

In presenting the findings for this theme, I will provide evidence citing instances from lessons designed and taught by the teachers: Lisa, Linda and Tyler who were teaching English in Spring Hill School, Lakewood School and Forest Lake School, respectively; and Steve and Lauren both of whom were teaching maths in Valley View School. Tyler's second lesson involved a variety of tasks within a forty-minutes lesson; Lisa's third lesson was designed by her and, in this case, not handed down by her HoD. Linda's first lesson is noteworthy in comparison to Lisa's third lesson as both the teachers taught how to structure a written response to GCSE questions to their Year 9s. The examples of Lauren and Steve will serve to shed light on their thinking and varying choices that they made working within the same context. The theme will also function to provide a background of lessons from teachers other than discussed in Chapter 5.

6.1.1 Context

The participant teachers of both the subjects used their interpretation of the demands placed on them by their institutions in the form of good teaching policy in regulating students' learning and thereby influenced the nature of talk in their classroom. They reflected on their students' prior knowledge of concepts and their own past learning experiences. They reflected on the ways in which they might support their students in drawing connections with their previous learning and present learning of the content.

For instance, Linda was teaching her top set Year 9 students to structure their response to a GCSE type question. Linda's school regulated learning in the classrooms by means of success criteria in the form of three medals that the school had provided to the teachers to use in every lesson; it was mandatory school policy. The discussion of the criteria was at the heart of whole class discussions and regulated not only Linda's thinking but also her students' as they were expected to use the criteria in their thinking about critically analysing the poems that they were reading.

Hence, in teaching an in-depth critical analysis of one of the two First World War poems 'Who's for the Game?' by Jessie Pope and 'Dulce Et Decorum Est' by Wilfred Owen that the students had been reading, Linda made use of the school's policy of incorporating the success criteria of bronze, silver and gold medals (refer to section 6.1.5). For every lesson, the criteria had to be presented to the students:

> "We have bronze, silver, golds, and the idea is that whatever they [students] do in the lesson, they'll get somewhere. They'll get a medal." (Linda, during lesson planning)

The students were required to use the medal criteria to self-assess their work. Linda, on the other hand, used it as a tool to frame questions in order to help them reflect and think of how they might address reaching the outcome that they had intended for themselves. For example, if a student intended to reach silver but had assessed, either through interaction

with her peers in the group or with Linda, that her analysis was at bronze level, then Linda prompted the student to think how to reach the silver level.

Lisa, like Linda, was teaching Year 9 students, top set, to structure their response to a GCSE type question. She was also teaching in a context that followed a very tight top-down approach. As discussed earlier in Chapter 5, Lisa was not allowed to frame tasks for her lessons. These were handed down to her by her KS3 HoD. The only exception was her lesson on teaching students how to structure their responses to a GCSE type question, but the task created had to be based on a GCSE exam pattern.

In thinking about what she wanted her students to learn and why, Lisa reflected upon her students' prior knowledge to particularly assist her students to develop their arguments and, through that, their writing skills. She had been teaching them to find patterns, which they had done five lessons ago in response to a practice exam question. In that lesson, they had looked at language patterns in Chapter Seven of the text *Down and out in Paris* and looked at the presentation of the theme of exploitation. In the present lesson, she wanted them to look at structural patterns, "just to help them to talk about the breadth of the chapter" (during the interview). Moreover, she recalled that when they were working on the same text a few weeks ago the students wrote about the same structural point that she spoke about in that lesson and that said to her that:

> "they didn't learn because they repeated what I said. Which is why all the examples I gave them was [*sic*] far away from what they were to write so that they could then create their own." (Lisa, during the interview)

Hence, to help them develop confidence and the skill of presenting argumentation in writing, she provided an example of a different situation which would make her students think on their own and not rely on her for answers.

Tyler was teaching American poetry to the Lower Sixth Form at Forest Lake School. He was working in a context that required him to exercise his authority as a teacher and, at

the same time, provide students the opportunity to lead their learning, something which was not very explicit in other teachers' contexts. Tyler was aware of his students' prior knowledge, and he used that knowledge to design what he wanted to focus on. His students had been reading *The Great Gatsby* and were familiar with the concept of the 'Roaring Twenties'. Tyler used this knowledge to think of what is it that he wanted to engage his students with, something that might assist him in combining students' reading of the novel with similar concepts in poetry

In the case of the mathematics lessons, Lauren and Steve were teaching in the same school and same department. Their department did not give them any strict guidelines to follow, something which was visible in Lisa and Linda's case, and this shaped the way the two teachers did things differently. The two things that the department demanded from them were to give verbal feedback to the students and use a lot of questioning. Both Lauren and Steve were teaching at KS3. Lauren was teaching bearings to Year 8, while Steve was teaching the base numbers to Year 7. Both the teachers included opportunities for their students to discuss their thinking about the concepts that they were learning and discuss the processes of problem solving by making them work in pairs and involve them in whole class discussions. Lauren was aware that her students had the knowledge of angles and direction, and she used that knowledge to steer their learning forward. Steve also knew that his students would know what ten to the power meant:

> "I was confident that they would know that. And if they've forgotten it, then we can deal with that quite quickly. I was confident they could write those numbers as words." (Steve, during the interview)

He utilised this knowledge of his students to take them a step further in their learning of the base system.

6.1.2 Intention

Teachers' intentions are influenced by their contexts, the institutional demand, the SoW and students' prior knowledge. Intentions give direction to teachers; it involves what the teachers want their students to learn and why they want that, and further shapes the organisation of teaching and learning situation.

Tyler's SoW provided from his department had required him to teach American poetry covering a time period from 1880 to 1940 and the novel *The Great Gatsby* by F. Scott Fitzgerald. One of the major themes that Tyler had identified in the novel was the theme of immigration. He wanted to engage the students in forming their understanding of the American attitude towards immigration surrounding the novel. He reflected upon his starting point and decided to work backwards from the outcomes:

> "What I want them to be able to do and how will I know if they've done it most." (Tyler, during the interview)

He designed his main task based on what he wanted his students to think, how much he wanted them to read and what essay he wanted them to write. Tyler's intention to make students think about how attitudes towards immigration and social class changed or developed in the 30 to 40 years surrounding the novel directed him to think of the artefacts and imagine how he might use them.

In her lesson on structure (see Appendix D), Lisa wanted to engage her students with two things: firstly, "to look at the exam question and talk about the components of the exam question" (during lesson planning) in responding to a GCSE exam question based on the fictional text; secondly, she wanted them to form opinions, to be able to explain their thoughts and provide evidence from the text to support their opinions:

> "Because, even in our writing, the explanation part is the most important. You can't explain, you can't move past band two or three, that's the first thing. Second thing, they use vague language. So, I can only get to the specific point they are trying to

> make through the asking. And finally, they need to learn that their responses need to be more specific, more defined." (Lisa, during the interview)

Hence, Lisa thought of where to start to get her students to the end:

> "Where are the areas that they will fall, how can I phrase it [question] so more students can access the question I'm trying to ask, and what is the importance of this question to what they're about to do…it's where do I have to start to get them to an end?" (Lisa, during the interview)

The starting point was important to her to assist her students in their writing:

> "What question can I bring forth that will help them in the easiest way concerning the chapter, but also to build an opinion about the text. So, any written question like this has got to be opinion based." (Lisa, during the interview)

She wanted to phrase a question that would provide scope for her students to reflect on the demand that the question places on them, the specific element that it requires them to focus on, and think of the patterns that they could derive and provide evidence of that.

The focus for Linda was to assist her students with the process involved in analysing the two poems in order to be able to write a final essay for which they would be assessed:

> "start thinking about analysing the language uses closely and the techniques closely [in Owen's poem] before they start to compare those techniques to the Jessie Pope poem." (Linda, during lesson planning)

Her intentions were not for them to focus on drafting the essays but focus on close analysis which was a step between the students' understanding of the poems and the writing of their essays.

Lauren reflected on how to make her students "evaluate on their learning" of the concept of bearings so that they use their new knowledge to apply to situations that she imagined to engage them with: "because they will actually be finding bearings." Before introducing the concept of bearings to her students Lauren wanted them "to feel that they understand how to estimate angles and if their estimations were quite accurate" (during the interview). She had designed the first and second lesson on bearings with the intent to convey to the students the rules for measuring bearings and help them understand the

mistakes that one can make while measuring those. In her second lesson, she had planned to engage the students with more contextual questions and real-life situations in which they apply their knowledge and find things, and reflect on the patterns that emerge. However, she did not at this stage plan of what she might do in her third lesson as she wanted to wait for her students' responses from the first two lessons to think about her next move. I will discuss this decision in section 6.1.4 on selection of artefacts.

Steve wanted to achieve two things from his lessons. Firstly, to give his students a better understanding of the Base 10 system and place value, in general, by introducing different bases and engaging the students with them. Secondly, it would allow him, in the next term, to use that as a self-planned extension technique at the start of a lesson as a ten-minute activity. Steve would start from what his students knew and then build from there.

> "What is the mathematics they know and how does it relate to what I want to teach them. What's the link between those things? Well, I am very much trying to start from what they already know and link it to the next sort of thing. So it sort of like builds rather than it just being a separate thing." (Steve, during lesson planning)

He wanted to assist his students to bring their previous learning of concepts and reflect on those in connection with new information that they would be introduced to.

6.1.3 Figured World

The name of this theme is derived from Holland et al.'s (1998) concept of the figured world which refers to imaginary situations that individuals create to change their sociocultural reality or overcome a difficult situation. This study highlights that the figured world as a concept is of utility for pedagogical decisions as well, especially in designing tasks. The purpose of teaching is to change students' spontaneous knowledge to scientific knowledge or to take them further in their level of abstraction of the concept (Vygotsky, 1987). Either way, the participant teachers intended some shift or transformation, illustrated in detail in Chapter 5. In order to do that the teachers organised their thoughts for teaching a particular

topic in which they organised the ways in which they will overcome the challenges in bringing about that shift. They organised situations for their students as well; the situations in which the students were required to think of entering an alternative reality and think of themselves as critics and evaluate the situation they are in. To illustrate the point, I present a few examples.

Tyler created an imaginary situation whereby he would be able to fulfil his intentions of introducing the students to attitudes on immigration, engaging them with different perspectives and building their understanding of the concept of immigration through focused instruction and discussion. The challenge for the students was "figuring out and discovering it. That was the process" (Tyler, during the interview). Hence, he invited the students to imagine the world of people impacted by immigration and think of the social changes involved in the concept of immigration involved from different perspectives by engaging them with three different readings and thereby entering three different worlds/situations.

Lisa weighed the learning situation that she would enter in a very near future in which she intended to engage the students with analysing the text and writing a response to a GCSE question:

> "Work has completely destroyed the characters' moral compass. Looking closely at the narrator's attitude by Chapter Eight, how far do you agree with this statement?" (Lisa, during the classroom observation)

She only had one lesson to achieve her goal for the lesson:

> "A lesson following this, upon my reflection, is to actually look into these sentences in more detail. So, that's something I definitely need to do." (Lisa, during lesson planning)

She would have another lesson on the structure before the students sat for assessment. Therefore, it was critical for her to do the groundwork before thinking of stretching them further in their writing. She added,

> "What I want them to do is look not just language as a pattern but also structural patterns as well. Just to help them to talk about the breadth of the chapter. They're going to obviously pick those in the example that I give them because, of course, they know how to do this skill. But also, it would give them an opportunity to explore things that they want to respond. Then finally, they're going to write a response." (Lisa, during lesson planning)

Lisa visualised that the situation involved three challenges for her: helping the students understand the importance of the keywords and finding them; assisting them in building an opinion by connecting each other's ideas; and to be able to write "sophisticatedly" (during lesson planning).

Lauren imagined the way to engage her students with the concept of bearings and which became especially essential to her because she felt that she had failed in her previous two attempts at introducing the concept to her students from previous years. In her first year, she had only stated the rules; in the second year, she added reasoning to the rules; this was her third year of introducing the concepts:

> "I need to get them engaged, and I need to get them thinking about how many different jobs would use this and why would it be important for it to be measured from the North? Why is that continuity important? So that they don't just see it as three rules they have to remember. They think of bearings as something that is used, and for it to be used effectively, these three things need to happen or they wouldn't work… because if they don't, bearings won't work for everybody" (During the interview).

Hence, she created a narrative around the rules (refer to Appendix F). During the lessons, she invited the students to imagine runways and think of the structure of runways; she invited them to imagine going from one place to another and think of the bearing that they might start from and the bearing that they might reach; think as critics of the mistakes that other people might make when measuring bearings; finally, work as a team in pairs and think of themselves as members of Royal Air Force while working through the tasks (will discuss in section 6.3.2).

Steve imagined the structure of his first lesson. He would begin by asking them to calculate powers of 10 and write those in words as this will "make explicit the Base 10 place

value system and what the numbers actually represent" (during lesson planning). Students would also calculate powers of 2, 5 and 7, "This would act as good practice for powers, but also be available later for use when working in these bases" (during lesson planning). They would then move on to a teacher-led part, wherein Steve would show them a slide of 'how many dots are there?' and then show them the number 4326798, emphasising place in number and then linking back to the powers of ten. They would then go back to dots,

> "We can now consider how we would write in base 5. Setting up columns for base 5 and taking lots of 25, 5 and units." (Steve, during lesson planning)

Students would then work on writing the number of dots in different bases,

> "The questions keep the number of dots fixed while the base varies, this is to emphasise that these are multiple representations, rather than different numbers. For the next set of questions, he will keep the base fixed and vary the numbers." (Steve, during lesson planning)

He aimed to assist them in making sense of the transitions from one base to another and understand different representations of the same number.

The figured world formed the key part of the participant teachers' designing of tasks and structuring their lessons in two ways. Firstly, by serving them to imagine their future classroom learning situation, whether it was detailed or brief, in which they would enter and put to practice their intentions for students' learning and their course of action. Secondly, in their visualising of the lessons, the participant teachers involved their students. They thought of inviting them to enter as literary or mathematical critics into a new reality that they had created for them in the form of tasks.

6.1.4 Selection of Artefacts

The teachers' selection of artefacts, both for the main task and supporting material, was influenced by their intentions and their SoW. Teachers used the SoW provided to them by their departments along with other resources: material derived from their own resources; the

knowledge gained from their experience of teaching a particular piece of content over time; material borrowed from other teachers or from teaching websites; and their own material and notes that they had maintained over time.

The SoW provided Tyler with the American text to cover for the term; however, it did not recommend the poems. Tyler selected three poems to use in teaching and one more poem as a supporting material to hand out to the students to read in their own time. The selection was based on his own understanding of the American literature, on which he had taken a course at university. In combination, the poems would help him put the novel that the students were reading for the term on the "historical continuum" (Tyler, during the interview). Tyler was, therefore, aware of the different perspectives that the poems would offer to the students; and thus he combined the SoW with his own resources to draw the material from in order to drive his intentions for students' learning. He had imagined his students would explore all sides of the story of immigration, what people experienced and how they felt about it:

> "I deliberately picked three examples, one very pro-immigration, one very anti-immigration and one from the perspective of an immigrant." (Tyler, during the interview)

The three poems he selected for the lesson were: 'The New Colossus' by Emma Lazarus (1886); 'Ungaurded Gates' by Thomas Bailey Aldrich (1894); and 'The Buttonhook' by Mary Jo Slater (1954). Apart from the three poems, Tyler provided the students with one of Langston Hughes' poems 'Let America Be America Again' (1935) as a supporting material:

> "It didn't quite fit in the narrative perspective…it does say interesting things about the marginalised voices of America, and it does say interesting things about the social relationship and the relation between wealthy and poor, and black and white and all those things. It could have gone really well as a poem but, actually, I just wanted them to have it." (Tyler, during the interview)

Tyler was aware of the Afro-American struggle for equality, and that Langston Hughes was a key figure associated with the Harlem Renaissance. He wanted his students to also think

of the marginalised status of the people who, despite being American citizens, lacked a voice in mainstream American life. It would add another dimension to their understanding of the concept of immigration and view the social changes that were taking place in the city of New York, something which he did not incorporate in his lesson but thought to hand it to the students' to reflect upon on the basis of their discussion that would take place in the class.

Lisa's SoW provided her with information on the text to read for the term, George Orwell's text *Down and Out in Paris*. She combined the reading of the text with a sheet containing stem sentences (refer to Appendix E) as she wanted the students to use those sentences to frame their responses. She had observed that in their practice exam, the students did not write in a sophisticated way, which was why providing an extra resource was for her a way of giving them a chance to reflect on their structuring of responses.

Along with quotations from the poem that the students were critically analysing, Linda provided her students with pink sheets which contained a list of things that she expected to see in an analytical essay:

> "It has on one side of the column what I want to see and, on the other side of the column, it has how they could do that. So, instructions for how they could do it if they haven't done it. So if I set it, there was a target, they can use that sheet to look at what they could do include in it." (Linda, during the interview)

The students were required to use the sheet as "a point of reference of skills" (Linda, during the interview) when analysing the poems.

Both Lauren and Steve were provided with the topics to teach. However, while Lauren used a combination of different websites, the one recommended by her department (STEM) and the other on her own accord (Diagnostic Questions), to engage the students with misconceptions; Steve created his own slides, deriving from mathematical ideas presented in research on the concept of teaching base numbers. Lauren did not provide any supporting material for teaching the topic directly, but she had an additional task printed on

the back of the task sheet that she had provided the students, in case they wanted to practice on their own. Steve, on the other hand, had prepared extra material to use in class if need be.

Teachers' providing of the supporting material along with the main artefact/s to their students complied with their intentions for their students' learning. Tyler wanted his students to think about the concept of immigration from different angles and view the city of New York from the light of new knowledge that the material provided. Lisa realised that her students needed assistance in writing, specifically in framing sentences. Linda wanted her students to learn the processes involved in analysis and set targets for themselves, and work towards achieving those. Steve wanted his students to form a better understanding of the base 10 system by engaging them with other base systems. The teachers thus had clarity about what they wanted their students to learn, and that led them to decide on the material they would use in the lessons.

6.1.5 Learning Objective

Teachers' intentions for students' learning are communicated to the students in the form of learning objectives which refers to some form of guideline or information to students about what they will learn and what they should be able to do; it serves as a guide to students. This information is given to the students in various ways during teaching and learning situation: through outlining of specific objectives and reading those out to them; by stating the topic or a theme that they will engage with as a class; by reiterating the theme that emerges from discussion among students during the initial part of the lesson; and by the tasks that are assigned to them.

For instance, Linda used success criteria (as discussed in section 6.1.1) to define learning objectives (institutional policy) for her students. However, she attached her intentions for student learning to these objectives:

> "The harder I make it, the better for me in terms of differentiation because if I make the bronze hard enough, I'm really pushing the top end who do go for the gold, but I'm still, I suppose, giving challenge to the students that maybe shouldn't be going for the gold and should be thinking more carefully about where they're going." (Linda, during lesson planning)

She added the words "in depth" and "insightful" in the success criteria, which allowed her "to make the bronze, silver and gold success criteria" clear and challenging for her students:

> Bronze: "The least they would be able to do is to comment on the effect of specific techniques in 'Dulce' and compare these effects to the effects created in 'Who's for the Game?'"
> Silver: "Provide more than one effects or comment in depth or insight and add as much details to the comparison of 'Who's for the Game?' They would use PEAA (Point Evidence Analysis Analysis) by means of which they would layer their analysis and make more than one comment on a quotation."
> Gold: "Offer insightful comments on the effects of specific techniques and link by layering analysis. Include comments on context and message that link to analysis. Offer an evaluative comparison, which considers the similarities and differences, but also the relative successes of both the poems." (Linda, during lesson planning)

By creating the criteria, she met three challenges for herself: first, she met the school's expectations of discussing the criteria with the students; second, she provided a choice to the students to assess their current level of knowledge and skills based on the three medals and take a decision about where they wanted to see themselves in future and work towards that level; and, thirdly, she segued the criteria with her intentions in engaging the students with close analysis of the poem by making each choice very specific and challenging for the students to meet.

Linda and another teacher, Justin, were the only two among the participant teachers who displayed learning objectives for the students in the form of criteria as three or four objectives. Both did so according to the requirements that their institutions placed on them. However, this does not mean that the other teachers did not have a learning objective for their students and that the students were not aware of it. Although the other participant teachers did not explicitly write the lesson objectives on the board, they did set the objectives for their students for the lesson. They set these out in the form of either a topic (Lisa, Lauren) or the main task and activity they might engage the students with (Tyler, Jeffrey, Alex,

Steve, Lisa); or through what the task required them to solve or write. Hence, the students were indirectly aware of their learning objectives for a lesson.

6.1.6 Task Distribution, Instruction and Time Management

Task distribution, instruction and time management play a vital role in task design. The participant teachers used different ways in which they distributed tasks which were dependent upon the manner in which they wanted to engage the students with the tasks within the available time. The most common way was to assign the same task to all students and instruct the students to work in groups and pairs on specific thing required within the task. However, there were other ways observed as well, wherein teachers either used parallel tasks or divided different tasks to different groups. Doing so aligned with their intentions for their students' learning.

Tyler had only 35 minutes left from the forty-minute lesson to put his intention to action. Though Tyler distributed all the three poems to his students, he allotted one poem each to the three groups for critical reading, a strategy that segued with his intentions and the limited time at hand. There were three students in each group. When assigning a poem to the groups, he gave both common and specific group instructions. As a common instruction, he asked the students to think both stylistically and thematically, and also think about the themes that they had discussed in the previous lesson. As a specific instruction, he instructed group one to focus on the shift in tone in Lazarus' poem; group two to focus on the tone in Aldrich's poem and view the poem as a melting pot; and instructed group three to see Slater's poem through a lens of an immigrant, and to see the photo provided and infer. He thus achieved three things within a limited time. Firstly, he gave ten minutes of reading time to the groups to critically read the poems. During that he provided them with one-on-one group feedback and learnt about their thoughts and critique. Secondly, the groups

presented their critical reading of the allotted poem. Thirdly, the group's reading of the poem was followed by whole class discussion in which the students from the other two groups weaved in their comments on that poem.

To take her intentions forward, Linda planned to provide her students with six quotations from the poem 'Dulce Et Decorum Est.' with each quotation to explode at each of the six tables. After 15 minutes of 'explosions' (see Appendix I) she instructed the students to swap their explosion sheets with other groups and critique the analysis of the previous group. She instructed them to ask specific questions when analysing the critique. The questions were:

> "Have they found techniques, have they labelled them with the correct word to the techniques...have they commented on the effect of the technique." (Linda, during classroom observation)

If the previous group had not done any of those things, she instructed the present group to add in.

> "Then you need to ask yourself, have they commented on more than one aspect of the quotation; if they haven't, you need to use your pink sheet to layer their ideas and consider all terms of the interpretations. Every single comment they've made, I want you to ask the question why has the quotation had the effect they say it has had." (Linda, during classroom observation)

She wanted them to look at the 'why' and wanted them to explain the comment.

Lisa timed the duration to achieve her intentions for the students as smaller steps. Time allotted ranged from 3-15 minutes, according to the demand the task placed on the students. In her first lesson, she gave seconds as well, for instance, to look for a word meaning in the dictionary:

> "Sometimes the kids can be a little bit slow and they do intentionally because they're just kind of slowly going through, I don't have time for that. So, I give them seconds because then, they're like, 'Okay, got to get this done.' And for tasks that need more interrogation that's where I give them six minutes, where they talk to each other, they get as many of this as they can. They were only pursuing two points anyways so 6 minutes was actually a long time…So, they were just looking for the pattern and then talking about what that meant in response to the question. And then 15 minutes for the writing." (Lisa, during the interview)

Overall, Lisa was not very strict regarding the exact seconds or minutes as Justin was, but she still stipulated time to the students for them to stay focused.

Steve and Lauren, like Lisa, allotted a range of time, from 3-20 minutes, for the students to work on the tasks. Timing the task depended upon the situation: whether they wanted the students to try something that the students already knew and which required only a short time; or they wanted them to establish their learning of the concepts taught and for practice, and which might longer time.

The teachers simultaneously distributed tasks while interacting with their students or when the students were at work or while giving specific instructions.

Summary: Task Design

The six elements of Task Design discussed above formed an essential part of teaching for both English and mathematics teachers. The design of tasks was embedded with pedagogical activities in order to generate thinking about and dialogue around the concepts introduced; it was the foundation upon which teachers created experiences that they intended for their students. The six elements are closely knitted as these work not as separate parts but in relation with one another. For instance, context informs intentions, which further paves the way for teachers to imagine how they might steer learning, their selection of artefacts and how they might distribute tasks. Hence, several assertions can be made from the above analysis:

(a) Task design can be said to be intention-based or intention-driven.

(b) An institutional culture which includes lesson duration, SoW, departmental or school's expectations, prior knowledge of students, teachers' prior pedagogical experiences influences teachers thinking in terms of placing their intentions for students' learning.

(c) The teachers' intentions for lessons are straightforward and specific. Before entering the lesson they gain clarity over what they want to achieve and on their reasoning for that. The intentions are communicated to the students in the form of learning objectives.

(d) Figured worlds function as narratives that the teachers tell themselves to organise their intentions for students' learning. They see themselves as playing a key part along with their students in those worlds. The figured world also helps them foresee the artefacts.

(e) Selection of artefacts is imbued with what the teachers want their students to learn, why they want them to learn that and how they might engage them with those artefacts, on the one hand, and with what they want their students to produce or be able to do with their learning, on the other hand.

(f) Learning objectives and teachers' intentions are closely tied. The latter is used by teachers to direct themselves while the former is used by teachers to direct their students. Teachers of both subjects work on a continuum of their contexts to take their intentions for their students' learning forward and create opportunities for their learning of the subject content. Sometimes learning objectives might be a product of teachers' giving shape to institutional policy. However, these objectives are attached with their intentions for their students' learning. Teachers' intentions thus shape learning objectives.

(g) The element of task distribution, instruction and time management forms a natural and implicit part of teachers' functioning in the classroom.

6.2 Practices of Formative Assessment

Task design paves the way for teachers to practice formative assessment. The teachers created opportunities for themselves to know their students' thinking, where their students were in their learning of concepts or in their awareness of concepts, or of any cognitive conflict through the use of tasks. The following were the tools of formative assessment that the teachers employed:

Table 11. Practices of Formative Assessment

Practices of Formative Assessment	
Moving around the classroom	Refers to teachers' purposeful physical movement in the class when students are set at group or pair or individual work to listen to their discussions, observe their work, talk to them and assist them. Teachers reach out to the students at one-on-one or one-on-pair or group level.
Asking questions	Refers to teachers putting questions to students to elicit information from them or to direct their thinking; students' verbalisations serve as a source of information about their present level of learning.
Collaborative problem-solving	Teachers solve tasks along with students to make visible to themselves how the students might have reached an answer and, at the same time, helps students reflect on the reasoning that they provide and participate in the ongoing discussion.
Other ways of assessment	Teachers' use of tools to help themselves derive some pattern to assess the success or struggle of students in completing tasks.

The participant teachers formatively collected data from the students' responses and used it in various ways: to assess their students' understanding of the content, their struggles in learning the content and assessing any misconceptions that might emerge from their prior knowledge or experiences; and teachers use this information to make adjustments in their own instructions, re-explain the content differently by means of providing a new context to the students to make sense of it or steer their learning in accordance with their intention or conceptualisation for students' learning. Formative assessments thus provide an opportunity for the teachers to reflect on their teaching in the light of their students' present learning and to think of how they might recontextualise the subject content at hand. The

recontextualisation might occur in-the-moment, in subsequent lessons or might become a part of knowledge base to reflect on further for future teaching and learning situations.

6.2.1 Movement around the Classroom

The teachers moved around physically in their classrooms and reached out to their students at every opportunity they created. These opportunities could be in the form of engaging the students in group discussions, pair work or individual work around tasks. All the teachers observed used this mode of assessment.

Justin utilised group discussions extensively in his lessons. He used it for his students' thinking to become explicit. He interpreted their thinking and adopted it for different purposes: to steer the lesson forward as he had intended and to provide explanations based on their responses; to arouse their interest; to identify misconceptions; to identify learning difficulties; and to identify the students' future needs and incorporate that in future designing of the lessons. For instance, Justin introduced the students to a problem of stealing money from one of their teachers' rooms (see section 5.2.1.2) and instructed them to discuss the following questions at their tables: "what you need and what preparation would you need?" There were seven tables in the class, with four students each at six tables and two students at one table. While the students were at the discussion, Justin moved around and stopped at each table to know what they were talking about:

> "So, I wanted them to eventually get to the idea of maps. That was my aim. I didn't care about anything else…I kind of went around hoping someone will say something about map and then I found one student who did." (Justin, during the interview)

Justin's intentions for the lesson were clear. He had wanted to introduce them to maps, but he wanted it to come from them.

While Justin focused on how his students resolve a problem, Steve focussed on his students' learning difficulties. Steve also moved around the classroom and stopped at several

desks to see what the students were doing, whether they had gotten started or if anyone had written something wrong and, at times, spoke with them – redirecting their thinking or challenging them by pointing out to something or asking them questions or simply making them recall their prior learning. He provided both individual and collective assistance. For instance, he stopped with one student sitting at the corner of the outer circle of the seating arrangement. Steve recalled what happened there, "She was trying to do the factors of 36 but couldn't remember how to start" (during the interview). As a class, they had dealt with the topic previously and were reviewing factors for the first ten minutes of the lesson, a regulative classroom culture. In helping the student "jog her memory in terms of things that she needed to multiply to get together to 36," Steve drew a big "factor bug", as shown in Figure 33.

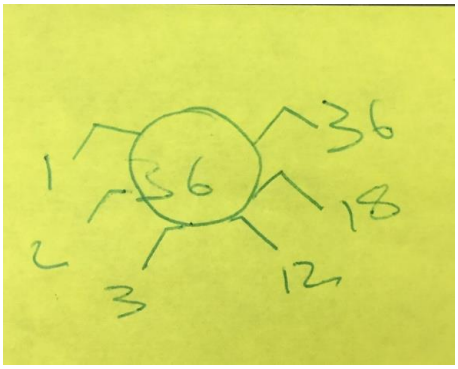

Figure 33. A factor bug

"For her, it was like completely getting started," he stated during the interview. At another moment in the lesson, Steve assessed that there were a couple of students who were finding it difficult to represent 100 in different bases, in Base 10, Base 7, Base 2, Base 6, Base 5 and Base 11. He assessed that it was going "to be more difficult when they get to larger numbers…They clearly they are still having to do that visualisation" (during the interview). He reflected that he would have to give them practice so that they could visualise setting up of columns for different bases. He addressed the issue in the latter part of his first lesson and subsequent lessons.

Both Linda and Tyler were similar in their approach to using their movement in the class: to provide specific guidance to structure their students' thinking concerning the specific task provided to them as a group. As an example, Linda moved around constantly and paused at the tables to have a "quick focused conversations" (during the interview) with the students where she asked them what they meant by their written responses on the sheet provided and, upon reflection, provided her feedback. In one such conversation which occurred after the swapping of response sheets with another group:

> "The first group had written about obscene and bitter, 'Repulsive imagery makes you think of yucky food' and Name [one of the students in the group] said, 'Well, I don't really agree. It doesn't make me think of yucky food.' I said, 'Well, what does it make you think of?' And another student said, 'Rotting and decay…Maybe it's more bodies of soldiers,' and I said, 'Well, that links to war a lot more, doesn't it?'" (Linda, during the interview)

Another student in the group added to the discussion, "Well, I suppose dissolving food rots which also bodies do when they're rotting, they have a sense of decay." Linda liked the idea of the group linking rotting of food to the idea for being barbaric, which was nice because the students were linking "to one of the keywords that we used in the starter" (during the interview). She assisted them to progress as a group from where they were in their learning, in helping them draw connections with the theme of the poem and the poet's perspective on it.

Similarly, Tyler, as explained in 6.1.4, had assigned three different poems to three groups. He provided both whole class and group instructions to read the poem. While the group discussions were going on, Tyler circulated and spoke with each of them on a one-on-one basis and "structur[ed] the discussion" (during the interview) so that they are more productive in their discussion. One of the groups was attacking the problem in a very logical way:

> "Oh, I don't know where these places are. Why don't we try and work it out or kind of deduce it?" (Tyler, during the interview)

Tyler sensed that they were trying to make sense of abstract tribes and "getting bogged down by where these tribes came from and why these might be interesting" (during the interview). He posed them a question:

> "Does it matter where they are? Or is it just to give this kind of overwhelming sense of kind of Babel-like foreignness?" (Tyler, during the interview)

He wanted them to take from it "just the way the syntax works to make it overwhelming":

> "I'm more interested that they can pick that up than they know where this Mongolian tribe are from." (Tyler, during the interview)

Apart from structuring the discussion, Tyler utilised spending time with each group to inculcate the "good principles of close reading" (during the interview). Hence, in assessing their progress, he worked at:

> "trying to force them to do the other thing they'd have to do, which is to look at how it works as a poem. So they don't just put one lens on it. They get used to kind of changing lenses." (Tyler, during the interview)

Moreover, circulating and spending time with each of the three groups was helpful to him, especially when he "inevitably run out of time at the end of a lesson." He had "already heard ideas from everyone and assessed their thinking" (during the interview). Doing so saved him from asking from each one what he or she thought and helped him to direct how they as a whole class would go with the discussion.

6.2.2 Asking Questions

Asking questions was another most common and frequently used tool for assessment. It served as a means for the teachers to progress the lessons at the heart of which lay the intention to assess the progress that their students were making in learning the concepts and assist them in that. The teachers used questions to know whether the students were familiar with the new topic that they were going to learn. They asked questions in subsequent lessons at the start of the lesson to check if the students recalled their new learning before proceeding

with engaging them with more abstraction of the concept. They asked for explanations as that allowed them to assess their students' thought processes. The knowledge thus gained was then used to either reaffirm their students' understanding or re-explain the content to them using a different situation, or identify misconceptions and respond to those.

Lauren asked questions to test her students' comprehension of a previously learnt concept when she identified students' misconception in their understanding of reflex angles. The students were confused if the reflex angle was between 180 and 270 degrees or 270 and 360 degrees. Justin asked specific questions to his students to assess their understanding of the difference between volume and surface, both previously learnt concepts.

Moreover, the questions were also used to make students continue to reflect on their own or their peers' responses. Such type of questioning would not stop until the students had reached a point in their understanding that the teacher wanted to develop and, hence, worked as a means of a teaching strategy which allowed the teacher to assess students' thinking and the students to analyse their own verbalisations. For instance, Lisa, in the latter part of her first lesson, kept rephrasing the students' opinions in the form of questions that challenged the students who were then forced to reflect on their reasoning. The situation marked a change in their thinking and led to the further assessment of the progress in their learning.

Furthermore, in asking questions, the teachers often asked responses from specific students, a strategy which depended on the teachers' intentions. For example, Steve did a mixture of things. He would often pick someone whom he thought "will explain it or will give a correct answer so that they can then just listen to them." He explained:

> "If I know a kid doesn't know how to explain it or I know that they can't get something, then it's almost silly me asking them. All I'm going to get is a wrong answer or a 'I don't know.' If I think that they have half an explanation, then it might be useful because they can explain what they're thinking and we can adjust it, but often I'll pick someone who I think will give correct explanation." (Steve, during the interview)

In other situations, to see whether the students were following the concept, Steve would pick students whom he knew struggled with the content. Either way, he could gain access to their reasoning and assess if they understood the content in order to take appropriate action.

Sometimes by asking questions, teachers also gain a general understanding that their students might not have yet reached the learning that they had intended for them. For instance, Steve, in his second lesson, assessed, through his interaction with the students on base numbers, that there were some students who were able to remember what they had done in the previous lesson, but

> "in a very process way…because even at this stage after the lesson they are doing it how many seven squared go into 26 dots…So then how many lots of seven go into [a column], so even though that's kind of process." (Steve, during the interview)

Steve had provided a task to the students to represent 26 dots in Base 7. He interpreted that as they were saying, "Okay, we know that's the unit's column, the sevens column and the seven squared column." Everyone seemed happy with that part, "So they've got I would say a relatively solid understanding of setting up the columns." Then there was the process of going, "Well how many sevens squared go into this [column], how many sevens go into this [column]?" which he thought that the students had not established yet.

6.2.3 Collaborative Problem-solving

The method was used mainly by mathematics teachers and seldom by English teachers who mainly wrote words or word meanings on a whiteboard, with Lisa's grammar lesson as the only exception. In her lesson on grammar, the students were required to use grammatical rules and not their opinions to answer the tasks. Hence, there were several tasks that she took to the board.

All the mathematics participant teachers used the whiteboard to write their students responses to a task and solved the tasks along with them that helped them in assessing their

students' learning and ask for reasoning. The students responded using mathematical language stating numbers or symbols or words, but that could not make visible to the teacher how they might have reached that response. Therefore, writing problem-solving steps on the board came with benefits as it: provided to the teachers their students' logic in order to take any further action; assisted the students to verbalise the abstraction; and benefitted other students to see and reflect on the reasoning provided and participate in the ongoing discussion. In English lessons, on the other hand, the students presented their responses to the situations, which they encountered in the literature, in the form of opinions. However, the English teachers, like mathematics teachers, pushed their students towards stating why or how they might have reached a certain opinion or what evidence supported that opinion. The purpose of both subject teachers was the same – to help their students express their thoughts so that they could help other students draw connections, parallels or argue.

6.2.4 Other Ways of Assessment

The teachers sometimes used other ways of assessment as well, such as multiple-choice questions, Hands up Hands Down, excitement in classroom, in order to help themselves derive some form of pattern and which might also assist the students in drawing conclusions about their own learning. For instance, Lauren introduced short quizzes in her second lesson to assess her students' understanding of the concept of bearings. She used quizzes in the form of multiple-choice questions both at the start of the lesson and at the end of it. At the start to assess if they had understood the basic three rules – starting from the North; measuring clockwise; and writing in three figures – that Lauren had explained in the previous lesson and whether they could apply those. She again made use of quiz at the end of the lesson to assess their learning from the lesson in which they had done contextual tasks and found a pattern that the difference between the two bearings is always 180 degrees, a

straight line. Students gave different responses to quiz questions. The situation was perplexing for Lauren and prompted her to reflect on the kind of tasks that she might use in her third lesson. I will discuss this further in the theme of Reflective Practice in section 6.4.2.

For Justin, the task itself functioned as a tool for assessment. In lesson one, Justin had provided the students with eight triangles at each table to make any shape that they could. He used that to help them find a pattern and if they could see any kind of representation with numbers. He asked for the number of vertices, edges and faces of the shapes that the students had made and drew a table from their responses on the board to lead them to Euler's formula:

> "Because it matches with the formula [Euler's formula]. So that was my way of checking that they got it right." (Justin, during the interview)

From their responses, he could check in his head whether they had done it correctly.

Of all the participant teachers, Lisa, Justin and Lauren often used a tool of hands up hands down, while the others did not. Each of them made use of the same tool for a different purpose. Justin utilised hands up hands down when he wanted to know how many students had completed a certain task or if he wanted them to hold up a type of shape they had created. In contrast, Lauren used it to know how many students answered a certain response in a multi-quiz. Lisa used the tool to asses her students' feelings about their confidence in their learning or to know whether they understood a particular situation.

Summary: Practice of Formative Assessment

Two practices of formative assessment were highly common amongst teachers of both subjects: movement around the classroom and asking questions. Whether the students worked on the tasks as a group or as a pair or individually, the teachers went to each of them to assess their work. They asked questions in such situations or even during the whole class discussion to know: what the students were thinking; how were they solving the problems; what reasoning they had used to support their argument or to scaffold their thinking; and the

difficulties any student might be facing in order to assist the students in their learning. Teachers also used other ways of assessments such as quizzes and Hands up Hands down. Mathematics teachers, in particular, used collaborative problem solving by writing students' responses on the board.

6.3 Recontextualisation

Each teacher observed was involved in the process of recontextualisation, regardless of whether they were teaching English or mathematics. Recontextualisation can be defined in terms of the ways in which the participant teachers framed or contextualised, reworded or provided a different situation of a similar example of the content so that their students were able to form a conceptual understanding of it. Some of the ways in which teachers recontextualised the subject content are as follows (see Table 12):

Table 12. Ways of Recontextualisation

Ways of Recontextualisation	
Teachers' explanations	Teachers' statements or narrations giving out critical information or revealing facts, giving details or describing situations; rephrasing students' responses.
Creating imaginative situations	Transporting students into a different context or physical reality and assigning them a different role in it.
Drawing connections	Assisting students in making connections between different parts of texts, among different responses from their peers; assisting them in reflecting on their own responses by rephrasing their verbalisations.
Breaking into smaller steps	Teachers divide a lengthy task into smaller manageable steps and give critical information about a concept in parts.
Provide a model response	Teachers provide an example of a response either by working along with the students or by giving them an example to imitate or by giving them an example of a similar situation that students are required to accomplish.
Provide suggestions for thinking	Direct the students to something particular to make them think differently about a situation or a problem; might be phrased as a question.
Students recontextualise the content	Students' verbalisations serve as a means of re-explanation of the content at hand for other students as well as for the teacher. These verbalisations are in the form of individuals summarising their understanding of the content or students' collective interpretation of the content.

The theme is closely related to the theme of practices of formative assessment. Having used different ways of formative assessment to identify learning gaps and misconceptions, the teachers then used these methods stated in the table above to recontextualise the subject content for student learning. Learning gap here refers to the distance between teachers' intentions for students' learning and where the students were in relation to that. Misconceptions refer to the existence of erroneous understanding or an idea that makes sense to the student but is faulty. In responding to gaps or misconceptions, teachers adjusted instruction with the aim that their students might see the content from a different angle and make sense of it for themselves. It also emerged that it was not always the teachers who recontextualised the content; the students contributed towards it as well by expressing their ideas in a whole class discussion.

6.3.1 Teachers' Explanations

At some point or another, all the teachers observed offered an explanation of the content they were teaching to their students. Providing explanations was closely tied with an assessment of the progress of their students' learning or based on the teachers' interpretation of the students' understanding of the concept.

In his second lesson, Tyler assigned the poem 'The New Colossus' by Emma Lazarus to one of the three groups. One of the things that the group had identified when presenting the poem to the class was that it was a fourteen-line poem called a sonnet. The group explained that it was the poem about American love and provided the rhyme scheme of the poem. However, the group missed identifying a key element of a sonnet as they superficially stated the rhyme scheme and did not delve further into it. Tyler had read their "mental filing cabinet" which equated to "sonnet equals love poetry" (Tyler, during the interview). He questioned them, "After how many rhymes does the rhyme scheme shift?" He wanted to talk

them through the idea of a turn in the sonnet. “Eight,” came the response. He then explained the technical aspects of the sonnet and provided an example from the Shakespearean sonnet to explain its function. He explained that the sonnet was always fourteen lines. Talking generally about sonnets and not going into the details of Petrarchan or Shakespearean sonnets, Tyler was pointing at a specific aspect of a sonnet: a shift in tone. The first eight lines called the octet, and the last six lines are called the sestet; in between the two, there is a volta (Petrarchan use of the word) or a turn (Shakespearean use of the word). He added that the rhyme scheme in the poem changed just after the eighth line. He gave the example of the famous Shakespearean love sonnet ‘My mistress’ eyes are nothing like the sun’ to illustrate how the sonnet worked with the shift in tone after the first two quatrains:

> “The first eight lines list the ways in which his girlfriend is not conventionally beautiful, and then, in the next six lines, he brings it back to how to him she is still beautiful.” (Tyler, during the lesson observation)

He thus tried to merge their concrete understanding of the structure of a sonnet to its functionality.

Another example is that of Steve, who was teaching base numbers to his students. Steve assigned a task – how many red dots? He displayed a group of twenty-four dots to emphasise grouping for the students in order for them to understand the representation of a number in Base 10. One of the students suggested they could put them in groups and chose to make a group of four dots and then count. He had made six groups of four, as Steve *rephrased* the response. Another student suggested counting the number of rows, “so like six dots on the sides and four dots on the top, then four times six equals twenty-four.” Steve was happy that they were trying to group in different ways, and the answer was still 24. Even though Steve realised that it was a sensible way of grouping, he wanted them to understand the representation of the dots in Base 10. He explained to them that he would group it

differently, in groups of ten and four units. He emphasised that what they were trying to say by grouping the dots was that they had two lots of ten and four units.

Alex identified his students' misconception who thought that drawing a perpendicular from vertex A to the base BC in a right triangle ABC would bisect the base. Though he offered an immediate explanation, the situation came up very soon when he gave them the dimensions of another triangle. Alex rephrased their responses and assisted them in realising where they were going wrong.

Jeffrey explained the context of the Victorian times to his students in the form of short anecdotes of the times as and when the students interpreted something and brought an idea forward. The strategy assisted them in their thinking, in adding detail to their further interpretations and close reading of Chapter Eight of the text *Great Expectations*. As an example, the lesson involved a dialogue around the concept of 'whiteness' in the novel. One of the students suggested that "white was considered as purity", while another suggested that "everything was black because of smoke." Jeffrey rephrased explaining a contextual reference to the industrial revolution, the industrial way of life that "smutted or smeared or besmirched everything into darkness." "Whiteness", he said, then was "may be very hard to establish." He asked the students if they had read a book in the library about *How to be a Victorian*. He informed them that the book talked endlessly about how much time the Victorians spent washing, scrubbing and brushing things to keep them clean. The Victorians were trying to "reach for something that is unachievable." Another student added that 'whiteness' could also refer to "Paleness, unhealthy…doctors." Agreeing with the boy, Jeffrey again added the context. He explained that it meant that

> "if you were aristocratic, the paleness of your skin indicated that you didn't have to go to agriculture to work because people who worked in fields became much prone to the seasons, had weathered and darkened skin; and people who had pale skin meant they either lived indoors and as an aristocrat and don't have to go out work in the fields." (Jeffrey, during lesson observation)

However, he pointed out that this situation of "paleness" becomes complicated when you have people who because of working in the factories are also pale. He continued to explain that aristocrats then had to find other ways to show that they were different from those who work.

6.3.2 Creating an Imaginative Situation

Another method of recontextualising the content was to create an imaginative situation that would psychologically transport the students into a different context and which might require them to take on a different role other than that of students and assist them in viewing things from within that perspective.

In an attempt to bring the students on board in their critical analysis of the text *Great Expectations,* Jeffrey argued that Estella, one of the characters in the novel, "conflates in with other languages." He drew his students' attention to why do they think all those languages were put in Greek or Latin or Hebrew? One of the students responded that Estella used those languages to prove how irrelevant those languages were to them. Another added that it was subtle that Estella was not brought up in a noble household. Jeffrey openly expressed that he was unhappy with such responses. He instructed the students to imagine themselves to be Victorian readers and try to understand clues to do with what Estella "actually knows" and think of what Estella was "actually doing or appearing to know the right answer."

Some of the students' responses that then emerged added to establishing the character of Estella through her actions were:

> "She was putting on a show; she was pretending to be educated."
> "It was suggestive of social hierarchy during the times. Even Estella uses the child and puts on humble clothes."
> "She is mocking on the church. Rest of the time, she speaks properly with perfect grammar. Here she is, I imagine, deliberately using a mocking tone." (Students' responses, during lesson observation)

According to Jeffrey, the boys had understood that Estella was getting the language wrong. It was important for him

> "to make sure that they all understood that something as simple, apparently as simple as that, a little throwaway detail actually sits at the heart of how we're interpreting." (Jeffrey, during the interview)

He wanted the students to consider small details that the author uses to create meaning when interpreting the text.

For providing practice, Steve gave his students to calculate the following numbers, as shown in Figure 34.

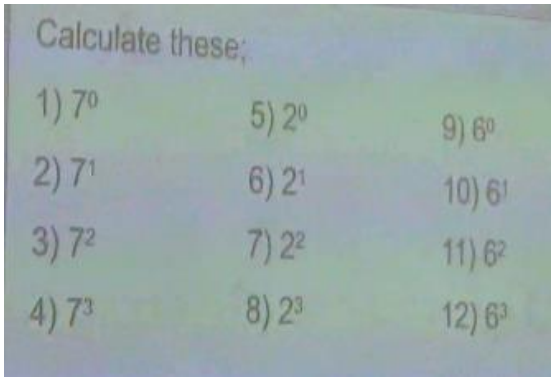

Figure 34. Calculate the number

He reminded them, after the completion of the task, that so far when they were talking of the units, tens and thousands column, they were referring to the powers of 10. He questioned them to imagine,

> "What if we chose to scrap them? What if we chose to get rid of the Base 10 system? What if we instead decide to have Base 5?" (Steve, during the classroom interaction)

He explained that the reason they had Base 10 was that "we have ten fingers, so it is easy to count," which was also the reason that their fingers were called digits as well. Steve then asked them to imagine that he had

> "chopped off your [students'] hand and that you have one hand with five fingers." (Steve, during the classroom observation)

Imagining this way would as a consequence change the way they counted, he explained.

Lauren wanted to assist her students in understanding the connection between two bearings, a connection that not everybody had made explicit in the two lessons on the topic despite being engaged with the problems based on it. They knew the procedure; however, when it came to the conceptual understanding of the concept, though they were practising it and saying it when asked, it had not yet come from them. Despite having done tasks using runways in the first lesson and having found a pattern that the difference between the two bearings was 180 degrees in the second lesson, not all the students had made the connection that bearings would be a straight line. In order to address this concern, Lauren introduced a task in the third lesson (see Appendix G) in which the students would imagine themselves as part of an elite team to get involved and evaluate their learning. She invited them to imagine themselves as a member of a "Quick Reaction Alert Group" which gives them "the power to deploy an aircraft at a moment's notice." They had to prove that they were "a worthy member of the team" (Lauren, during the classroom observation). The task, according to Lauren, required

> "a lot of visualisation on their behalf because they needed to in their heads picture what this bearing might look like. It involved a lot of geometrical reasoning, estimating…" (Lauren, during the interview)

The kind of visualisation involved in the task would bring their focus on the "straight line" concept.

6.3.3 Drawing Connections

The teachers helped their students draw connections and make sense of their learning. They used the whole class discussion as a tool to connect the students' thoughts and associated that with their current level of learning.

For instance, Steve utilised classroom discussions around the tasks and assisted the students in making the transfer between the columns being words and the columns being

powers; in learning how they could represent the same number in different bases or different numbers in the same base; and how to make a transfer between columns.

In her third lesson on structure, Lisa assisted the students through a whole class discussion in finding structural patterns in relation to a task. She helped the students connect and build upon the thoughts of their peers in order to build their critique of the content and reflect on their own responses (refer to Appendix D).

6.3.4 Breaking into Smaller Steps

The teachers taught the concepts in smaller chunks. Not only did they design a whole lesson based on a particular concept and divide the teaching of a concept into smaller connected and manageable tasks, but they also divided some of the tasks into further smaller steps. The case of Lauren is one such example that demonstrated both aspects. In her first lesson, she introduced the concept of bearings step by step. First, she introduced the three rules in smaller steps as small narratives. Next, she let the students gain confidence and visualise bearings using a runway task, without explicitly using the rules. After that, she introduced the language that they would encounter in the exams and that explicitly demanded them to use the three rules. Engaging the students with the concept stepwise helped her in two ways: she assessed her students' progress in learning the concept; and helped her students learn the three essential rules to use when finding a bearing that was evident towards the end of the lesson from their verbalising the three misconceptions in finding a bearing.

Another way of breaking the content into smaller parts was based on task demand. A situation in Justin's lessons serves to illustrate the point. Justin had ended his lesson one by assigning a particular task at the end to find the shortest distance the spider had to travel. By moving around and observing the work at each table, he had assessed that the students were finding it difficult to visualise the opening of a cuboid and marking the vertices. In his

second lesson, the first thing he did was to work with the students to solve the problems taking smaller steps: firstly, assisted them in understanding why they chose base as the starting point for unfolding the shape; secondly, assisted them in labelling the vertices; thirdly, visualising the spider's movement; fourthly, using the Pythagoras theorem in solving the problem; and finally, modelling perseverance to them in solving a problem.

Lisa, on the contrary, simultaneously juggled with several things in her first lesson on colonialism through role play. She divided the lesson into two parts to run parallel and, within that, two actions took place simultaneously: reading a paragraph from the comprehension task sheet provided to the students and a whole class discussion on its content with the students; and Lisa's use of the situation as explained in a particular paragraph to create a similar situation in the role play. The third action involved a short break for the students from reading and experiencing colonialism; they were required to use their present knowledge from the discussion and experience and use that to write their response to the questions given at the end of the passage.

6.3.5 Provide a Model Response

As and when the situation arose, the teachers provided model answers to their students. Justin reflected on his students' struggle with visualisation in the spider problem, as explained in the previous section, and therefore decided to model the problem taking responses from the students. Steve showed them the transfer of lots in solving an addition problem which, according to him, they always did, but they were not aware of actually what it was that they were transferring. Lauren modelled a diagram on the whiteboard showing a bearing at the other end of a runway, as shown in Figure 35. The students were provided with a bearing at one end of the runway at the airport in Helsinki, 04. The students, as she

had assessed, knew how to find the angle, but they were not sure of what type of diagram to draw to represent their answer.

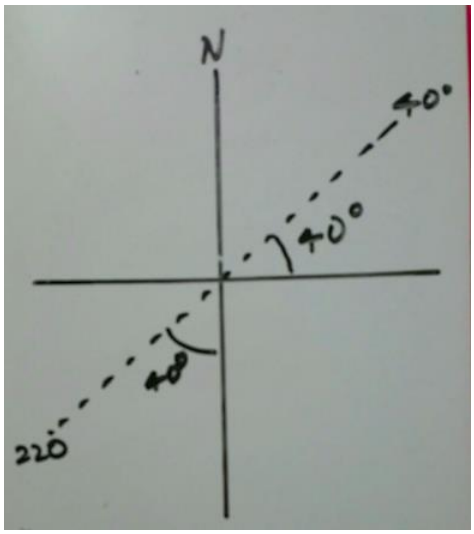

Figure 35. Teacher modelling a response

Lisa displayed a model answer on the IWB to support her students draft a sophisticated response for the structural pattern that they were required to look into in their reading of the text in the third lesson (see Appendix D).

6.3.6 Provide Suggestions for Thinking

The participant teachers did not provide direct answers to their students; they made their students think differently by directing them toward a particular thing that the students could use to explore the situation and find their own answers.

Towards the end of the second lesson, one of the boys in Jeffrey's class raised his concern. He was not able to understand the second line of the first stanza. Jeffrey asked him to think of the tone of the poem, "they groan and shake their fists?" He asked him to think of what the mob in the poem by A. E. Housman sounded like:

> "…if they sounded middle class, upper class, lower class, working class? Or it sounded like the voice is somewhat expressing anger? What is it you're accusing me of? What is he being after?"

He explained that the use of mono-syllabic words suggested a discourse of the mob accusing someone. Another thing they could consider was "Who are they being after?" that accuses the accuser of homosexuality. To be 'after' something is indeed a form of sexual discourse, he explained.

Tyler responded to a whole class discussion of the third poem 'The Buttonhook' by bringing the students' attention to the question in the poem, "a doctor? a policeman? (Papa would have known, but he had sailed/ all alone before them and was waiting / now in New York; yet wasn't this New York?)" He assisted them to dig deeper by asking the questions: What does the question show? Why there are so many? Why they interrupt the narrative like this?

6.3.7 Students Recontextualise the Content

There were times during whole class discussions when students recontextualised the content by summarising their own understanding of it and which assisted others in making sense of the content. The students thus participated actively in their own learning. Such summarisations also helped teachers in framing the content for their students.

In Tyler's first lesson, there came two key points when the students recontextualised the content at hand. In a whole class discussion in the first lesson, when a student while expressing his thoughts on the New York City as a melting pot stressed that he inferred three voices: one from people coming in; another from people already there; and the third voice representing the interaction between the two voices and multiple cultures. His interpretation served as a summation for the students and also for Tyler in framing their view of the city in their reading of Chapter Four of *The Great Gatsby* and using this understanding further in their reading of the poems in the second lesson.

The second situation also occurred in Tyler's same lesson when another student expressed his inability to interpret a sentence from the text, "Even Gatsby could happen." Such a free expression of the challenge that the student was facing in understanding the meaning of the sentence led to a whole class discussion. The discussion involved students in engaging with interpreting and critically analysing what that sentence could mean and how that meaning was evident in the chapter that they were reading. As a result, the discussion brought a new perspective to the theme that Tyler had asked to look into at the beginning of the lesson: the city of New York as a melting pot. Before the concern raised by the student the class was viewing the theme in question from the perspective of two men, Gatsby and Nick, the characters in the novel, entering the city and how they viewed it. However, interpreting "Even Gatsby could happen" helped the students recontextualise their thinking from a vantage point that anything was possible in the city and view the notion of immigration from a perspective of pretence. Gatsby in *The Great Gatsby* pretended that he was Oxford educated and used that to create a highfalutin image of himself amongst the Americans.

In his second lesson, continuing with teaching base numbers, Steve introduced a task which required the students to bring their learning of base numbers from the first lesson. The students were required to represent the number of dots, as shown in Figure 36, in a particular base.

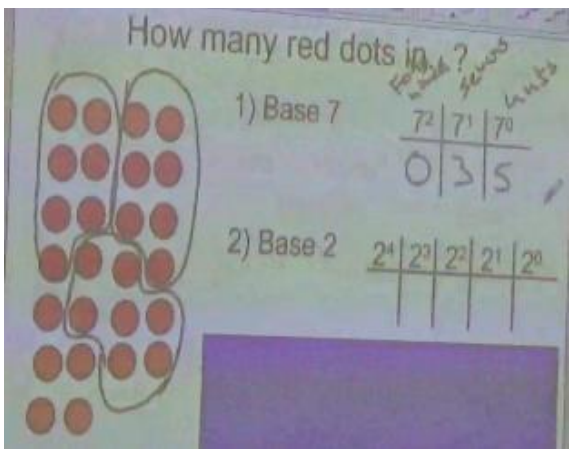

Figure 36. Representation of the number of dots

In response to the second task, representation of dots in Base 2, one of the students answered that they had one in the sixteenth column, three eights, six fours, then thirteen twos and then 26 in the units place (shown in Figure 37).

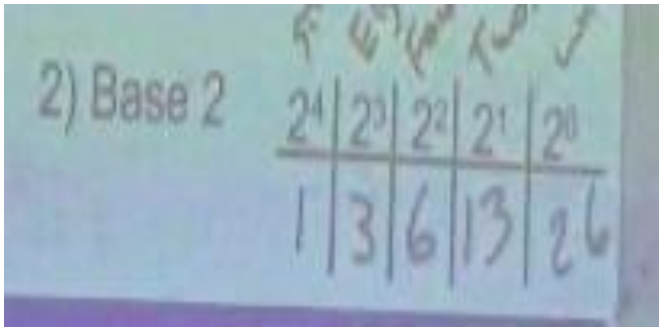

Figure 37. A student's response of representation of dots

The student, through his response, showed to Steve that conceptually he had not understood (misconception) writing the representation of the number of dots:

> "it was very much, well I could see how many sixteens go into that, I can see how many eights go into that, I can see how many threes go into, but each time going back to the original 26 dots." (Steve, during the interview)

Steve asked if that was a sensible way to write the number. He asked them to think of the difference with what they did with Base 7, which they had solved prior to this question. He wrote the number on the board without the columns signifying that the number was in Base 2, as shown in Figure 38.

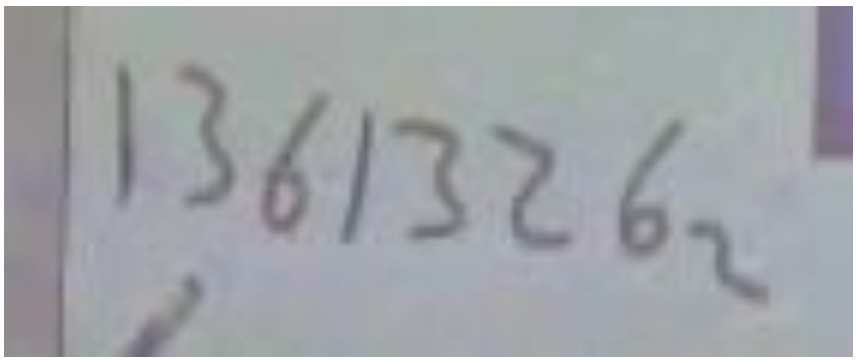

Figure 38. What the student response looks like: a number without columns

He rephrased the response from the student. It meant six units, two lots of two, three lots of four, one lot of eight, and he stressed that that would be "different number of dots" (the teacher recontextualised). There was another student who wanted to respond to the task. The student said that they had one lot of sixteen, one block of eights, no lots of fours, and therefore they need to put zero in that column "because they have to," and then one lot of two and then zero again. While the student answered, Steve circled the lots. The student, through his response, recontextualised the representation of the dots in Base 2 for the student who responded to the task first and also for others who might have misrepresented the number. Steve utilised the student's response to explain the use of "place hold", which "tells us that the columns have dots" (during classroom observation).

Summary: Recontextualisation

The onus to contribute to and connect the thoughts and reasons was not solely on the teachers. Both the teachers and students were involved in teaching and learning the content; it was a collective enterprise. It is worth reiterating here that teachers' recontextualisation of subject content to assist their students in learning the content was a corollary of formative assessment and intertwined with reflective practice.

6.4 Reflective Practice

The teachers reflected for designing tasks, reflected while teaching, and reflected on the teaching and learning that took place. A key finding was that a point of focus of their reflections was their students' responses and their own teaching. The teachers' reflections included the following aspects (Table 13):

Table 13. Reflective Practice

Reflective Practice	
Reflections on students' understanding of the subject content	Refers to teachers' analysis of or thinking about students' current level of learning by means of their responses in order to take the next step towards supporting them in their learning; teachers' thinking of the next element that they might require to engage students with; these reflections take place in-the-moment.
Reflections on the challenges interpreted for future planning	Teachers recognise that students are still not where they intended them to be in their learning; recognise the gaps in their learning and think of the ways in which they might address those gaps in the subsequent lesson or distant lessons.
Self-assessment: Self-critique for their own teaching	Teachers identifying gaps in their action for students' learning; their display of discomfort in having missed something which they could have possibly used for teaching; their awareness of the measures that they could have possibly taken.
To ascertain their beliefs	Re-evaluate their thinking in relation to assumptions they hold; might consolidate the existing assumptions or cause a stir.

Reflective practice is a constituent of continuous action and is intricately weaved into formative assessment and recontextualisation that, at times, it is difficult to segregate it from the other two themes; it also informs knowledge base and influences task design.

6.4.1 Reflection on Students' Understanding of the Subject Content

The teachers used their students' responses to reflect upon their students' understanding of the content in order to assess their learning and take successive action. For instance, Lisa was shocked at the students' response to the very first question in her first lesson. She had asked if anyone had heard of "colonialism" as a means of introducing an abstract concept to the class through a question. As already discussed in the case of Lisa in section 5.1.1.2, one of the students and the only one of African heritage said that he had "heard of colony but not colonialism." The rest of the class was silent. An important point here is that for Lisa, the situation was relevant as a point of transfer:

> "They would have to make some kind of connection in their own minds about what it is and what it means."
> "They would have experienced it or heard about it or known about it. Not experienced it as in actually but in history or something." (Lisa, during the interview)

She read the first sentence from the comprehension task sheet: “When one country colonises another, it means officials from one country governs over the people in another. The British had lots of colonies, and these made up the British Empire.” She paused after reading the sentence for the students to respond. It was a “signal that they need to think or read again, or anyone got anything to say?” (during the interview). It was only when the students understood that the sentence was the definition of colonialism and rephrased the word to show their understanding of the word that Lisa moved forward with the lesson.

Linda, in the “explode a quotation” task, reflected upon her discussion with each group and made changes to her original plan. She had initially planned to model a critical analysis of the poem based on students’ responses and then she changed her decision while reflecting upon students’ group discussions. She decided to stretch the students further; she wanted them to add more detail to the interpretations by asking them to swap their sheets and respond to the analysis done by other group members.

Steve was teaching powers to Year 7. From the kind of responses Steve was getting during one of his lessons, Steve reflected about what his students understood about the Base 10 system and felt amused. He thought:

> “On the whole, they had no idea that we started with Base 10 to zero [ten to the power zero] and go 10 to one, 10 to two, 10 to three, 10 to four and then these are the columns. I thought that was really interesting even though that they’re using that language constantly.” (Steve, during the interview)

The students’ responses led him to reflect on the kind of tasks he must bring to the next lesson.

6.4.2 Reflections on the Challenges Interpreted for Future Planning

The participant teachers were aware of the implicit challenges that the students’ responses raised. They took those into account to think of a future course of action which could be a subsequent lesson on the topic they were teaching or the next opportunity in the distant

future. In her second lesson, as discussed in section 6.2.4, Lauren had assessed students' learning through the use of quizzes. She was shocked to see that even after engaging with the concept for two lessons how in the two quiz questions, which she asked at the end of the lesson, the students were struggling with the language of the questions, "from A to B" or "of A from B". She felt uncomfortable and was surprised by their lack of confidence. The students who had answered the first quiz question correct convinced themselves that they were wrong and changed their responses. She realised that the second quiz question was a bit of a thinker, and she did not wish them "to leave with a misconception" as the time was running out. Hence, she supported them by explaining the choices; she had wanted them,

> "to make that 180° connection again and a lot of them didn't even think to do that. We talked about 180 in the starter the connection in the main task was 180, now you've got a difficult problem. Maybe it's to do with 180°, but not many of them made that connection again. I think it's something I need to work on with the class as a whole, use what you've already done to help you with the next task." (Lauren, during the interview)

She reflected that the students struggled to understand the language and were confused about the complementary angles:

> "I know that that's something I need to really hammer home in the next lesson and that they're still very confused about the complementary angles. So, if this is the bearing from A to B, what's the bearing of B from A? They're still very confused on that, we still need to spend a lot of time on that." (Lauren, during the interview)

Lauren reflected that she had to do something quickly as she had only one more lesson left to teaching bearings.

Lisa's first lesson relating to the concept of colonialism was creative in nature. She problematised the task handed down to her by her HoD, and as a response to that she intended to conduct "a social experiment" (during lesson planning) in which the entire class, including her, would participate. By the end of the lesson, the students learnt the concept from both the economic and psychological perspectives. The lesson made her reflect on the kind of task she could have provided to the students:

> "I would have loved to give the students an opportunity to do something creatively in response to this question [Is it ever right for one country to rule over another?], in response to the lesson." (Lisa, during the interview)

The experience thus bolstered Lisa's confidence in her creative capability.

In Tyler's second lesson, there was a situation in which the class was deconstructing the sentence, "Even Gatsby could happen, without any particular wonder," from the text they were reading. In the situation, Tyler reflected on how else he could have tied the discussion to the theme they were discussing:

> "I would have liked to have done and say that this idea of like pretence and immigration are quite linked like building yourself an identity. That's exactly what Gatsby is trying to do. Again, that would have been a nice place to take their discussion to." (Tyler, during the interview)

Also, considering the time constraints, he reflected on bringing the ideas up in another lesson during the course of the students' reading the text *The Great Gatsby*.

Steve, as discussed in the example in the previous section, had identified a misconception in the students' use of language when using the concept of Base 10 counting system:

> "Next lesson I think I'm going to stick with the different bases, but then what I want to do is, bring it back to our Base 10 system. Just to really emphasise that this is what's happening in our Base 10 system. You can see it's the same thing when we change it to Base 7. We still do seven to the power of zero, seven to the power of one, seven to the power of two." (Steve, during the interview)

Steve's aim was to make the students become aware of the fact that whichever base system they might work on, whether it is Base 10 or Base 7 or Base 2, the transfer between columns or representation of same number in different bases and *vice versa* will require the same logic.

6.4.3 Self-Assessment: Self-Critique for their own Teaching

The participant teachers were highly critical of themselves. They assessed their teaching against their students' responses. Lauren was teaching bearings to Level 8. She recalled

during the interview that she had assumed that the students would understand the relationship between two bearings, A and B, that they would be able to understand that bearings would always be a straight line. While she circulated the class to assess the progress of her students' understanding of the content, she reflected upon the responses that she received from "higher ability" students:

> "They thought that the two angles should add to 360. When they had found one, they didn't bother finding the other one. They just took the first answer away from 360 and wrote that down…it was actually the higher ability students who faced this problem because they jumped to a conclusion…and then managed to convince themselves." (Lauren, during the interview)

She took responsibility for the mistake that these students were making. She had checked them doing the first part but not the second. Though she assisted the students immediately, she critiqued her action. She identified a problem area in her own teaching and realised that she would have to learn to deal with such situations.

In her third lesson, Lisa used a question for the students to make a connection between the chapter they were reading and the previous chapters. The object was to help the students respond in a whole class discussion to a question that was similar to a GCSE exam question:

> "Work has completely destroyed the narrator's moral compass. Looking closely at the narrator's attitude by Chapter Eight, how far do you agree with this statement?" (Lisa, during the classroom observation)

The students expressed their interpretations but were not able to make the connections between each other's responses. That was where Lisa played an important and significant part. She assisted them in drawing connections by using statements like:

> "So this develops that point because da da da. And you've added to this point because." (Lisa, during the interview)

She helped them see the connection because she wanted that:

> "when they come to write, they realise that it doesn't just end where they thought." (Lisa, during the interview)

However, she was aware that it was she who made the connections between their explicit thoughts and that she was taking the lead in helping them see how they could further develop "detailed and focused" response to the exam question:

> "I know that I'm at the stage right now where I'm the one making the connection, but we're only in the second term of this class as a dynamic amongst themselves. And I know that by the end they will start saying to add to that and so on and I will support them in doing that. So that I'm no longer standing at the front." (Lisa, during the interview)

Lisa was critical of her action and, at the same time, was aware of the subsequent action that she would take in order to assist them in taking the lead in responding to an exam question.

6.4.4 To Ascertain their Beliefs

Reflecting upon the students' responses provided the scope to the teachers to either substantiate or review their own beliefs about teaching and learning. Where Steve used his students' responses to strengthen his beliefs, in contrast, Lisa used the responses as a point to question and reflect on her existing beliefs. For instance, Steve believed that learning "is changing long-term memory" (during the interview). According to him, his lessons provided the students with an opportunity "to form correct memories." They were doing things that were correct and

> "challenging enough that they are not doing something they can already do…there were lots of moments where they could see how it progressed; they could see how we change something and what was happening." (Steve, during the interview)

He reflected that "the prerequisites for learning" had happened, which he explained as:

> "The mathematics is correct, obviously. I don't think I made any mistakes…so they have a chance. They also are seeing something that they've not understood or seen before. But I don't think that it's too far away from their grasp. They are on their cusp of – I've never thought about this before or I don't quite understand it yet. But there's a thing here that I can get hold of." (Steve, during the interview)

Steve reflected on the experience that he created for his students for learning transfer between bases through the tasks that he engaged them with; he reflected that whether the

students were not conscious of the base numbers or it was completely a new topic to them, he provided ample opportunities for them in the span of three lessons to be able to feel that they can get hold of it.

Lisa firmly believed that learning is social in nature. The interactions that took place in her class reaffirmed that belief for her. However, she was not very confident in teaching grammar explicitly to the students and did not believe that it would do them any good. From her interactions with the students and the misconceptions that erupted in the course of the second lesson, she reviewed her belief and showed a sign of agreement with her HoD:

> "…that explicitly teaching grammar means that it actually is taught." (Lisa, during the interview)

The HoD had given her a task sheet containing ten sentences to correct spellings, ten to correct punctuation and ten to check grammar (see Appendix C). Lisa was not happy with the format; however, her belief stood challenged in the light of her recent experience with her students.

Summary: Reflective Practice

The output of the participant teachers' reflections on their students' responses was the construction of immediate explanations or further questioning or probing, or making students think about something specific; the construction of near and future tasks; assessment of their own role in students' learning and being critical of themselves; and confirmation or questioning of their beliefs – all of which added to their existing knowledge base and to their continual growth of practice.

6.5 Knowledge Base

This theme differs from the previous four in that that teachers use and build on their knowledge base while designing tasks, when making formative assessments, when

recontextualising the content and when they reflect on their thinking. Hence, teachers draw on and from their existing knowledge base and develop it further by assimilating new pedagogical experiences. The different types of knowledge bases that collectively form their personal sense of past experiences and upon which the teachers reflect when thinking about teaching and learning situation are as follows (see Table 14):

Table 14. Teachers' Knowledge Base

Teachers' Knowledge Base	
Knowledge of context	The intricate link between institutional demand, departmental policy, SoW and national examinations.
Knowledge about students	Teachers' knowledge about students' interests, their learning difficulties, their prior learning or cumulative learning, their learning in other subjects and their collective characteristics.
Knowledge from interaction with the other	Teachers' knowledge acquired over time in relation to their interactions with others in the teaching community: their colleagues; their academic tutors; their own teachers when they were at school; their students; their reading of the literature; and their memberships to various teaching websites.
Knowledge of self	Their beliefs about teaching and learning or about the subject they teach, their feelings, their identity as knowledgeable persons or of their roots.
Knowledge of pedagogical structures	Teachers' knowledge of the type of inquiry with which to engage students in their learning of subject content; the way in which teachers connect immediate learning needs with the cultural practice that matters in their subject.

Teachers knowledge base included knowledge of context, knowledge of students, knowledge of the other, knowledge of self and knowledge of pedagogical structures.

6.5.1 Knowledge of Context

An institutional culture which includes school or departmental policy and SoW, national examinations and classroom contexts played a significant role in participant teachers' decisions in designing tasks. These factors influenced the classroom subject pedagogy irrespective of whether the participant was teaching English or mathematics.

The *departmental or school policy* formed the core of teachers' knowledge upon which their pedagogic decisions were based. It was also interesting to note that the departmental or school policies were deliberately tied to the demands of the GCSE *national examination*, so much so that the policies along with the examination became the background against which the teachers thought and planned their lessons. Most of the participant teachers were teaching at KS3, with the exception being Alex and Jeffrey who were teaching at KS4 and Tyler who was teaching at A Level.

The impact of the institutional culture on classroom pedagogy was visible in all participant teachers' lessons. Lisa aligned her third lesson, which she designed herself, with the *departmental policy* that expected its teachers to structure the lesson within the bounds of a question pattern of a GCSE language paper. Ironically, this was the only lesson in which she was allowed freedom to plan. Linda's school, like Lisa's, was also impacted by a focus on the *national examination* and made it mandatory for its teachers to use "success criteria" in every lesson taught and which was derived from the GCSE marking rubrics. The use of criteria was so essential that members of her faculty randomly inspected the lessons to ascertain its use during the lessons. In complying with *school policy*, Tyler, Jeffrey and Alex, all of whom taught in Forest Lake School, ensured that their lessons were both teacher-led and student-led, a practice that their school promoted. In their lessons, both these aspects were highly visible. All three designed tasks and structured their lessons in a way that led the students to derive from their prior knowledge and lead discussions in the class. For the *Scheme of Work*, while Alex used a textbook as a source as a part of practice in his department, Tyler and Jeffrey used SoW as a source to know the texts that they were required to teach. They used the information to derive material for teaching from either a common online portal or their own resources.

Lauren and Steve are other examples that portray the influence of institutional culture on their pedagogic decisions. Both of them taught mathematics in Hill View School. Lauren used quizzes to assess her students' learning of the topic; quizzes were the type of assessment that her *department* promoted. Steve, on the other hand, designed a ten-minute generic lesson starter in which the students reviewed their previous term's learning. The starter informed Steve whether his students remembered what they had learnt and also helped the students in evaluating their own learning. Both of them taught differently but aligned their pedagogic actions with the department's ethos that required them to show that learning happened.

6.5.2 Knowledge about the Students

Knowledge about the students includes the teachers' knowledge of their students' interest, their prior learning, their learning in other subjects and their collective characteristics as a class. Although the teachers were teaching their respective classes for the first time, they were familiar with the students. By the time of lesson observations the teachers had spent a term or two with their students; they were aware of the students' prior learning in the subjects they taught; had built a rapport and had a general interest in their students' learning; and through their interaction with other teachers, each teacher had developed an innate sense of their students' interests. Additionally, their teaching experience, ranging from 3-35 years, likely contributed to their knowledge base.

Justin tapped into his *students' interest* when designing the task of finding the shortest distance in which the spider had to move from one point to another in a cuboid. He explained during the interview that he sees "that all the time in the back of students' books" and subsequently picked the idea of using a cuboid. Another example is Lauren. She used her students' informal interactions and their interest in the enrollment of her two Year 10

students as cadets to select tasks for her third lesson (see Appendix G). She told her students that they were assuming a new role: they were no longer Year 8 students but were members of the Operations Team for a special task force in the Royal Air Force. She, therefore, used her knowledge of her students' recent interest to assist them in relating to real-life situations as a part of an elite team and helping each other reach conclusions.

The students' prior learning was another source of knowledge that the teachers used. The first thing that Linda did in her Year 9 lesson was to assist her students in recalling their previous learning. It had been a week since the class had read two war poems: 'Who's for the Game?' by Jessie Pope and 'Dulce Et Decorum Est.' by Wilfred Owen. Since they might have forgotten the meaning of the poems, she asked the students to explain in writing the difference in message between the two poems. The point was for them to draft a short introductory paragraph recalling their understanding of the poems and review the poets' perspective of the war.

Another example is Tyler, who in both his lessons, displayed a graph depicting the foreign-born population versus the total US population from 1850 to 2010. The students were familiar with the graph and also with the concepts of 'Roaring Twenties'. Tyler instructed them to reflect on their familiarity with the concept in exploring the concept of a city as a melting pot, keeping the graph in perspective to draw conclusions. He thus used the graph which functioned as both students' prior knowledge and supporting material to engage them with their present learning.

In mathematics teaching as well prior learning of students was considered. For instance, Alex was aware that his students knew sine and cosine rules, but he thought it likely that the students might not apply the rules when finding the area of a right-angled triangle. He used their traditional method of finding the angle to gradually take them to a more advanced level, as they utilised their knowledge, to find the area. According to Alex,

using the latter was a difference between getting an A and an A* (Grade 8 and 9) in the GCSE. Steve, on the other hand, knew that his students had been using the Base 10 system for calculations since primary school as it is a standard system used around the world. However, he also knew that most likely they were not conscious of it. He utilised this unconscious understanding to assist them in understanding base numbers and becoming aware of how the same number might be represented in different bases.

The knowledge of student learning in other subjects. The teachers reflected upon knowledge of their student learning in other subjects in understanding how their students think and in helping them to draw connections between subjects. Jeffrey was "very conscious" of the fact that a higher than an average number of students in his school took religious studies at GCSE or engaged with theology on a daily basis in the school, and

> "even if they're not taking it, they are interested in looking at the world in that way. There's the choristers in school; there's chapel every day. Many of the boys frame their questions through a theological lens or through a philosophical lens." (Jeffrey, during the interview)

Jeffrey was conscious that

> "in terms of values and how they are thinking, they are wanting to explore; their minds are switched on to big questions." (Jeffrey, during the interview)

His knowledge thus became the basis of questioning the students about the poem they were reading, as discussed in section 5.1.2.2.

Another teacher who used students' learning in other subjects was Lisa. In her second lesson on grammar, Lisa asked the students to define morphemes. They started to give her very vague definitions and that prompted Lisa to remind them to define the term technically as they do in science:

> "In Science, you would use technical language. When they asked you about photosynthesis, you wouldn't say, "It is that thing shining bright [*sic*] in the sky. That provides some kind of nourishment to the plants as a part of the cycle." (Lisa, during the Classroom observation)

As a consequence, the students partly succeeded by giving a technical word "suffix" which Lisa explained was "a small unit added at the end of a word." She wanted her students to connect and understand that even if they were reading English, they could not be vague in stating the meaning of a word. They needed to be specific and scientific in their language, just like when they define words in science.

Knowledge of the collective characteristic of their students. Another aspect that emerged as part of the teachers' knowledge base was their knowledge of the collective characteristics of their students and the way they learn. Justin made use of the energy of his students. He knew that his students were a

> "…very eager, keen class, has a lot of energy, which is why I quite kind of back and forth with me in the beginning…and kind of they can put their energy to work at the end of the lesson." (Justin, during the interview)

Justin engaged his students for the major part of the lesson with group discussions, followed by a whole class discussion of the content; and, in the last 15-20 minutes, he would provide them with tasks where they would have to reapply the concepts that they had learnt. In group discussions, the students always had some kind of physical tool to make sense of the concept, and that gave them something specific to talk about.

Jeffery and Lisa are more examples of teachers who were aware of the strengths and weaknesses of their students. While Jeffrey's students were outspoken, Lisa's were shy. Jeffrey's students were at ease with each other. He tapped into their forthrightness and encouraged them to be more vocal. The students readily expressed their ideas and built upon the contribution of their peers. In contrast, Lisa's students started slowly but, with a little assistance from her through prompting or helping them connect their thoughts with each other's, they showed a marked change in their confidence and involvement in learning the content. Over the course of the lessons, her students shifted from being hesitant in expressing their thoughts and understanding the content to being confident.

6.5.3 Knowledge from Interaction with the Other

Interaction with the other comprises of the teachers' experiences formed by their interaction with others within their teaching community. The source of these interactions included colleagues, academic tutors and their own teachers when they were school students; it also included their interaction with the literature that they read for their own learning and other sources.

Interaction with colleagues. The teachers often cited their interactions with colleagues that helped them in various ways in their professional learning. It helped them reflect and learn some of the challenges that students face. For instance, Justin explained that although he was aware that students generally find 3D visualisation challenging his awareness was confirmed from his interactions with his colleagues or from observing their lessons. Justin had observed a colleague's lesson a day before his first lesson observation. He had noticed that the students struggled to visualise a shape in plan view, and from there he got alert to the possibility of a similar situation that might arise in his own students' learning of three-dimensional representation.

Interactions with their academic tutors, mentors, and peers. Such interactions during their PGCE (Post Graduate Certificate in Education) and NQT (Newly Qualified Teacher) year had a significant impact on teachers' thinking. To illustrate, Lauren stated that her teacher training had influenced her "in terms of how [she] approach[ed] pedagogy and the theories that [she] consider[ed]" (during the interview). She also spoke of the influence of her mentors and peers during the course. Justin also described his training during his PGCE as "a big influence" (during the interview). He said that although he did not do anything in particular in the three lessons observed that he could identify as an influence, he often would "look back to [his] training for ideas, discussions [he] had with [his] tutor at the time."

Interaction with their school teachers. The teachers' own school experiences also served as their knowledge base. Jeffrey's lessons were impacted by the ways that his classics teacher had conducted his lessons. The teacher allowed discussions to be

> "frank and free, structured and fun and rigorous, in terms of making you work on the text in front of you, but also allowing you to refer to popular culture that had been on television that related to what we were studying." (Jeffrey, during the interview)

Jeffrey provided the same freedom to his students. He assisted them in connecting their learning of the content with their understanding of the kind of prejudices that exist in modern times, in thinking about how those prejudices challenge one's "being" in relation to living in the present times and how those were related to the current discourses around Brexit and the US elections. Similarly, Tyler recalled his experience with his English teacher, who was also a keeper of rare books. Tyler recollected the way his teacher sorted activities, "we do a bit of the text, we do a bit of something else, we do a bit of art history" and "discover things ourselves" (during the interview). The process amazed him, and he determined to put that process into practice in his own lessons.

Interaction with the literature. The academic literature that the teachers read contributed to their understanding of their students' learning, the ways in which they approached task design and how they challenged their students. Jeffrey found the literature about teachers who create a reading trail of their own reading history intriguing. He shared this knowledge with students in order to develop their interest in literature. He had maintained a library in his room and suggested books about the content that students might want to read. Linda was specific about how she used talk in her class. She was influenced by the notion of Neil Mercer's "exploratory talk." Mercer, a psychologist, has researched the role of language in the classroom and its relationship to the development of children's thinking. His work draws attention to the use of language as a tool for thinking together to solve problems (the notion is also discussed in section 2.1.1). Using his concept in her first

lesson, Linda asked the students to swap their sheets with the other groups. However, before that she provided them with some guiding questions to ask within the group to analyse the previous group's analysis. These were questions they had to ask themselves as well, and, in the process, internalise.

Steve, like Linda, was specific in his choice. He utilised his understanding from John Mason's work in his lessons and referred to

> "the invariance amongst the midst of change or variable thing while you keep something else fixed and kind of see what's happening." (Steve, during the interview)

Mason, a mathematician, has designed mathematical courses and written several books and articles that foster mathematical thinking amongst student teachers and teacher educators. He encourages teachers to practice noticing their own pedagogy to promote mathematical sense-making in their students. Steve was influenced through his readings of Mason's work to make decisions to challenge his students:

> "The idea of keeping the number of dots the same and changing the base so that we could see that we've got this number of things that stay the same. It's our representation that's changing, how it's influenced by the base." (Steve, during the interview)

He used this idea to bring clarity to students understanding of the base system.

Mathematics teaching websites. These provided the mathematics teachers with tasks that they could use in teaching subject content, while the English teachers did not mention the use of any such sites. Lauren used websites to design tasks for her lessons, as discussed in section 6.1.4. Justin also used the teaching website ATM (Association of Teachers of Mathematics) where he watched a video of a teacher talking about the experience she had during her primary school enrichment lesson:

> "where with eight little triangles there are two different polyhedrons you can make, one regular and one irregular, and it turns out that there is one configuration of the net for the regular one, which when you unfold into that net, you can then fold it back into the other one, the irregular one." (Justin, during the interview)

Justin's third lesson was based on this knowledge of folding and unfolding in assisting the students in their thinking about nets.

6.5.4 The Knowledge of Self

The name of the theme is taken from Turner-Bisset (2001) in which she describes knowledge of self as an understanding of one's own personality and using that understanding in teaching. In this study, the knowledge of self refers to the teachers' 'sense of self' which includes their beliefs, their feelings and their identity as their knowledge base. Their beliefs, whether for students' learning or for the subject they teach, impacted their pedagogic decisions and the way they functioned in the class.

Teacher beliefs for students learning. There existed a close and significant relationship between teacher beliefs and classroom subject pedagogy. For example, Lauren, Justin, Lisa and Linda practised beliefs that they deemed essential to inculcate or teach mathematical and literary skills or concepts. While Lauren believed that practice was key in consolidating learning of mathematical concepts, Justin believed that problem posing engages and attracts students to learning. Lisa believed interaction amongst students plays a key role in their learning, while Linda placed great value in teaching processes to reach an end product. Lauren used dialogue to engage the students in much practice of the concepts that they were learning. She believed that:

> "In mathematics, it's really important that practice happens. They could watch me do ten examples, but until they do it themselves, it's not going to be consolidated." (Lauren, during the interview)

In her second lesson, as her class continued their learning of the concept of bearings, Lauren modelled one of the tasks and left the rest of the tasks for the students to work out themselves. The tasks required the students to work in pairs to measure a bearing from one city to another and then back. There were five cities that they had to work out. The repetition

of the task was to give them practice and, after the completion, find a pattern that would establish their conceptual understanding of bearings.

For Lisa, learning meant negotiating, "what we learned together in previous lessons and what we learned today." She believed that:

> "if you're not building on anything then you're not learning. There have to be a foundation for that learning, even if that foundation shows misconceptions…you have to know something and then build on it. That's when real learning happens, building on something." (Lisa, during the interview)

In her second and third lessons on grammar and structure, respectively, she assisted the students to recall their previous learning, previously learnt grammatical concepts and previously framed language pattern. She also believed that:

> "Learning cannot be done alone; it has to be a group effort; it has to be everyone bringing their understanding together." (Lisa, during the interview)

This belief influenced her approach in introducing the content to the students and working together towards learning in which she was herself involved.

Linda was influenced by top-down structures provided to the teachers in her school to use in their teaching. She used the "success criteria", a mandatory policy from the school, and apart from that, she used a Point-Evidence-Analysis (PEA) construct which was in accordance with the departmental expectations. She used PEA to suggest to her students that they could use that to frame their written responses to a writing task. However, she did not want her students to place too much weight on either of those requirements. Hence, she shared during the interview that she often narrated her belief to her students as a metaphorical story of a farmer trying to sell his pig at market. Linda was the farmer and her students were the pigs. If she wanted to sell them for the maximum price, she would not just put them on the scales every morning to weigh them without doing anything differently. She would feed them to get them fat so that she would get the most money for the pigs. Similarly, she said, she did not want them to focus just on assessment:

> "because that's just you weighing yourself or me putting you on the scale every day. What's important is the food, the knowledge, what you're actually taking in from this. If you spend too much time being preoccupied by the end product, you'll miss the bits that's going to help you get the end product." (Linda, during the interview)

Doing "explosions" was Linda's way of getting her students to focus very closely on the process of reaching analysis rather than focusing on the end product. In addition, to assist them a "bit more within the criteria [Gold, Silver, Bronze]" (during the interview), she, along with a couple of other English teachers from her department, produced "green, purple and pink sheets" to help the students reach the end product. Linda used a pink sheet in her lesson:

> "as a point of reference of skills that they should have when analysing. It was things like, what is the effect on the reader of this and what is the technique that's being used called? Pretty much just pulled directly from the marking scheme [GCSE] that they would have to work towards sometimes." (Linda, during the interview)

She wanted them to focus on the analysis as that was what, according to her, students of literature do. It does not mean that the end product, the written response to a task was not important to her since she knew they would have to focus on that as well at some point.

Beliefs for the subject they teach. Apart from their beliefs for students' learning, the teachers' beliefs for their subject also assisted them in reflecting on classroom teaching and learning decisions. For example, Justin believed that everyone had the potential to be very good at mathematics:

> "We use much more complicated reasoning in our everyday lives, especially with regards to social relations, particularly among teenagers! Maths should be about trying to formalise and generalise intuitive ideas about numbers, shapes, data in a way that is concise and, if possible, elegant." (Justin, during the interview)

Justin did not hand out worksheets for his students to write on. He gave them a lot of time to experience working with the material that he provided them to make sense of the topic and to experience both success and failure in the process of making sense of the tools that were at once the learning material and a concept. He would first make them work with artefacts, talk about their discoveries within their groups, and then involve them in a whole class discussion. They were seen doing "things, all the same things all at the same time"

(during the interview). For example, when they were doing shapes, they were also solving problems on surface area.

Lisa believed that the subject she taught was an important one that "underpins the students' success within the school, in every other subject, and in life."

> "English language and literature, both empower the students to access and understand the world, and all the opportunities and tasks also helps the students to interact with the world. English language and literature are not just about the exams at the end of Year 11; it is also about exploring the social values we might have and being able to articulate them, act upon them and share them. Learning English and the literature is also helping students to develop their use of the spoken and the written word and to possibly (with time) feel empowered to bend the rules!" (Lisa, during the interview)

According to Lisa, reading English language and literature contributes to students' understanding of the world, empowers them to evaluate the texts they read or interactions they have with others, provides them with opportunities to form attitudes towards issues that concern their lives and, thereby, endow them with the ability to make decisions.

Teacher identity as a knowledge base emerged very strongly in Lisa's case. She was required to teach colonialism from an economic point of view. Her KS3 HoD created the lesson. Lisa showed high resistance to teaching the content from just that perspective. It required her to present an incomplete picture of colonialism to the students who were studying the topic for the first time. Lisa was of African heritage. Hence, her identity made the conflict all the more meaningful. Lisa took three deliberate decisions: to teach the content from a social and psychological perspective as well; to use drama as a social experiment in which the students experienced colonialism; and to add to the questions provided by her HoD a question that required the students to respond to the situation they had experienced *via* role play. Moreover, her response was not just a conflict in terms of identity in relation to the content that she was required to teach, but also a conflict in terms of her identity as a teacher. She felt "suffocated" (Lisa, during the interview) by her lack of say in planning the lessons.

In the case of other cases, there did not exist any noticeable clash between expectations of the department or the institution with the teaching of the subject content. A reason for this might be that none of the other teachers was provided with prepared tasks to follow and teach to their students. There were hints of some friction in case of Linda. Though Linda was provided with strict structures to use in her daily teaching and learning situation, she made an effort towards finding her way by giving relevance to the teaching processes with which she tied her intentions for her students' learning.

Teachers identity became apparent also in the fact that all the teachers took pride in themselves as knowledgeable teachers and in ensuring that best teaching and learning takes place in their lessons. For instance, Jeffrey showed his collection of books maintained as his personal library in his classroom from which the students were free to borrow some of the books that he often recommended for extra reading. He also recommended them books from the library. He said that he maintained a reading trail, which included the list of books he had read since his days in college and had kept his detailed notes from those. Justin showed on his classroom desktop an array of documents that contained presentations for each lesson for each class that he taught. He informed that he continued to add in that document from his teaching experience and of his own interest.

6.5.5 Knowledge of Pedagogical Structures

Pedagogical structure refers to the way in which teachers structure the subject content for teaching and is based upon the foundation of their subject matter knowledge, the substantive and syntactic knowledge (Schwab, 1964; 1978). In this sense, the knowledge of pedagogical structures is 'emerging' in nature as it includes knowledge base acquired over a period of time and combines that with the needs of immediate or near future teaching and learning situation. For instance, Lauren in teaching the concept of bearings to her students was aware

of the syntactic structure of her subject discipline as was evident from the pedagogical structure she planned for the content: estimate, apply, use of mathematical language, and draw inferences and connections. Defining a pedagogical structure provided her with an opportunity to create affordances for her students for the kind of inquiry she wanted them to delve into. She wanted to engage them with their prior knowledge of angles and use that knowledge in understanding the concept of bearings by working on tasks related with their life experiences, to gradually work with the language that they might expect in the exams and with more contextual as well as challenging situations to engage with in order for them to transfer knowledge from one situation to another. In the process, the students drew inferences and connections themselves.

More examples are: Jeffrey's lesson displayed both extensive and intensive reading of both the context and literature of the Victorian times and the knowledge that he brought to the lesson in teaching the content in the form of short stories. He structured reading of the text as active reading and explained what he expected students to do. He wanted them to make notes of the kind of technique spotted on the page, clause structure, use of figurative language, provide evidence, iterations and include previously learnt vocabulary. Justin was aware of the problems that students face in visualising three dimensions and consequently sequenced his lesson in a way to build his students' understanding of problems of representation. He used problem posing as a pedagogical structure; used different forms of representations in order for them to observe, reflect, derive and reason. He introduced them to the isometric drawing before taking them to the concept of plans and elevations.

Summary: Knowledge Base

In this section, I discussed the types of knowledge that the participant teachers of both English and mathematics reflect upon to make decisions about how they would teach content to students. All the teachers used the comprehension of their respective contexts,

institutional culture or national exams as a knowledge base to structure the way in which they present the content to students. They used the knowledge of their class as well, that is, their collective understanding of their students' prior knowledge, and their knowledge of students' learning in general as informed by their teaching experiences. The teachers also utilised their interactions with others outside their classrooms in ways that were dependent upon the school context. They borrowed from others; or selected from various websites, GCSE exam papers or textbooks for a particular lesson for a particular purpose. The only point of difference between mathematics and English teachers was the use of websites for designing tasks. None of the English teachers suggested such use; Alex was the only exception among mathematics teachers to use a textbook to plan. Another common feature evident was that the participant teachers' beliefs shaped their classroom practice. Such a combination of resources is referred to as tool kit (Wertsch, 1993) or resource systems (Gueudet, Pepin & Trouche, 2013), but the important point is that all these resources were gathered over time and had the imprints of the sociocultural contexts in which the participant teachers studied (schooling, graduation or teacher training) or worked (were teaching) or were developed by others in the larger teaching community, and that the teachers used these resources on the basis of their assessment of or reflections on their students' learning needs.

6.6 Chapter Conclusion

In this chapter, I presented five themes that the teachers used for subject content transformation. The chapter illustrates a relationship between the themes. For instance, recontextualisation is a consequence of formative assessment in a classroom situation; reflective practice sometimes works in between formative assessment and recontextualisation, sometimes occurs after the classroom situation wherein teachers might reflect on their teaching, and sometimes comes before the classroom situation when teachers

reflect on their thinking in designing tasks; and, finally, in engaging with several pedagogical processes, including reflective practice, teachers continuously draw from their knowledge base and add to it and thus contribute towards their own personal growth of practice.

Chapter 7 Discussion

My research is based on the daily classroom practice of teachers who were identified as consistent high performers on the basis of FACTOR criteria (refer to section 4.3). The focus was on the mediational role that teachers played in assisting their students in merging their spontaneous understanding of concepts with scientific understanding of concepts or in supporting them towards reaching higher abstraction (Vygotsky, 1997); and deconstructing the teaching and learning situation to understand the process of subject content transformation and thereby the nature of their expertise.

In the four sections of this chapter, I will address the sub-research questions followed by a discussion of the theoretical perspectives that I used as a scaffold in this inquiry. I will then discuss the main research question. Finally, I will address the concept of teacher expertise and its relation to teaching.

7.1 Discussion of Sub-Research Questions

7.1.1 Teachers' Conceptions of their Subjects or their Student Learning

This section addresses the sub-research question 1: What are 'expert' teachers' conceptions of the subject they teach or of teaching and learning, or of their students' learning?

The teachers' beliefs played a central role in shaping their classroom pedagogy. There existed alignment between teachers' beliefs and classroom culture that shaped their classroom dialogue and also their thinking when imagining how teaching and learning would take place. Their beliefs shaped their conceptions of the subject they teach and the way they see their students learn. The finding aligns with Connelly and Clandinin's (1988) notion of personal practical knowledge, and with Korthagen (2004) and Männikkö and Husu's (2019)

view that teachers' beliefs determine their action in classrooms and provides them with rationale for their actions.

The teachers' beliefs and their knowledge of self were formed through their experiences: through their interactions with the other people in their own education years; or their interactions with their students and colleagues in the schools in which they taught. Their beliefs found expression in the form of metaphors (Clandinin, 1986; Connelly & Clandinin, 1990, 1994), an imaginative way in which the teachers captured their view of teaching and learning or teaching of their subject; and from narrative unity (Clandinin, 1986; Connelly & Clandinin, 1990, 1994; Connelly, Clandinin, & Fang He, 1997) that manifested itself in their Narratives of Teaching and Learning. NTLs emerged from the teachers' account of the way in which they planned their lessons, their account of the reasons for in-the-moment decisions and their classroom action, and their reflections on the action that they would take in the subsequent lesson or consider taking in future or distant lessons. The teachers expressed their beliefs about their students' learning in various ways, thus indicating their different teaching experiences. Their thinking also found expression in their ongoing teaching. Lauren used a *box of chocolates* as a metaphor for her students' learning:

> "…because you never know, like before you teach it. But things will still pop up that will surprise you as you saw in my previous lesson [Lesson 2]." (Lauren, during the interview)

Lauren's students, according to her, were like a chocolate box, full of surprises, from being confident in having understood the concept that they were learning to a state of indecisiveness and lack of confidence in solving quiz problems; changing their responses because a few knowledgeable others had a different response from theirs even when their response was correct; and from finding a particular pattern on their own to not being able to connect that with more difficult and abstract tasks.

Both Tyler and Jeffrey, surprisingly, saw their students' learning as the *squeezing of a lemon or an orange*:

> "I tell my students to think of it like juicing a lemon or something like that. Where if you give it one squeeze, you get a little bit of juice, but the more you squeeze it, and the more times you turn it, the more juice comes out." (Tyler, during the interview)

Jeffrey provided a similar image as well. Both of them, during their lessons, made evident to their students to add more detail or provide more evidence and encouraged them to connect their thoughts with others.

Steve viewed his students' learning as *a shift in thinking* and which was related to his concept of teaching:

> "Teaching is to provide students with the opportunity to shift their understanding…Student learning is that shift in thinking and taking knowledge as an idea, that cumulation in knowledge or that change in long-term memory and then transfer of being able to use knowledge." (Steve, during lesson planning)

He believed that mathematics "is self-owned" in the sense that "it is an explicit form of logical thought", and "the whole point of studying the subject is to shift your ways of thinking" (during the interview). In all the three lessons, as Steve said, he provided his students with the experience to form their "long-term memory." Students practised base numbers extensively: they represented a number in different base systems, engaged with addition problems to understand transfer between columns and worked on a few tasks based on pattern finding in which they had to make use of their new knowledge.

Whatever beliefs the participant teachers held, through their reflections on their ongoing teaching and learning experiences, they either continued to establish and strengthen the already held beliefs, as was the case with all the participant teachers; or questioned their own assumptions, thus implying a shift in their thinking, as was evident in Lisa's case.

Another aspect that requires a mention is teacher identity. In the case of Lisa's first lesson, her identity came in direct clash with the content defined and planned by her HoD,

and that led her to make a significant change to the content that she was required to teach. The incident apart from highlighting identity as one of the contributing factors to the designing of tasks and teaching and learning of the content, brought to the core the intersection of teacher identity and their forming of personal practical knowledge which is imbued with what Clandinin (1985) explains as the 'affective content for the person in question' (p. 362).

7.1.2 Use of Tasks

This section addresses sub-research questions 2 and 3: What conceptual frameworks do 'expert' teachers utilise to explain the content to be taught and initiate a dialogue with the class? What tasks do 'expert' teachers assign for students' understanding of the concepts introduced?

Though the study assumed that tasks function as psychological tools that teachers use to mediate students learning, the findings confirmed the assumption. Referring back to the assimilated definition of tasks in section 2.1.1, the reference to academic task cannot be defined simply as a problem to be solved or an essay to write or to critique something; an academic task is defined by a combination of subject content (scientific concepts introduced in the form of situations followed by questions) and accompanied learning activity, and is, therefore, inclusive of both cognition and social interaction.

In designing tasks (discussed in section 6.1), the teachers reflected on their thinking to derive their intentions for teaching the subject content for a particular lesson or a set of lessons. Their thinking was informed by their situatedness which was representative of institutional contexts that provided them with good teaching policies, schemes of work, teaching resources, the class set to teach, the number of lessons to assign to a topic, and sometimes guidelines about common misconceptions in teaching subject content and

information of useful websites. The teachers' thinking was also influenced by their classroom contexts that form their everydayness, shape their pedagogical experiences and beliefs. The centrality to framing tasks for students was that teachers of both mathematics and English attached their intentions (Cole, 1996) to the teaching and learning situation. This was true whether the teachers took the material for tasks from a prescribed textbook (Alex, Justin), websites available to them (Justin, Lauren), the examination pattern (Lisa, Linda, Jeffrey, Tyler, Lauren), or created their own material or used their own sources (Steve, Lauren, Justin, Tyler). This was also the case whether the good teaching policy required them to engage the students by creating interesting tasks to arouse their interest in the subject (Justin) or ensure that the lessons are both teacher-led or student-led (Tyler, Jeffrey and Alex) or gave them some form of structure to use or follow such as handing down the tasks or using specific criteria.

Having defined their intentions, teachers then thought of ways in which they might organise those intentions. The organisation included thinking in some detail about a near-future teaching and learning situation: imagining situations and reflecting on artefacts with which to engage the students. The teachers structured the lessons "in their heads" by imagining: a step-by-step progression of the lesson; what they would introduce first; what questions they might ask; how their students might respond; which group they would reach out to first; which students would require more assistance; and how they might respond to some of the challenges that they anticipated. In their imaginations, the participant teachers: visualised some of the moments of contingency that might arise in the classroom and the ways in which they would respond to those (Justin, Steve, Lisa); anticipated the way their students might respond to their new learning (Alex); and visualised extensively (Lisa, Linda, Justin, Steve) the way in which they would put the tasks to purpose and the student interaction within that (all the participant teachers).

Organising of a teaching and learning situation is on a continuum. For a teacher teaching three lessons or a single lesson on a specific topic, reflections on material and situations might emerge from teaching and learning situations in the first or second lesson; or in the case of a single lesson, from their previous pedagogical experiences. There is a possibility that teachers might mould their intentions due to students' responses in the first and second lesson and might also reflect on the teaching material with which to engage the students to address the learning gap. Thus, whether teaching an academic concept in a single lesson or a set of lessons, the reflections from those teaching experiences inform teachers' future intentions and decisions. In this sense, teachers' organisation of learning situations for students is an imprint of their intentions and their reflections on their past, present and to-be teaching and learning classroom experiences.

In designing tasks, the teachers in this study focused on the ways in which they could push their students in their learning of a topic or skill and in establishing their students' attitude towards the subject content, thus combining the cognitive demand with social interaction. In thinking about what knowledge they would engage their students with, they also reflected on how to engage them with that knowledge. They maximised opportunities for themselves to support students' learning; and, for their students, to engage them with the concepts introduced and with their peers in relation to those concepts. Therefore, teachers used tasks to create both a *cultural space* and a *learning space*, both of which are closely knitted together. A cultural space is an environment in which dialogue is possible and the conditions that make it realisable exist. A learning space is one in which the subject content becomes the focus of attention and gradually becomes the context of learning.

The teachers assigned tasks that generated activities, requiring the students to work and engage in pairs or groups. The teachers assisted the students in understanding what the task required and how they might reflect on those within their groups or in pairs. The setting

functioned as small learning spaces where the students learnt with each other. The situation could bring in a range of possibilities – bring out misconceptions, students' learning difficulty, ideas that could be used for teaching or affirm students learning – for a teacher to make assessments and recontextualise the content for students' thinking or their own teaching. The teachers used the group or pair discussions to involve the students in whole class discussions that placed these small learning spaces in interrelation with each other within the collective learning spaces or collective ZPD (Moll & Whitmore, 1993). However, it was observed that such spaces existed because of the high level of trust that was well established amongst the students and between the teacher and students.

The teachers of both subjects were thus highly involved and participated in their students' learning and assisted them in various ways: by providing the situations to critique or solve real-life problems; by reaching out to them to assess their learning; interacting with them; asking questions; making explicit their group discussions; responding immediately to any misconception that might arise; recontextualising content for them to make sense of it; helping them draw connections with their previous learning; assisting them in recalling their prior learning and related daily life experiences; and assisting students in gaining confidence to write the exams.

Hence, the "eye of the teachers' focus" was on students' learning. The tasks that were assigned, the activities that those generated, the students' group or pair work, and the classroom discussions were all highly connected. Thus, they transformed the content of learning to the context of learning. The content became both the background and foreground against which the students' learning took place. The students opened a dialogue by responding to the task questions and, at times, they were amused by the questions their teachers asked. For example, the first question that Jeffrey asked in his second lesson was: "What was the colour of his hair?" (during classroom observation). The students laughed in

embarrassment at the question for a while before collecting their demeanour and responding to the question. In other situations, the students worked in groups and, at times, helped each other across groups as well. For example, in Justin's lessons, the students were often heard telling other groups to try things differently. The students also participated in whole class discussions and made explicit their interpretations. For example, there was a point in Jeffrey's lesson, when he inferred that the poet was cursing God, that led to an outpouring of students' comments. One of the students interpreted the comment as a spitting action and stated that it pointed at the self-hatred going on in the poem. Another student thought of the situation as a changed human nature which, he explained, was "shaming like grace" for something that was not the poet's fault. The comment connected to the idea, previously discussed in Jeffrey's case, of the use of a slippage metaphor for "that over which we have no control." There are additional similar instances of the students' interaction and interpretation in Chapters 5 and 6, where the evidence reveals that the teachers transformed the content as context against which the students engaged in their own learning with the other – the task, peers and the teacher. The experience thus gained functioned as the knowledge base for the teachers' own learning for their professional growth of practice and in further steering their students' learning, either in-the-moment or near-future or in distant future.

Tasks are pivotal in assisting teachers in mediating their own teaching. It is through the use of tasks that teachers structure and design their lessons and create cultural and learning spaces for their students to engage them in their learning of concepts. Therefore, tasks assist teachers: in managing order and encouraging students' need for social interaction (Doyle and Carter, 1984); in using social interaction to support students to learn the subject content at hand and involve them in practices of learning that matter in subject culture (Edwards, 2015; Thompson, 2015) as well as with practices that are appreciated within their

institution (Bernstein, 2000); in bringing in critical knowledge (Smagorinsky, 2008) that the students require in order to complete the tasks (Doyle & Carter, 1984; Edwards, 2015; Stylianides & Watson, 2015). I will further deliberate on teachers' mediating role in shaping the quality of teaching and learning in section 7.2.2.

7.1.3 Formative Assessment

This section addresses the sub-research question 4: What understanding do 'expert' teachers make of their students' learning from the classroom interaction?

One of the practices by means of which the participant teachers formed an understanding of their students' learning was formative assessment. They were involved in their students' learning, and that was where the concept of the ZPD became evident. According to Vygotsky (1986), the aim of instruction must not be 'at the ripe' but 'at the ripening functions' (p. 188). The ZPD provides an opportunity to the educators to understand 'those process that are in the state of formation, that are just beginning to mature and develop' (Vygotsky, 1978, p. 87). Hence, the ZPD serves in two ways: as a diagnostic tool, and as a means to understand the process of development of academic or abstract concepts.

The question then is how teachers assess their students' learning of abstract concepts, their higher order psychological processes. This research demonstrates that the way the teachers designed the tasks as material and concept (Cole, 1996) accompanied by social interaction between teacher and students and among students and that gave the teachers the scope to formatively assess their students' progress in learning (Edwards, 2015; Thompson, 2015). The interaction around tasks provided scope to the teachers to start with the reading and writing processes (Rosenblatt, 2005), reading the text of students' responses and making sense of that to be able to recontextualise their students' thinking. The teachers used different practices of formative assessment in order to assess where their students were in their

learning and think about what needs to be done as a consequence – in terms of: explanations, further questioning, making them think on a certain aspect or use more tasks; assist their students toward their 'potential level of development' (Vygotsky, 1978, p. 87); and how they might adapt their teaching to meet their students' learning needs (Black & Wiliam, 1998; Black et al., 2004).

None of the teachers used tasks for peer assessment. The only traces were found in Lisa's grammar lesson where the students assessed the responses of their peers. Though they were able to identify the error and offer the correct response, they were not able to explain the reason behind it. Another point to bear in mind with regards to this particular instance is that Lisa had not designed the task for this lesson. Rather it was handed over to her by her KS3 HoD who had not set that as an assessment task; according to Lisa, it was set as a task to teach grammar to the students. The opportunity of peer assessment arose because of the way she structured learning: three students worked as leaders for each of the three sections, each containing a set of ten sentences. The leaders selected their peers one by one to correct a sentence. Lisa had structured teaching and learning in this way with the core intention of making students learn together and not with the intention of peer assessment. Nevertheless, peer assessment followed. Linda was the only teacher who, as per the quintessential policy of her school, used the success criteria (Gold, Silver and Bronze medal) as a psychological tool for students to self-assess their current level of learning and where they might want to reach. She also provided them with pink sheets in order for them to make judgements about how they might reach where they intended to. From the analysis of findings from the teachers observed, it can be said that peer-assessment and student self-assessment (Wiliam, 2011) were not common amongst the teachers, with the exception in the case of Linda where the routine need of student self-assessment came from top-down. The use of explicit tools for student self-assessment in daily teaching practice emerged from the mandatory school

policy, where teachers were required to think of incorporating the assessment criteria with daily learning of their students; such a form of assessment was part of the culture in Linda's school but not in the other schools.

7.1.4 Recontextualisation of Subject Content

This section and section 7.2.4 on reflective practice address the sub-research question 5: What understanding do 'expert' teachers make of their own learning from the classroom interaction?

Recontextualisation was another broad theme that emerged from the analysis. I have demonstrated the ways in which the participant teachers recontextualised the subject content for student learning. There were several ways in which the teachers recontextualised the content for their students' learning. The teachers either changed the context of the content and explained the same thing providing examples using a different situation, or used a different set of words to explain the same situation. These findings relate to the linguistic definition of recontextualisation that Linell (2009) provides. Each teacher observed was involved in this process, regardless of whether they were teaching English or mathematics. The teachers' representations of the content at hand emerged from their assessment of their students' responses, indicating that both the teachers and their students were active participants in engaging with the content and in dialogue. Moreover, it was not just the teachers who contributed towards representing the subject content, but the students also contributed to explaining the content in question for others to make sense of it.

I will further deliberate on the theme of recontextualisation from Bernstein's sociological view of it in section 7.2.3.

7.1.5 Knowledge Base

This section addresses the sub-research question 6: What knowledge bases do 'expert' teachers draw on to reflect on their thinking for teaching and learning to happen in the classroom?

The *knowledge base* of teachers has an important as well as active function in transforming subject content. It is the knowledge that the teachers bring in when reflecting upon taking decisions for planning lessons or while taking in-the-moment decisions during teaching in the classrooms. It is active in the sense that new classroom teaching and learning experiences add to the teachers' previous knowledge, and have the potential of either strengthening or challenging teachers' assumptions that might assist them in renewing their understanding of pedagogy as well. The participant teachers used the following types of knowledge bases: (a) their *knowledge of the context* included institutional culture; (b) *knowledge of the students* included students' interest, prior learning, learning in other subjects and collective characteristics of their students; (c) *knowledge of the other* included interaction with colleagues, their academic tutors, mentors, their school teachers, the literature, subject websites and the other; (d) *knowledge of self*, discussed in section 7.1.1, included their beliefs: their beliefs for the subject they teach, their beliefs for students learning, and their own identity; (e) and *knowledge of pedagogical structures* which refers to the mode of inquiry used in alignment with syntactic knowledge of subject discipline.

The participant teachers utilised the different types of knowledge bases, as illustrated in section 6.5, in their daily teaching work to represent the content to teach. The teachers used various forms of representation – narratives, games, questioning, explosions, play with material and situations and which affirms the relevance and importance of Shulman's (1986, 1987) concept of PCK. However, it became evident that the representation of the concepts did not end with just preparing for a lesson. It extended during the lessons as well when the

teachers were in interaction with the students and participating with them in their learning of subject content. In this sense, the transformation of concepts is not unidirectional, involving teachers' knowledge of the subject and representing that into PCK (Shulman, 1987). Rather, the transformation process is bi-directional. Transformation of the concepts involves the active participation of both the teachers and their students. The teachers were involved in the active representation of the subject content deriving from their assessment of the students' responses. The teachers represented the subject content as a preparation to teach the content and as a response to their assessment of their students' responses in-the-moment. Such representations functioned in two main ways: as the knowledge required by the students to understand the new abstract concepts that were introduced to them; and for the teachers to assist their students in learning skills and processes that they required to function in the subject.

The teachers used pedagogical structures (Schwab, 1978) to involve the students with a method of inquiry about the subject content; their use of the structures made explicit the syntactic knowledge, suggested by Schwab (1978) as one of the necessary components of learning. The English teachers wanted their students to develop the skill of critical analysis of the texts that their students were reading. The skill of critical analysis includes investigative, interpretative and argumentative processes, the processes necessary to function in the subject. In mathematics, the teachers worked towards developing mathematical skills and thinking by engaging the students with reasoning, evaluating, and drawing patterns and connections.

The teachers also used curricular knowledge, as suggested by Shulman (1986), to reflect on their teaching and steer their students thinking. The teachers' knowledge of the continuity in their subject curriculum proved to be advantageous for them in introducing the students with the kind of questions or the language they might encounter in GCSE

examinations and in connecting their students' present learning in preparing them for both present and future demands. The knowledge of curriculum in other subjects also helped them assist their students in drawing connections or parallels with other subjects (Cases of Lisa, Jeffrey, Lauren).

Another type of knowledge base is *knowledge of the other*. The findings have provided evidence of the interaction with others, whether actual people or in the form of literature, in shaping participant teachers' thinking. This kind of knowledge helped them to: understand the kind of tasks to introduce; assess their students' responses; try and test what works and what does not in a classroom situation, use ideas from others in their teaching of the content; seek opportunities to share material with others for its use for teaching. The findings of *knowledge of self* align with the work of Turner-Bisset (2001) who describes the term generally as teachers' understanding of their own personality and its impact on teaching. Instead of a general understanding of self, this study identified that *knowledge of self* comprised of teachers' beliefs for their students' learning, which aligns with Traianou's (2006) study; beliefs for the subject they teach; and teacher identity. Teachers reflect upon their histories and engage with their experiences.

A combination of forms of knowledge, as discussed above, functioned as a tool kit for the teachers (Wertsch, 1993). The tool kit of teachers consisted of the SoW along with other resources that they used in shaping the content for teaching and learning. For instance, Lauren, in engaging students with the concept of bearings, drew from her knowledge of details provided in her SoW which contained information about the websites that the department recommended its teachers to use along with information on common misconceptions in a particular topic among students. She also incorporated her knowledge from teaching the same topic to other sets of students in previous years. On the other hand, Justin also used teaching websites to plan tasks for his lessons, but these were not

recommended to him by the department; rather, he held individual membership to these sites. Apart from that, he selected from his knowledge of how his students function and learn, and aligned his lessons with school policy. In the context of English teaching, though Jeffrey and Tyler contributed to material shared in the common online platform created as a common resource within their department to share material, they drew more from their personal collection of texts, notes and other artefacts. Such a common online platform was missing in the maths department in the same school. Lisa used a mix of resources such as the texts that she had read during graduation, contexts of students, exam pattern, material taken informally from colleagues and tasks that her KS3 HoD assigned. Linda formally collaborated with other teachers in developing supporting material for teaching as a way of working in her department.

7.2 Discussion of the Theoretical Perspectives

The theoretical perspectives, as discussed in Chapter 3, have been a lens through which I viewed participant teachers' teaching in their varied school contexts. The key concepts that were discussed drew on the interrelationship between: the concepts of figured worlds; the concept of mediation and the theory of transaction; recontextualisation; and reflective practice. The concepts include the recognition that human cognition and understanding is socially constructed; social is a necessary component of psychological formation; and that some form of mediational or psychological tool is required to commence and engage in the social and psychological processes. Hence, this section further expands the discussion of sub-research questions beyond their scope and delves more deeply into the processes involved in subject content transformation by discussing the findings in the light of the core concepts.

7.2.1 Figured Worlds: Teaching and Learning Situation

In the discussion in section 7.1.2 on the use of tasks, I briefly discussed the concept of figured worlds. In this section, I further elaborate on the concept as it is central to both conceptualisation and implementation of a teaching and learning situation. The concept of figured worlds emerged from the works of Holland et al.'s (1998) in the context of their interest in 'identities, and imaginings of self in worlds of action' that take place 'within the frames of social life, such as romance, mental illness and its treatment, domestic relations, Alcoholics Anonymous, academia, and local politics' (p. 5). Their study demonstrated how people form imaginary realms within real-life situations and work their way in living and achieving those realms. The use of the concept, when applied to daily teaching and learning situation, provided evidence that the teachers formed such worlds or realms to draw themselves into it and work their way in achieving their intentions for students' learning. The study thus aligns with the previous study by Holland et al. (1998). The teachers created and used figured worlds at three levels: firstly, the teachers used these as frameworks or structure to steer their lessons. They imagined the way in which they will achieve their intentions for students' learning by building a narrative thread. Secondly, they made use of figured worlds to invite students into them by engaging the students in a dialogue around the tasks that in themselves are a world of situations in the form of a question, numbers or symbols. In this sense and the above, the teachers used figured worlds as dialectical tools. Thirdly, they, at times, helped their students to enter into another social and cultural situation that they created as a response to a learning need upon which they either reflected while designing tasks or which they assessed through an ongoing dialogue with their students. The teachers also entered into such situations along with the students. In this sense, they entered into two realms at once: the one that they created for themselves to push through the lesson; and the other in which they worked along with their students to push them towards a new

understanding and to assist them through both dialogical and dialectical processes to work towards being knowledgeable persons.

The teachers were actively involved in imagining and structuring their lessons before entering the classrooms as well as at the time of implementing those figured worlds in the classrooms. In creating the figured worlds, the teachers interacted with their sociocultural contexts deriving from their resource system: their knowledge of their institutional culture, their own beliefs, the contexts and prior knowledge of their students, their interaction with others and their knowledge of subject content. These worlds served the participant teachers the purpose of creating both restrictive and generative conditions for students learning. For instance, both Tyler and Lisa's engaged their students with the knowledge required to function in their subject. They engaged the students with critical analysis of the text but worked their way with their students through the operationalisation of sociocultural contexts that shaped them and were shaping them, and also interacted with the contexts of their students in shaping teaching and learning. Tyler was highly influenced by his classics teacher as a student and recalled his influence on him in shaping his belief about the similarity between the work of an archaeologist and students' learning of literature: in working like archaeologists, the students were required to be 'skeptical, reflecting and sensitive in treating the material at hand' (Tyler, during the interview). In his assigning of three poems to his students, he expected his students to think like archaeologists about the theme of immigration from three different perspectives from three different time periods. Instead of giving their opinions about the theme from their personal experiences of the times in which they live, he wanted them to reflect upon their previous learning about the concept of roaring twenties, pull out evidence in support of their interpretations, and draw connections with the readings presented by their peers and across the three poems during whole class discussions. Lisa, on the other hand, believed that students learn best together.

Her belief was manifested in several ways: she was aware of who worked well with whom, who was dominant and could control a certain student and, therefore, paired them accordingly; in whole class discussion, each pair was given a chance to present their argument; and after initial lead by Lisa, one or two pairs gradually started to draw connections between their arguments and that of others. In Tyler's classroom, the scene was different. Tyler was teaching in a school where students came from affluent families and were well supported at home, while Lisa was teaching in the context where students came from socially and economically disadvantaged families. The difference impacted the decisions of the two teachers and was evident in action in the classroom. Tyler, unlike Lisa, did not have to worry about his students' writing. His main concern was to get them to develop ideas and support them towards connecting those. Lisa, on the contrary, was concerned that her students wrote poorly and in an unsophisticated manner despite being a top set. She was aware that she had to take the lead in helping the students draw connections, in helping them see how an argument from one pair connected with the argument from the other pair, and ensure that they challenge themselves in finding structural patterns from the text and not simply paraphrase an example provided by her. Hence, while Lisa aimed for her students to identify the keywords and understand the demand of the question, identify a structural pattern, draw connections, and write an argument; Tyler aimed for his students to think critically. Though both aimed at their students to deconstruct a question based on GCSE exam pattern, their intentions were different, which were reflected in the pedagogical structures with which they planned to engage their students. For Tyler the method involved inviting students to the excavation process: be sensitive to words, phrases, rhyme schemes, present their reservations and argue about what they read and interpret. For Lisa, on the other hand, the method included: evaluation of the text, which further included finding structural patterns, presenting evidence in support, drawing connections and writing an argument. To

involve the students with the processes imagined, Lisa drew from her knowledge of GCSE exam pattern, departmental expectations, collective characteristics and individual behaviour of her students, and knowledge of common errors that students make in writing a response to an exam question. In short, she used a resource system that composed of a mix of her own resources developed over time with experience coupled with material borrowed from her colleague. Thus, for both Tyler and Lisa, their figured worlds were influenced by their own situatedness that influenced the contexts of learning that the two teachers created for their students and thereby shaped their students' experience of subject content. The key thing was that these worlds were both restrictive and generative in nature. The method of critical analysis and choice of material in both cases restricted the students from drawing shallow opinions. In Lisa's case, the students had to further reflect on the sentence stems provided to them in thinking of the sophisticated way in which they might present their argument. Moreover, her giving away a different example from what was expected them to find, constrained the students from using the same example and provided them with an opportunity to challenge themselves in finding patterns from the text that they were reading. In Tyler's case, the students had to go beyond their personal views of immigration to reflect critically upon the ideas they met in reading the poems. He afforded them the possibility to view the concept of immigration from three events in the historical timeline and critically engage with that evidence in order to reconceptualise their own understanding of the concept.

Even in mathematics teaching, the figured worlds used by the teachers were framed within the sociocultural contexts of the teachers. Taking examples of Justin and Alex, both worked in school's diametrically opposed to each other. Justin, like Lisa, was teaching in a school located in an area of high social and economic deprivation that expected its teachers to create engaging lessons to arouse students' interest in the subject; while Alex was teaching

in the affluent school, same as Tyler's, that expected the lessons to both teacher-led and student-led. The contexts themselves shaped the way the two teachers imagined what might happen in their classrooms. Justin was aware of his students' collective characteristics and had already established a culture where students worked together in groups, at times across groups on their own, and engage in whole class discussion and problem solving. Apart from deriving ideas in relation to his knowledge about his students, Justin selected material from his other resources as well, deriving from his own teaching experience, from various websites and textbooks. The figured world that Justin imagined for them to enter into afforded both for him and his students a space to keep problem solving central to teaching and learning. The figured world afforded both for Justin and his students a space to keep problem solving central to teaching and learning. It also enabled the students to remain actively involved in their learning throughout the lesson. Justin worked by means of his belief that students learn best when they are enticed by a problem. Alex, on the other hand, knew that his students did not easily accept new things. He wanted to push them further in their abstract thinking about the area of a triangle. Aligning with the school policy that learning must also be student-led, Alex introduced initial tasks using textual questions for the students to apply their previous knowledge of finding the area of a triangle. However, despite all his efforts, the students resisted using the new formula and adhered to using the old formula. Hence, the students led him to think of ways other than he had tried to convince them of using the new formula. That was when he drew from their previous knowledge of the sine curve. Hence, his figured world of using the known to move towards the unchartered territory afforded his students with an opportunity to reapply their previous knowledge of relationship between sides and angles as well as reflect upon that relationship from the point of abstraction that Alex had wanted to lead them to. Thus, Alex enacted his belief about the need of some kind of method in a mathematical inquiry that called students to have an open

mind and to try and bring in ideas from different directions when solving a problem so that they are able to find a succinct way of solving a problem and not simply repeat a process. It restricted them from staying in their comfort zone and generated for them an opportunity to push themselves further in thinking in more abstract ways of solving the area of a triangle.

7.2.2 Mediating Role of Teachers

This section focuses on the mediational role of teachers in shaping the quality of talk and quality of experience in classrooms. Teachers use tasks to introduce concepts and start the learning activity (discussed in section 7.1.2). However, it is the nature of the transaction between the teacher, students and tasks that holds the key to the quality of talk and quality of experiences.

The teachers framed the tasks as situations. These situations helped them in invoking their students to start the selection process (Rosenblatt, 1978; James, 1981; Doyle, 1983; Edwards, 2015): select from their experiences, situations or prior concepts that either revealed to the teacher their everyday understanding or a scientific understanding related to it. The teachers used this knowledge of their students to take them towards higher levels of abstraction. Furthermore, the teachers framed or structured the tasks in a specific way in order to prompt their students to think in a particular direction or at a certain aspect, thus, implying that they not only attached their intentions to the tasks they assigned, but they also purposefully steer their students' reflections and influence their selection process. For instance, when Steve had given a "calculate the power" task to the students, he intended that they understand the Base 10 system and eventually use that to reflect on their thinking to understand the other base systems.

The teachers did not at any time, during the teaching and learning situation, try to preserve and orchestrate classroom talk (Mehan, 1979; Myhill, 2006). Instead, they played

a key role in mediating the quality of talk (Wells, 1999; Van Zoest et al., 2010; Ingram et al., 2015). The teachers made an effort to use the interactions in responding to their students' current level of learning, for instance, whether to: repeat the question that they had asked the students; revoice their students' responses (Boukafri et al., 2018); re-explain the situation or provide them with another example as an illustration of the same meaning that they were trying to convey; make the students reflect on different ways of solving a situation or think about a situation from different perspectives; make them draw patterns from the application of the concepts they engage them with; remind them to think of their already acquired knowledge of scientific concepts in the light of the present situation; encourage them to propose new questions to find solutions to the problems they might be handling (Van Zoest et al., 2010); or assist them to draw connections between their own thoughts and verbalisations of others.

It is important to note that the quality of talk became a reality in the classrooms of the teachers because of the relative experiences that these teachers created for their students in order for them to think about and think against. In this way, the experiences created functioned as both external and internal, that is, coming from the authority of a teacher and used as psychological tools to mediate students' learning (Pierce, 1994; Vygotsky, 1987, 1997), and whereby the students were able to make some form of connection or relation between their daily regularities or experiences with new knowledge presented to them (James, 1981; Pierce, 1994; Dewey, 2004). For instance, in order for her students to reflect on the concept of colonialism from a psychological perspective, Lisa created a relative experience for them to participate in, whereby the students start to give away their possessions on the unfair demands of the *Lab Coats*. This experience was relative to the students' experience of reading the comprehension passage, which dealt with the economic perspective of colonialism, and to their discussions around that. Even in the lesson on

grammar in which the students were required to correct the sentences, Lisa engaged them in a social experience of learning together which gave the students time to laugh at each other's mistakes; and, at the same time, be aware that they had the capacity of making mistakes and evolve in the process by relearning the grammatical concepts. Lauren started her lesson by providing her students with an experience of playing a collective game in which they derive from their previous knowledge of direction and angles to estimate angles before proceeding with introducing the concept of bearings that required them to use this prior knowledge. She also engaged them with an experience corresponding to their daily spontaneous experience of travelling to different places from their home in order to assist them in their learning the concept of bearings. Alex exposed his students to find the area of two similar triangles matching their current level of abstract understanding to gradually moving them towards higher abstraction and deriving a formula that would require them to think differently. However, when the students refused to accept a change that they collectively established, Alex asked them to think of their previously acquired concepts of the symmetry of sine wave, and thus helped them overcome resistance in using the new formula.

The teachers mediated the quality of teaching and learning by providing their students with relative experiences (James, 1981; Pierce, 1994; Dewey, 2004) and hence assisted them to form connections: to reflect on their previous experiences or/and organise their previous scientific knowledge in relation to present experience and new knowledge; to reflect on their emerging thought processes or their own verbalisations in relation to the verbalisations from the teacher and peers.

7.2.3 Recontextualisation: A Teaching Situation

This section extends the discussion in section 7.1.4 by throwing more light on the process of recontextualisation of subject content. According to Bernstein's notion of pedagogical

discourse of science (2000), the knowledge production of the subject content goes through several steps that includes discourse around it in the universities, research centres or in teacher training programmes until it is recontextualised in order to be handed to the teachers to put to use in the classrooms. This last step involves school. The school through its various departments provides its teachers with the SoW which tells them "what" knowledge to transfer. It provides them with what the school believes are good teaching practice policies which inform the teachers of the "how" of teaching that knowledge, thus conditioning its transmission.

This study demonstrates that the process of recontextualisation extends further. There are three layers of recontextualisation that lay in the hands of teachers, and that it outlines one of the chief ways in which the teachers, in return, impact the contexts in which they work. In the first layer of recontextualisation, the teachers create conceptual frameworks and tasks and create an imaginative world. They, thus, recontextualise their knowledge of the subject content and pedagogy in some form of representation. In the second layer, the teachers recontextualise their students' understanding of the subject content utilising the representations they formed; through their actions in the class in relation to the tasks that they assign; and through a dialogue with the students. The third layer involves teachers' own learning. It refers to the ways in which the teachers' interaction with the students in relation to the subject content shaped how they would reflect on the tasks or the strategies that they used, or how they would reflect on their teaching and learning experiences in creating future tasks, or how they reflected upon the challenges and interpreted the difficulties that the students faced in their learning. I will discuss the last layer in further detail in the following section.

7.2.4 Reflective Practice for Teaching

This section discusses the concept of reflective practice by the use of which teachers make sense of their own learning from the classroom interaction and thus partly addresses the sub-research question 5, as mentioned in section 7.1.4.

The teachers reflected while teaching whenever they met with a surprise and on the teaching and learning that took place. In this sense, the findings align with Schön's (1983) notions of reflection-in-action and reflection-on-action, and with Connelly and Clandinin's (1988) notion of personal practical knowledge, which the teachers build over time through their reflections on their classroom experiences. However, the teachers reflected in further ways than Schön's description of reflection. The teachers reflected while-designing-action as well, when they think of their intentions for students' learning of scientific concepts, imagine the way action might unfold, think of pedagogical structures they might use or think of ways in which to balance their beliefs, teaching of subject content and institutional regulatory policy. In all the three different phases – designing, teaching and post-teaching – the important thing that emerged in the findings was that the participant teachers reflected specifically two things: on their students' learning; and their own teaching in relation to their students' learning. They used their reflections to think of their next action when making assessments in the classroom situations; to critically self-evaluate their teaching on the basis of their performance in the classroom: the things they could have done better; the alternative examples they could have provided; the kind of tasks they could have provided to get a different kind of response from the students. They also acknowledged the challenges and struggles they faced and how they might address those challenges in future. In short, the teachers engaged in the analysis of their own teaching on the basis of their ongoing formative assessments of their students' learning of subject content; problematised their own teaching

by either working towards finding solutions to the problems or having identified problems, remained in the state of deliberation.

7.3 Process of Subject Content Transformation: Addressing the Main Research Question

Based on the evidence (presented in Chapters 5 and 6) from this study and the discussion of sub-research questions and the theoretical perspectives in this chapter, I address the overarching research question that this thesis sought to investigate: **How do 'expert' teachers transform the subject content in order to support student learning in classrooms?** The participant teachers transformed the subject content provided to them by continually engaging with pedagogical processes represented as four intertwined phases (shown in Figure 39): (a) Reflect on their personal sense of experiences; (b) Design tasks and figured worlds; (c) Involve and engage in transaction, assessment and recontextualisation; and (d) Assess classroom teaching and learning experience.

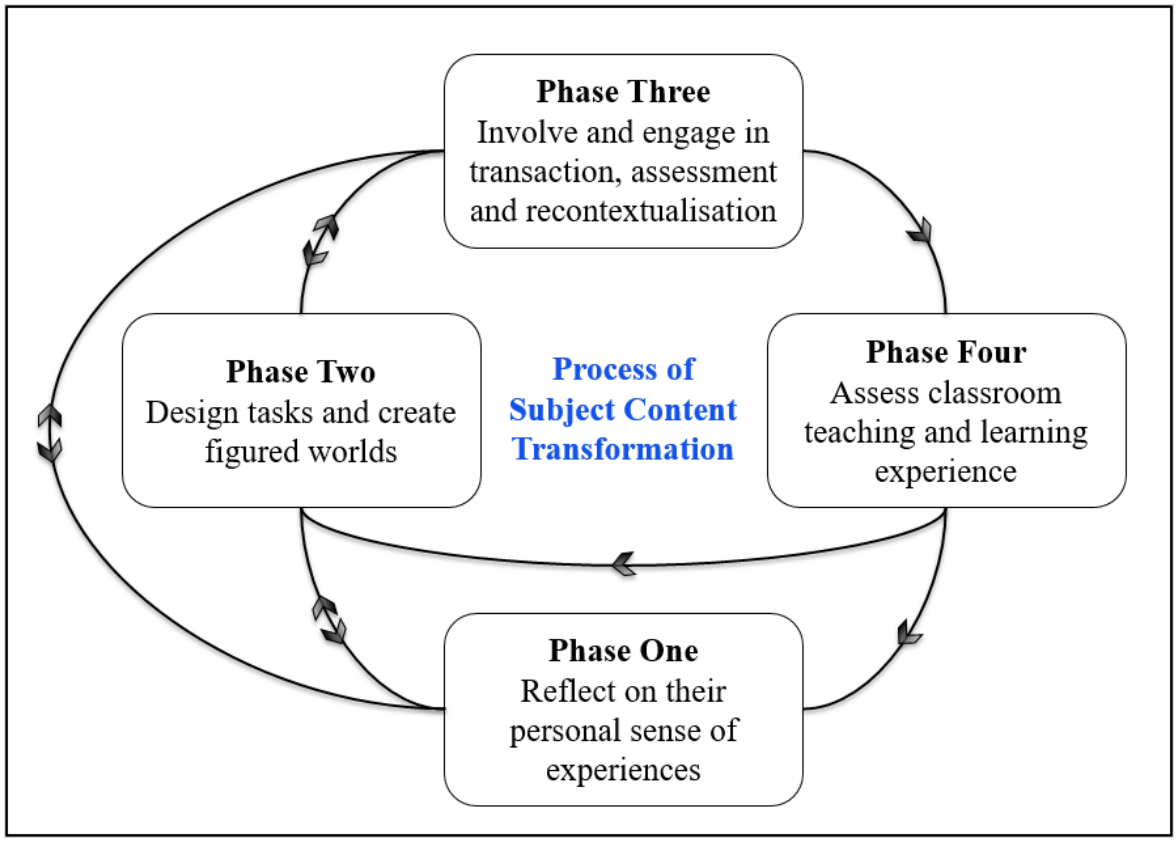

Figure 39. Process of Subject Content Transformation

Phase One: Reflect on their personal sense of experiences

The first phase of subject content transformation involved the teachers in reflecting on their thinking for teaching the subject content in relation to their knowledge base. The knowledge base is representative of teachers' cumulative addition of facts, principles, ideas, identification of problems or resources acquired with time by means of their past and ongoing teaching and learning, and educational experiences. The knowledge base of the teachers ranged from their personal sense of experiences as a student in school, university or a PGCE trainee to their personal sense of experiences as a teacher. The latter includes a combination of several sources: their understanding of their *institutional demands* defined in the form of "good teaching" processes along with their sense of their past diverse experiences inclusive of their *knowledge of pedagogical structures*; *knowledge about students*; their *beliefs* about teaching and learning; their *interaction with others*, for instance their colleagues, mentors, professors, tutors, school teachers, students, literature and subject

websites. The teachers, thus, worked by means of regulatory discourse of the institution and by drawing from several resources in making classroom teaching and learning decisions.

Phase Two: Design tasks and build figured worlds

The second phase included designing tasks and works in tandem with the first phase. In designing tasks, teachers fostered a balance between their situatedness and their intentions for students' learning. Teachers' *intentions* served the purpose of giving direction to the teachers in terms of guiding them in their subsequent teaching decisions. Driven by their intentions, teachers *imagined figured worlds* that functioned as their landscape of action in which they viewed themselves as supporting their students in bringing a shift in their thinking or conceptual understanding. They also reflected upon the *artefacts*, both for the main task and supporting material, which they might require to involve students in dialogical and dialectical processes and support them in their engagement with scientific concepts. Based on their intentions, teachers also thought of *learning objectives* to give a sense of direction to students. Lastly, task design involved teachers in thinking about *task distribution, instruction and time management* that assisted them in making decisions about how they wanted to divide tasks among students, the guidelines that they wanted to give about task expectations or demand, and think of the duration and kind of activity – a group or pair or a whole class activity – they would like to promote to initiate dialogue among students.

Figured worlds function as mediational means for teachers to get through an inherent contradiction of teaching subject content to their students and making learning possible; they also serve as psychological tools to invite students as critics to enter into a new physical reality in order for them to contribute toward their own learning of subject content. The teachers build narratives for themselves to transport themselves forward in time to imaginary classroom teaching and learning situations in which they see themselves enacting their

intentions for teaching a particular content. Such situations provide them with an opportunity to: visualise the way they want to see their students engage with the tasks; think of the groups or individuals that they will have to reach out first; give them access to possible students' responses to tasks and think ahead of the ways in which they might respond to those responses; and prepare supporting artefacts in case there was time to do more or for an unexpected contingency when they might think of changing or modifying their plan.

Phase Three: Involve and engage in transaction, formative assessment and recontextualisation

In this phase, teachers implement the tasks designed and enact figured worlds. The teachers in this phase were highly involved in their students' learning. They introduced the tasks one by one as they had imagined. By doing so, they initiated a dialogue with the students; made the students reflect on their thinking and verbalise it; and encouraged them to engage in dialogue with their peers in relation to the subject content, add to the thoughts of others or build from there. The teachers at all times were on their toes, making an assessments of their students' learning or in being alert to any misconceptions that might arise. They did so by physically *moving around in the classroom*, observing and listening to pair or group discussions; by *asking them questions* so as to direct their thinking or gain information; by *collaborative problem-solving on a whiteboard* with the aim of making their students' thinking explicit to other students and create opportunities for the students to participate in their own learning; and *through other ways of assessment* such as using quizzes and excitement in class. Thus, by engaging with the formative assessment practices, the teachers created for themselves conditions to assess their students' current level of learning and used that information to recontextualise the subject content; and for students, to reflect on their thinking and review their sense of the content in question.

To recontextualise the content in the situation, the teachers employed various means. They *explained* the content using a different context so that the students could connect with that and make sense of it or explained the same situation by means of different choice of words. Though by designing tasks the teachers had formally invited their students to enter into the world of words or symbols arranged in a particular order, they, at times, invited the students informally to enter into another reality, *an imaginative situation*. The teachers also recontextualised the content for student learning by *drawing connections* between their responses, between their present thinking and past learning experiences; by *breaking a task* into further smaller steps; by *providing a model response* that might emerge from in-the-moment assessments of students' learning or might have been a deliberate attempt from teachers owing to their assessments of students' responses from previous lessons; or by *providing suggestions for thinking*, especially when students provide shallow reasoning or require assistance on the same thing repeatedly. There were also times when *students recontextualised* the content by clearly stating their understanding and explaining it to their peers or by taking the responsibility to assist their peer in understanding something.

It was interesting to note that this phase involved the teachers in a dialogue with their students as active participants rather than "in their heads" as in phase two. Active involvement in students' learning gave space to the teachers to make formative assessments about the progress of their learning, gain insight into their learning difficulties, pick misconceptions or identify the preconceptions that they brought with them, and accordingly, take the necessary action. In doing so, teachers drew from their past similar experiences or from their repertoire of resources to reflect upon the learning needs of their students. Hence, teachers engaged in transaction with their students through the processes of formative assessment and recontextualisation to assist their students in making sense of abstract or academic concepts introduced to them.

Phase Four: Assess classroom teaching and learning experience

In this phase, the teachers made assessments about students' progress and their own teaching on the basis of their reflections on their interactions with their students in the classrooms. The teachers assessed the progress of their students, in specific, whether they were confident with the content taught; they assessed their future needs or ways in which they will possibly address some of the contingencies that arose but which did not require an immediate concern; they reflected on their beliefs and either further cemented those or reviewed those; and, most importantly, they self-assessed their own performance in teaching the content and were critical of their teaching. The assessments that teachers made in this phase did not come to an end here; these assessments were used to recontextualise their own teaching either in the subsequent lesson or kept as a resource in the form of some perplexity or a problem which they might have to address in future teaching and learning situations. In this way, assessments formed in Phase four fed into Phase one.

Hence, the process of subject content transformation involves a continuous flow of thought formation and transactional action amidst different phases; and it is not sequential in nature. Phase one and Phase two work together, backward and forward. Task design and figured worlds created in Phase two are enacted in Phase three. In Phase three, that is a classroom teaching and learning situation, teachers reflect on their personal sense of experiences (Phase one) for taking in-the-moment decisions; sometimes they also think of the tasks (Phase two) they might have to introduce in their subsequent lessons when reflecting on their students' responses. In Phase four, teachers use their interactions with their students in Phase three to assess their teaching. Such assessments then become a part of their personal sense of experiences (Phase one) and which they also use to design tasks. Teachers are thus involved in continuous action and reflection on their own teaching to derive from with the aim to support their students' learning of academic concepts.

7.4 Teacher Expertise and its Relation to Teaching Processes

Teacher expertise is woven with quality of teaching. Teachers bring about quality of teaching by means of their continuous action in engaging with several pedagogical processes simultaneously. These processes serve as mediational tools which not only help teachers to support their students' learning but also provide conditions by means of which teachers engage with their own teaching. In this way, the teachers become the object of their own action. At every stage of the teaching process, teachers are continually involved and engaged in thinking about the possibilities of constructing and reconstructing daily classroom teaching and learning experiences and deriving from it; in problematising and critiquing their own teaching. Thus, teacher expertise lies in teachers' continuous interaction with their past, their present and their future circumstances in shaping the quality of teaching and learning in classrooms.

The literature on teacher development of expertise and learning (Alexander, 2003; Dreyfus, 2004) and the literature of routine and adaptive experts (Anthony et al., 2015; Yoon et al., 2015; Männikkö and Husu, 2019) acknowledge the influence of teachers' beliefs formed over a period of time and teachers' responsiveness to students' learning as emerging in classrooms (Traianou, 2006; Alterator et al., 2018). However, the previous literature neglects or rarely draws on immediate macro-level entities, for instance, institutional good teaching policy and how that regulates teachers' thinking in shaping the learning contexts and activities of their classrooms, which further informs the transformation process of the subject content. This thesis forged a connection between the principles of micro processes and macrostructure of control in the formation of classroom pedagogy. Teaching is regulated and shaped by sociocultural circumstances by means of which the individual teacher operates; these sociocultural circumstances include institutional policy and its demand, teachers' beliefs formed with experience, and their capacity to imagine and enact future

contexts of their classrooms and their students' learning. Thus, even when working alone, the moment-to-moment decisions involved in the teaching and learning processes that teachers make are informed by their sociocultural situatedness and circumstances.

Another critical point to make is that teacher expertise is not bound to a long period of time, 10-15 years, to reach expertise as previous literature states (Alexander, 2003; Dreyfus, 2004; Griffiths, 2013; Enow & Goodwyn, 2018). Lisa had four years of teaching experience in comparison to Jeffrey, who had 25 years of experience. From their lessons detailed in Chapter 5, it can be marked that Jeffrey's knowledge of Victorian society and its biases was extensive and detailed. It was the period when the British had established colonies in various parts of the world, and some element of that emerged in Jeffrey's interactions with his students. Lisa's case, on the other hand, required an explicit understanding of colonialism. She did not have as extensive knowledge as Jeffrey might have, but she definitely had the very basic intention of engaging the students as a group in understanding the problems inherent in the economic perspective of colonialism and utilised her beliefs about learning, her knowledge about the content of colonialism and incorporated that with the demand of her department. Her expertise was similar to that of Jeffrey in terms of engaging with the processes of teaching and learning: ensuring the vertical learning of the students by designing tasks and learning spaces to meet the demands of the institution and her own intentions, using formative assessments, recontextualising the content for her students, engaging in reflective practice; and in doing so, helping students reflect on their own thinking and recontextualise for themselves their understanding of the concept.

Teachers use both routine and novel solutions to teach subject content. Though Lisa used a novel approach in teaching the concept of colonialism and which involved higher risk in terms of that the lesson might have been a fail if the students had not responded to an alternative situation that she had created for them, the question then is – Did she use that

novel approach every time she taught a lesson? Did not using a novel approach in her other lessons make her less expert? The answer to both these questions is 'No'. In the other two lessons that she was teaching, she did not do anything novel. She engaged with the demands placed by her school as a way to structure her third lesson on the basis of GCSE examination; in her second lesson, she handed down the grammar task sheet that required students to correct the sentences apart from her engaging the students in other regularities that the school expected from her. In both the situations, she made learning together as a mandatory culture of the classroom; she imagined a particular way by means of which to engage students in their learning; she helped them draw connections between ideas and propose solutions, to think scientifically, and, at all times, she was formatively assessing their progress and finding means to do so. As a matter of fact, none of the teachers observed orchestrated control over their students by merely asking their responses to situations or offered them quick solutions to the problems. They were all involved in the pedagogic processes identified in this thesis in Chapters 5 and 6. Alex refused to give up when his students showed high resistance and rejected to apply the new formula to find the area of a triangle, even though they had collectively worked towards deriving it. They implicitly challenged their teacher to either convince them or to simply leave it on their choice in not taking the challenge further and give up his intention of assisting them in reaching a higher level of abstraction. Steve was doing something very regular and ordinary, teaching the base system to his students through the tasks that he had constructed himself. The 'extra' that he added to that ordinary emerged from his reflections on his students' responses and in defining what he might do next in assisting them to participate in the learning process whereby the students were observed making choices and thinking of possible solutions. Similar was the case with Lauren; she constantly reflected on her students' responses and made adjustments in her instruction either during the lesson or in the subsequent lessons.

The aim for teachers of both the subjects was to get the subject content across to their students in ways in which the students might engage with their own learning instead of transmitting knowledge to them. Though some kind of teachers' authority is involved (Pierce, 1994) in such a way of engagement with learning, the teachers worked towards giving that authority slowly and gradually to their students in order for them to reapply the new concepts that they learnt to more difficult situations or to be able to work at ease with them. The processes by means of which transformation of subject content takes place, as discussed in section 7.3, are the same for teachers of both the subjects whether they were teaching the concept of a two-dimensional representation of three dimensions or colonialism, the concept of bearings or prejudice. Either of the concepts, whether in English or mathematics, could be abstract for the students. So, the challenge for the teachers was how to make it possible for their students to understand those concepts, to assist the students to draw connections between their present and prior conceptual experiences and reorganise their understanding about those concepts.

From the discussion in this section, it can be thus be stated that teaching expertise is a product of responsiveness to the past, the present and the future experiences; alternatively, it can be said that teachers are in constant transaction with experiences from which they derive to create relative experiences for their students (James, 1981; Pierce, 1994; Dewey, 2004; Rosenblatt, 2005); or teacher expertise lay in a continuous effort of teachers toward building their capacity to engage with their own practice and several pedagogic processes simultaneously.

Chapter 8 Conclusion

My thesis aimed to investigate the mediational role that the participant teachers played in transforming the subject content in order for student learning to take place. Based on a sociocultural analysis of teaching that included analyses of the school contexts, writing school descriptions, narrative analysis and thematic analysis, it can be concluded that though teaching and learning is a complex phenomenon, there is a method that teachers use in dealing with complexity, and it is the method that defines the quality of teaching and learning. The method is not fixed; it is transactional in nature depending upon teachers' institutional and classroom contexts, and on their own beliefs on the grounds of which teachers perform the agentic function to shape classroom subject pedagogy. However, the processes by means of which teachers mediate learning align with Vygotsky's explanation of the merging of spontaneous and scientific concepts or reaching towards more abstraction; and involves the use of sociocultural contexts in the form of institutional contexts, classroom contexts, teachers' beliefs, the figured worlds that they create, and an ongoing dialogue with their students as psychological tools in order for teachers to involve, engage, foresee and impact the quality of students' experiences of engaging with abstract concepts. Two things emerged from this investigation: an insight into the processes involved in teaching; and, through that, reframing an understanding of teacher expertise.

In this concluding chapter, the two main contributions that I have mentioned above followed by critical reflections on methodology will be addressed. Finally, implications for various stakeholders and directions for future research will be suggested.

8.1 Subject Content Transformation: An Insight into Teaching

My study contributes towards an understanding of the processes using which teachers assist their students towards their conceptual progression by providing a model of the four phases of Process of Subject Content Transformation (see Figure 39). The model highlights the intertwining aspect of several elements; the interaction of between elements in the ways in which the teachers mediate and shape the quality of learning for their students. The elements are previously known in research; however, these are presented mainly as separate entities. This study contributes by demonstrating that the teachers engaged and involved with several pedagogic processes in unison and not in piecemeal. The process of subject content transformation demonstrates that the teachers showed signs of their active involvement in the learning process of their students: assisted their students draw connections between their present experience of engaging with the subject content with their previous knowledge and prior experiences of it; supported them by involving them in dialogue with each other and with themselves by pairing or grouping them or involving in whole class discussions; struggled their way through in assisting the students in appropriating the tasks and participating in a social activity associated with them in trying to change or shift their worldview and reapply their new understanding to more difficult situations; and through their involvement thus, they found scope to reflect and work on their own teaching.

The analysis of lessons, as evident in Chapter 5, allowed us to view the process of teaching and learning closely. In this study, I have demonstrated that the dialogical and dialectical processes that the teachers and students engaged with were not short of struggles and tensions. The struggles were the founding ground for potential development and provided a window through which to view the transformation of the subject content from a participant teacher to the students' learning of that content. I will review two examples of lessons already discussed in Chapter 5 in the light of the statement made. The two lessons

are poles apart in the sense that Lisa's one is lengthy while Alex's is brief; the former is English, and the latter is mathematics; the former was held in a school with a history of underachievement and social disadvantage, while the latter was held in a school with long-standing history in student achievements and affluent background.

Lisa, in her first lesson, used two tasks simultaneously, the task sheet that was both the material and included the concept of colonialism from an economic point of view. She used that material for the students to read and make sense of the concept from a particular viewpoint. She also introduced another task, a role play, in which the concepts of social and psychological effects of colonialism would have the possibility of becoming explicit through students' activities. The intention of the teacher here was that students issue statements based on their reading of the text and, at the same time, experience the psychological issues inherent in such a situation. In such an act, the students adhered to the basic instructions given by the teacher and interacted with the tasks, but they also impacted on the role-play task in return (Vygotsky, 1978; Dewey, 2004). During the role play, the five *Lab Coats* derived "joy" in oppressing their classmates by asking for things from them. So much so that the latter had stripped the former of all the paraphernalia that they required to read and write the tasks. The *Lab Coats* were instructed only to take away pens and books, but they took away dictionaries, all other stationery, bags and even ties. They thus did not leave any chance for the oppressed to read or write the tasks, and led them to feel frustrated, angry, and helpless. The important point was that Lisa was successful in achieving her intentions in making students momentarily experience the psychological effects of colonialism. The contradiction that the students faced assisted them in reflecting upon their statements in the light of new experiences with others in the classroom and in reconsidering their spontaneous understanding of colonialism.

Another example I will revisit is that of Alex as his students started from their already established abstract understanding of finding the area of a triangle. The task at hand for Alex was to take them towards more abstraction and, at the same time, aim at simplification of finding the area. In doing so, Alex met with resistance as the students were comfortable with their old scientific way of solving the area problems. Starting from where the students were, Alex took them through layers of thinking before, finally, a new way made sense. He tricked their minds by providing mirror images of the same triangle, helped them derive a formula by thinking about a relationship between an angle and two adjacent sides in a triangle, brought them to think of their previously learnt scientific concepts and engaged them with the idea of symmetry of a sine wave.

In both cases that I revisited, this entire process of transformation and learning involved the students in both vertical and horizontal learning through layers of dialogue with more capable peers, the teacher and with the tasks; and with different levels of complexity (Vygotsky, 1986). By the concept of horizontal learning, I refer to the teachers' repetition of previously learnt concepts, revisiting those and consolidating those again. Horizontal learning is important in two main ways: in assisting the students in remembering the concepts that they previously learnt to be able to reapply them, utilise them or to refresh their memory for future use; and in serving as the foundation in building an understanding of new concepts, which I refer to as vertical learning. The concept of vertical learning is reflective of the transformative process of spontaneous concepts into scientific concepts (Vygotsky, 1987, 1997) and required to reveal the emergence of the new scientific knowledge, and thereby the changes in the students' understanding of the subject content within the Zone of Proximal Development (Vygotsky 1987, 1997). Hence, simply put, horizontal learning is a consolidation of knowledge, while vertical learning is developmental in nature and refers to the development of psychological processes. The teacher, through the

appropriation of the psychological, social and cultural tools and by means of that through a mediated social activity, function as an agent in exercising a transformative role in merging of scientific and everyday concepts, and in the psychological development of students.

This study has established that Holland et al.'s (1998) concept of the figured world is not just applicable in the field of social and cultural anthropology but is of relevance and importance in the field of education as well, especially in understanding pedagogic discourse in the classrooms. The concept is helpful in understanding teachers' thought processes: when imagining how their lesson might take place, anticipating some of the responses of their students; and, deriving from their past experiences, the resources that might be helpful in dealing with or becoming alert to some of the learning issues that might arise. The teachers created such worlds not only for themselves but also for their students. The students imagined entering a situation and thinking of the possible ways of resolving the problems in those situations; the students' involvement in such situations provided them with opportunities to rethink about their previous experiences about the content at hand or reflect on their assumptions in the light of new experiences. Both English and mathematics teachers' thinking or imagination for future classroom teaching and learning situations emerges out of their sociocultural contexts with which they engaged previously, contexts in which they are placed and with the contexts of their students with whose learning they engage themselves. The figured worlds are used by the teachers to tread forward and structure the subject content in a way that generates tools for students to participate in the process of learning within the subject discipline, review their previous knowledge, and push themselves forward to gain new knowledge; and, in the process, identify themselves as knowledgeable persons.

My research also illustrated the role that the teachers played in creating conditions that maximised opportunities of learning for the students, which as a consequence optimised

the teachers' chances to formatively assess their students' progress in their learning of the scientific concepts. This study shows that the teachers used practices of formative assessment to regulate learning processes and attend to the 'moments of contingency' (Black & Wiliam, 2009; Ingram et al., 2015) that arose in their instruction. Such moments can be defined, as evidenced from the data, as moments of teachers' awareness that their intentions for students' learning of the content have not yet taken sufficient notice of students' awareness; moments where the errors that students make become evident that point toward the difficulty they are facing in their learning of abstract concepts and to the fact that the students have not yet fully understood the concepts; or the moments where teachers realise that they might require their students to review their previously learnt concepts. It is in such moments that teachers decide the next step in their instruction. Thus, this study can be viewed as an affirmation that social interaction is fundamental to both instruction and the development of higher order psychological functioning (Vygotsky, 1978). The function of a teacher then is to involve in continual formative assessment to form an understanding of the actual and the intended levels of development within the ZPD.

Social institutions, which are schools in this study, impacted the work of teachers (Bernstein, 2000) by providing them with schemes of work and guidelines of the "good" ways of teaching. The process of recontextualisation, however, does not end with SoW, which gives teachers information about what knowledge to transfer and how to transfer that; it extends further. The teachers use the SoW and the guidelines provided to them; they add to that their knowledge and intentions to design tasks and, thereby, further impact the content that the students learn and their learning experiences; which, in turn, creates ripples of discourse and establish a culture of learning, the kind of teaching valued. In the light of the new understanding of the concept of recontextualisation, combining both linguistic (Linell) and sociological (Bernstein) aspects, I define the term "recontextualisation" in terms of (a)

directionality: recontextualisation is bi-directional as that involves both teachers and students as active participants in the learning process and in shaping the content; and which involves teachers as active participants in shaping the content by reflecting upon their intentions and pedagogic decisions (b) revisitation: recontextualisation is a way in which the teachers assist their students to form a conceptual understanding of the subject content by revisiting the same concept using a different context or different choice of words with similar context.

8.2 Reframing an Understanding of Teacher Expertise

By means of drawing from both psychological and sociological fields in framing the description of teachers' macro contexts to draw its connection to micro process of classroom pedagogy, teacher expertise can be explained as (a) a regular transaction between teachers' institutional culture and their intentions for teaching; (b) a transaction between teachers' past and ongoing experiences to inform their immediate, in-the-moment and future pedagogic decisions; (c) a continual learning process which thrives on students learning; (d) a capacity to operate by means of sociocultural contexts in shaping classroom subject pedagogy; and thereby, it can be defined as (e) a socioculturally situated skill or a phenomenon.

By drawing out the relationship between the micro processes of teaching and learning and macro-level regulation by institutions, the study highlights that to understand the nature of teacher expertise, the macro-level sociocultural contexts will have to be framed and demarcated. Neglecting this aspect and not clearly demarcating it takes away seeing how these teachers shape the quality of their teaching and enable their students make more progress and learn more creatively.

Quality of teaching develops by means of teachers' capacity to draw a relationship between their beliefs; their institutional and classroom contexts; and their intentions, use of

figured worlds and tasks to assist students' learning of abstract concepts; and in bringing that understanding to simultaneously engage with several teaching and learning processes in the classroom. The notion of teacher expertise in that sense lay in teachers' continuous interaction with their past and present experiences and reflecting on those experiences. Thus, instead of seeing teacher expertise as an end product, it might be seen as a process in itself that involves continual engagement of teachers with pedagogic discourse and pedagogic processes; seen as being socioculturally situated rather than affording expertise with a superior view, with a time period view or with this-versus-that as that holds a risk of seclusion of teachers and making their working on the edge of their own capacity more difficult and elusive.

8.3 Critical Reflections on Using Multiple Qualitative Methods

Combining the three research methods – Think Aloud Protocol; classroom observations and video recording; Video Stimulated Recall and semi-structured interviews – assisted me as a researcher to study the phenomenon of classroom subject pedagogy in several ways. Firstly, it helped teachers draw connections between their present and past classroom experiences. Secondly, with classroom observation and video recording of the lessons, it became possible to capture the teachers' actions in the class and record the ensuing dialogue. The method aligned with Wilkinson and Birmingham's (2003) conditions for using classroom observation as a research method. However, solely classroom observation would not have sufficed. In that case, I would have to rely on my notes to draw narratives of the lessons observed. Since it would not have been possible to capture every dialogue, the narrative would have been highly subjective and more of a gist of a lesson rather than a detailed narrative of teaching and learning. The method was therefore supported with a TAP, and VSR and semi-structured interviews. Thirdly, the use of VSR and interviews provided

access to teachers' in-the-moment decisions and in understanding their pedagogy. Moreover, assuming that not all questions could be answered within a given time frame during the VSR and semi-structured interviews, a few questions were allocated for the TAP. It helped save time, gain insight into the teachers' thinking and assisted in triangulating data during analysis.

Another merit was that the participant teachers were able to recall their thoughts where interviews were conducted on the same day as lesson observation. This finding aligns with previous studies (e.g. Do & Schallert, 2004; Mackey and Gass, 2005; Schepens, Alterman, & Van Keer, 2007) that suggested that recall procedures must occur as soon as possible after the task is completed. There were no recall issues when two teachers, one each of English and mathematics, were interviewed on the next day of lesson observations. However, an issue of memory decay arose in the case of one teacher whose one lesson interview was conducted a month after the lesson observation. By that time, the teacher had forgotten the lesson. She was shown the video of the lesson, but she could not recall her decisions or her interactions with the students. This finding aligns with a previous study by Mackey and Gass (2005).

Another problem arose when an interview was conducted right after the lesson. In that situation, it was difficult to make any video clip selection, at which point classroom observation notes came to the fore. By writing the tasks that were introduced, the keywords and sentences spoken around that, and writing the actions taken by the teachers around the tasks, the selection of excerpts became tangible. Such a situation came for one lesson observed. The teacher had limited time and hence clicking on each shot of interest would have taken much time.

Lastly, the use of multiple methods was time-consuming and strenuous yet rewarding. The combination created room for an in-depth understanding of how teachers

inform their classroom subject pedagogy and derive from it. Multiple methods recontextualised the data and helped me as a researcher to view the data from different vantage points.

8.4 Implications of the Study

8.4.1 Pedagogical Implications for Teacher Educators

The role of teacher educators is central to defining the pedagogical practice of student teachers. Almost all the teachers talked about the importance of their interactions with their tutors during their PGCE course. It is pertinent for teacher educators to consider the kind of experiences or variety of theoretical stances they expose their student teachers to in order to create possibilities for them to do the following: develop ways of thinking and how they might approach teaching and learning in classrooms; think of the dilemmas they might face in relation to teaching in a particular context; and promote the application of their ongoing teaching repertoire to such dilemmas and classroom subject pedagogy. Apart from working towards establishing their student teachers' knowledge, it might also be helpful for teacher educators to reflect on some of their own assumptions about the quality of teaching and learning.

8.4.2 Pedagogical Implications for Teachers

Is a dialogue between teachers and students on a certain topic or simply forming of groups and asking the students to talk on the content, a sign of learning? The question put forward from Vygotskian theory is what is the function or the nature of classroom dialogue? Is it assisting the students in moving from being controlled to controlling their own learning and thus playing an agentic function in their own learning? What are the means or the tools used

in bringing about that change? Are they engaging in processes that repeat elementary memory or are they engaged in higher psychological processes? What are the demands of the institutions in which they work and how they might use that knowledge? Such are the questions that teachers of English and mathematics or teachers as mediators of the subject content from this research might consider when thinking of creating classroom tasks and engaging in a dialogue with their students in relation to the tasks. They might also reflect on the importance of using dialogue as a tool for conceptual formation, which, arguably, is the core purpose of schooling. In addition, designing the tasks prior to a lesson and imagining the function of the tasks within a classroom context is a way of preparing for the known and the unknown, the contingencies that might arise and those that cannot be anticipated.

8.4.3 Implications for Schools

The findings have implications for schools. The schools might have to step back, rethink and re-question their role as an authority in shaping the quality of teaching and, thereby, student learning. From the sociocultural perspective, the question to put forward might be what kind of affordances that the artefacts which they provide to their teachers in the form of good teaching policy or even task material generate? How these artefacts might be restricting for teachers? What kind of cognitive conflicts teachers might face because of those? What spaces are they providing teachers to challenge and engage in dialogue, in relation to the artefacts provided, with authority? These questions are pertinent in thinking about creating opportunities for teachers to be able to design the quality of teaching and learning experiences as teachers play a central role in mediating the institutional expectations with students' learning.

8.4.4 Implications for Researchers

My study holds the potential for researchers in two interlinked ways: to think of different ways by means of which teachers engage with their practice; and to risk combining different theoretical perspectives and ways of analysis to explore a phenomenon of their interest. My research illustrates the process of subject content transformation through four intertwined phases and demonstrates the potential of combining two complementary fields in forming a detailed understanding of how cognition functions. The study drew on the theoretical contribution of the psychologist Vygotsky to understand the micro social and psychological processes involved in classroom pedagogy; and drew from the works of the sociologist Bernstein to understand the macro social and psychological processes and the impact of those on the micro processes. It led to an understanding of the impact of institutional culture on teachers who not only work within the demands that their institutions place on them but by means of them. This latter aspect is the reason that recontextualisation of subject content does not end with policymakers or schools by handing down the Scheme of Work to teachers; what teachers do to the subject content in order to support their students to learn involves further recontextualisation of the content.

8.4.5 Implications for Ofsted

The study holds value for Ofsted, especially in the context of recent changes in their policy for inspecting schools. The Ofsted wants a shift in culture; they want to shift from a culture based on performativity to a culture of thinking about curriculum. The study has demonstrated the dynamics that the institutional discourse play in regulating teachers' thinking and action in classrooms, and, at the same time, in generating a classroom pedagogic discourse that shapes the subject curriculum through the experiences that the teachers bring to the classrooms through the use of tasks and their approach towards subject

pedagogy. It will be interesting to learn how, in future, Ofsted relates its new objectives to quality of teaching in the light of new knowledge that this study has shed.

8.5 Directions for Future Research

This thesis deconstructs the notion of quality of teaching through a sociocultural analysis of teaching and learning in classrooms by using a multicase study. A multicase study proved advantageous for this study as it allowed me to explore the functioning of several teachers in different contexts; draw comparisons; and critically understand the teaching and learning processes, quality of teaching and also the nature of teacher expertise.

Research in the area of task design is not just under-researched, but it seems to be neglected for some mysterious reason in many subject disciplines despite much focus on improving classroom practices. The field requires an explicit attempt in seeking to know how teachers reflect on their thinking for teaching subject content. In the process of deconstructing the ways of transformation of subject content, the study has demonstrated the teachers' thinking and decision making when designing tasks. So, the studies with a focus on task design in order to understand the quality of teaching have a high potential in throwing further light on teachers' thinking processes.

Further, the studies are required to test the four phases of Process of Subject Content Transformation in the light of understanding teaching across contexts and number of years of teaching experience. Moreover, researchers are highly recommended to use various concepts or methods within the overarching qualitative study, and not fear the use of two or more complementary theories. All these have the potential to provide a deeper understanding of the phenomenon of interest as that can be viewed from different lenses.

The transactional power of a sociocultural approach to teaching and learning is central to my own beliefs as a former English teacher, and this research journey has further

strengthened it. It is only when one engages with others that one is able to understand one's own perspectives; dialogue with others provide ground to review and reflect upon one's assumptions. In my case, dialogue with the participant teachers, observing them in dialogue with their students and their colleagues; and dialogue with other researchers and academics in the field through knowledge sharing sessions or conferences or casual conversations have contributed to my personal and professional growth. Some of these experiences were full of struggles which included my trying to make sense of the things or concepts or situations encountered. It was such experiences with others that steered me in the direction of making sense of the complexity of this research. In this research, I have analysed the teaching process; have illumined what quality of teaching looks like, and through that have reflected on the notion of teacher expertise. I have demonstrated that teachers play an essential role in the transformation of the subject content by fostering a balance between their beliefs, their interaction with the contexts in which they work, their intentions, the use of figured worlds and tasks as both social and psychological tools, and through their involvement with several pedagogic processes simultaneously. In future, I would like to work with teachers by being involved in their pedagogic processes with the aim to share, co-develop and extend my understanding of the sociocultural and sociological concepts that I have used; develop ways in which teachers can formatively assess their own teaching and work on their expertise; take further the conceptualisation of figured worlds in classroom pedagogy; and lastly, being aware of the strength of a sociocultural theoretical perspective, engage and contribute to reducing the learning gap linked to social disadvantage and promote qualitative changes in teaching practice.

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Appendices

A. Lesson Planning Guidelines

- What is/are the concept/s of the topic/theme that you will introduce?
- How you intend to introduce it? What framework do you intend to use if any?
- What tasks you will assign and why? How will this help in learning?
- Where do you think students will have difficulties? Why?
- What are your expectations of what you want to teach and your expectations from the students?
- Is there anything that you might have gathered or reflected from your previous classroom experiences about learning that you intend to use in the lesson?

Note: These guidelines are for teachers to review their planning.

B. Lisa, Lesson 1: Task

British Colonial Rule

When one country colonises another, it means officials from one country governs over the people in another. The British had lots of colonies, and these made up the British Empire. India was one such colony, and the rule of the British in India is possibly the most controversial and aspects of the British Empire.

From 1857, British rule in India was called the Raj. During this period a small number of British officials and troops (about 20,000 in all) ruled over 300 million Indians. This was often seen as evidence that most Indians accepted and even approved of British rule. There is no doubt that Britain could not have controlled India without the co-operation of Indian princes and local leaders, as well as huge numbers of Indian troops, police officers, civil servants.

Other historians point out that British rule of India was maintained by the fact that Indian society was so divided that it could not unite against the British. In fact, the British encouraged these divisions. The better-off classes were educated in English schools. They served in the British army or in the civil service. They effectively joined the British to rule their poorer fellow Indians. There are huge arguments about whether the British created or enlarged these divisions in Indian society, or whether the British simply took advantage of divisions that were already present in Indian society.

The British view tended to portray British rule as a charitable exercise - they suffered India's environment (climate, diseases) in order to bring to India good government and economic development (railways, irrigation, medicine). Research suggests that from about 1870 to 1930 Britain took about 1% of India's wealth per year. This was much less than the French, Dutch and Germans took from their lands. The British invested about £400 million in the same period. They brought in an irrigation programme, which increased the amount of land available for farming by 8 times. They developed a coal industry, which had not existed before. Public health and life expectancy increased under British rule, mainly due to improved water supplies and the introduction of quinine treatment against malaria.

However, other historians point out that ruling India brought huge benefits to Britain. India's huge population made it an attractive market for British industry. In the 1880s, for example, about 20% of Britain's total exports went to India. By 1910 these exports were worth £137 million. India also exported huge quantities of goods to Britain, especially tea, which the British drank or exported on from Britain to other countries. Then there were the human resources. The Indian army was probably Britain's single greatest resource. Around 40% of India's wealth was spent on the army, and the British used it all over the world.

So, did India gain or lose from British rule? It's difficult to tell for sure. But this, perhaps, does not answer a more fundamental moral question: is it ever right for one country to rule over another?

Questions

1. What does the word "colonialism" mean? Can you give a hypothetical example of it?
2. Why is colonialism a "controversial" subject?
3. In what ways is 20,000 British officials ruling over 300 million Indians different to how we run our country?
4. Read paragraphs 3 again. In what ways did the British try and consolidate their power in India?
5. How did Britain help India?
6. How did India help Britain?
7. On balance, which country do you think profited most from the Britain's rule? Explain your answer.
8. The writer considers the economic argument for colonialism – how much money was either generated or taken by Britain's rule in India. What is the other argument the writer says we must also consider when thinking about colonialism?
9. What are your views on colonialism? Would you like to be a country that colonises others, or a country that is a colony of another? Would you object to being either?
10. Orwell grew up in India while Britain still ruled over the country. How do you think this might have influenced his views about power and poverty?

C. Lisa, lesson 2: Task

Correct the common the mistakes on the line below. You have 5 minutes.

SPELLING

1. Correct the spelling: Leisure.
2. More than one army?
3. More than one box?
4. Correct the spelling: Puting.
5. Correct the spelling: Jokeing
6. Correct the spelling: Funnyiest.
7. More than one calf?
8. Correct the spelling: Carefull.
9. Correct the spelling: Faithfull.
10. Correct the spelling: Allmighty.

PUNCTUATION

11. The computer turned off
12. I was out of eggs milks and cheese.
13. After a while she home.
14. The boy who went home cried.
15. There two choices: run or fight.
16. manchester city are a good team.
17. She missed the goal she tried again
18. He wont go home because he cant.
19. It was John's apple.
20. The species lives were in danger.

GRAMMAR

21. The dogs chases the cat.
22. Your the only one for me.
23. There is no reason for there behaviour.
24. Her laces were lose.
25. The dog has it's share.
26. You couldn't of done that.
27. Wish you where here.?
28. He wasn't happy nor was she.
29. To many too do today.
30. The boys went home it got dark

D. Lisa, Lesson 3: Teaching and Learning Situation

Teacher: Lisa	Class: Year 9, Top set
Subject: English	No. of students: 28
Topic: Writing	Lesson: 3 of 3
Chapter Eight of George Orwell's *Down and Out in Paris*	

There were mainly three critical incidents observed during Lisa's third lesson: (a) identify keywords from the given question and understand the demand of the question; (b) discuss structural pattern in pairs and as a whole class; and (c) write a response. She had introduced one task to the whole class. The task was a question similar to the one that the students would get in the GCSE exam:

"Work has completely destroyed the narrator's moral compass." Looking closely at the narrator's attitude by Chapter Eight, how far do you agree with this statement?

The first critical incident was that Lisa wanted the students to identify keywords in the question in order to be able to make sense of the demand of the question and, also then, to be able to respond to it. According to her, reading the question well was is the first challenge that the students had. It was a skill that she was trying to work at. She knew that "a lot of time needs to be focused or attributed to that" and that it was critical because then the focus remains on specific details demanded in the question rather than "aimlessly looking for details" (Lisa, during the interview).

She started to take suggestions from the students and kept underlining the words that they identified as keywords in the question. The students came up with words "destroyed", "agree", then "moral". Lisa showed that "characters' moral compass" was one word and asked if they knew what moral compass was? The students started to check the dictionary. She told them, "It is not in the dictionary. They are two separate words, but in this instance, they are words together." She further questioned if they knew what moral was? None knew.

She asked again, this time, providing them with another word, morality, thinking they might have heard about that one. No reply came. She then asked them to look in the dictionary. One pupil confused the word with “morale”. “Morale” has an ‘e’ at the end. That was the reason they do spellings, she explained to them.

Lisa established the meaning of the word “moral compass” by dividing the compound word into two separate words and then putting them back together. Someone explained the meaning of moral, “Concerned with right and wrong”, while someone stated that compass “shows you direction.” So, what they thought “moral compass” meant, questioned Lisa. “It shows you the attitudes, like your attitudes about which way you act when you do something”, answered one of the students. According to Lisa, the student had phrased the meaning well, using a word from the question. She rephrased the meaning, “the moral compass is your attitude and your approach, to making right or wrong decisions.” She then re-read the question.

Lisa asked for more words from the question to focus on. Someone said that they need to focus on attitude, but then, “Why are we just focusing on attitude when it is owned by somebody?” questioned Lisa. They were quick to reflect and respond, “narrator’s attitude.”

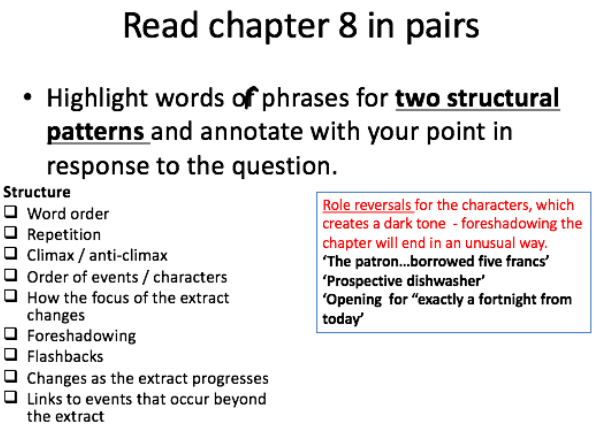
One of the students pointed “by” as the keyword. The class then discussed what “by” indicated and they concluded that it meant “by the chapters before.” Lisa rephrased for their understanding, “That everything that happens before, we need to have that in our minds when we consider his state of mind or his attitude at that stage in the novel.” She thus recontextualised their thinking about the purpose of finding the keywords in a question and about the significance that the words hold.

Having discussed the keywords, the next step for Lisa was to help them see what is it that they had to argue. She questioned, “Who believes that it [work] completely destroyed

his moral compass?" None raised their hand. She rephrased the question, "Who believes that it had an effect or an impact on his moral compass?" All the students raised their hands. Lisa pointed out that that was where their argument was. She explained to them, "you are saying that: although the statement, upon first glance, sounds right or seems correct, 'completely destroyed' is a bit of an exaggeration as they know the events that follow Chapter Eight." She explained that, in the GCSE language exam, they would be given a question similar to the one they were trying to attempt and that that would require them the same kind of thinking process. They will need to interrogate the question and would find it challenging to answer all parts of the question.

She then explained what they must look at, how they should go about reading a passage and thinking. She explained when they think about work, they might also think about the conditions of work, think about the pay, about the effect it had on the character's physical body. She further explained that the idea of "moral compass" might not have completely destroyed his moral compass, but they need to think if there was anything else that work might have completely destroyed? Hence, she instructed that as they read Chapter Eight, they would find some things that they might want to think about.

She set them to read the text in pairs or groups of three or four. She had displayed instructions on the board (as shown in the figure below) for the structural devices that they must be looking at when reading.



Lisa cautioned to look for two structural patterns, not language patterns. She gave an example that repetition was the structural pattern but personification was not, because it was a language device. She asked them to annotate the pattern with their point and respond.

Lisa circulated in the class and stopped at each pair or group to assess what they were doing or simply to see whether they had started or needed any further assistance. At one table, one of the boys asked her if he could flashback to the other chapters. That simply highlighted the misconception to Lisa. She explained to him that could turn back to the other chapters but he could not flashback to the other chapters "because flashback is a structural device and if you say that you're flashing back to the other chapters in your writing, then you're using the word incorrectly, and it shows that you don't understand that word." She explained to him that "flashback is when you're in the moment and you're thinking through the past, but to look back is the act of looking back."

At another table, a student had found the use of the pronoun "one" to describe the experiences of people working. At yet another table, the girls were talking about sleep and murder. They were discussing that sleep was more important to him because he said he went back to sleep within minutes of witnessing the murder. Lisa probed them with what structural devices were they looking at there. The girls told her that they were looking at the "order of events."

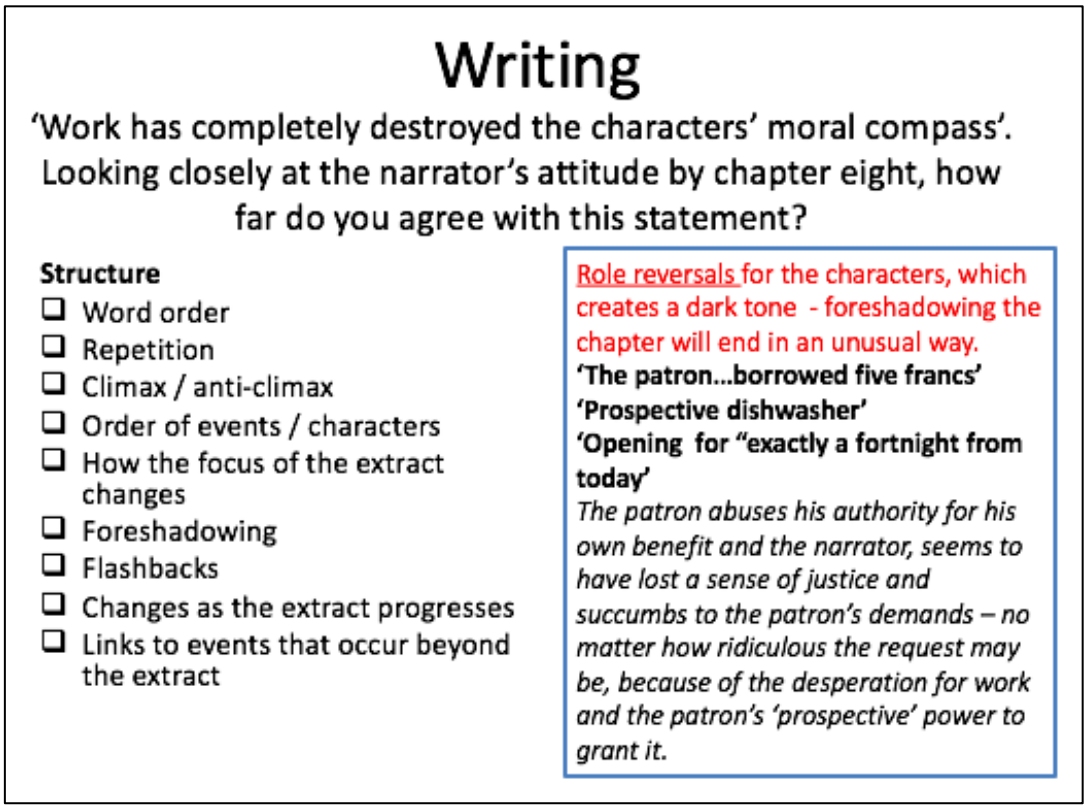
At the whole class discussion, Lisa asked the girls, mentioned above, what they had found. One of them explained the above mentioned and added, “It could be the anti-climax because his moral compass may be dull.” Lisa rephrased their meaning that the narrator should actually have more consideration while he does not in the situation, “He helps them, and then goes straight back to sleep again.”

Another student from another group added to their point. Though he was not sure of the technique, he explained that they did a structural pattern on time, “He destroys himself, and actually it just shows he has no sense, doesn’t care for himself.” Lisa asked him in the sense of what? What was that he did not care for? The student answered that he did not care for his own life. Again, Lisa questioned, “What about his own life in terms of what?” The student added, “In terms of what has taken over him and he’s not thinking about his own wellbeing.”

She then tried to recontextualise their thinking and supported them in their thinking further. When they say that his life was too vague, eg when they said that he was not thinking of his wellbeing, then that meant that they were directing their focus to something more concrete. She showed them what they had done. They had developed their point in terms of that “instead of it [work] completely destroying his moral compass, it’s [work] actually completely destroyed the way that he cares for himself, his interest in himself in comparison to before.”

Lisa read the learning objective again and asked them to think about their own points. She then provided them with a list of sentence stems/ structures that the students could use to frame their sentences and argument. She explained the use of the stems and argued that using those would help. For instance, Orwell uses blah blah to convey blah blah. They just needed to embed their references in their quotations and explain what that suggested by using any of the sentence types from the list. This entire exercise will help them make their

work sophisticated. She then read the model answer which she displayed on the IWB as shown in the figure below.



She then left students to read in pairs and discuss the argument. Again, she went at different tables and made meaning with the students.

E. Lisa, Lesson 3: Stem Sentences

***I want to…* identify a common thread**

Throughout the novel/poem/play _____.

EXAMPLE: *Throughout the poem,* the poet explores the pain of unrequited love in a variety of ways.

***I want to…* identify the main thing**

The most important word/sentence/idea/chapter/moment is _____ *because* _____.

EXAMPLE: *The most important word from this line is* 'top' *because* it emphasises the superiority of the bird.

***I want to…* closely analyse language**

Here, _____*employs the word/phrase '*_____*' to suggest/imply/reinforce* _____.

EXAMPLE: *Here,* the Inspector *employs the phrase* 'millions and millions' *to reinforce* the idea that Eva Smith represents many other working-class, Edwardian girls.

***I want to…* exemplify an idea through a character/setting/event**

_____ *reveals her/his belief in* _____*through her/his description of*_____.

EXAMPLE: Stevie Smith *reveals her belief in* the cyclical nature of war *through her description of* the 'ebbing tide of battle'.

***I want to…* contrast alternative viewpoints**

*Some readers might propose that*_____*; other readers, however, might argue*_____.

EXAMPLE: *Some readers might propose that* Shakespeare's portrayal of Shylock was cruel and unfair; *other readers, however, might argue* that Shakespeare was simply reflecting the views of the society he lived in.

***I want to…* note subtleties**

*Here, the writer cleverly*_____.

EXAMPLE: *Here, Ted Hughes cleverly* employs the image of a dying hare to remind the reader the war targets the innocent.

***I want to…* propose a tentative idea**

Perhaps, (writer's name) was hinting that _____.

Perhaps Steinbeck was hinting that human beings are no different from the rest of the animal kingdom.

***I want to…* contrast**

Although both _____, *they* _____.

Although both writers explore the idea of love, *they* express their ideas in very different ways.

***I want to…* compare**

Both _____ *and* _____*share* _____.

Both Beatrice *and* Shylock *share* feelings of anger and frustration.

***I want to…* explain the reader's response**

The reader is caught between...

EXAMPLE: *The reader is caught between* empathy for Lennie and disgust at the cruel world he lives in.

***I want to…* explain different layers of characterisation**

*On the exterior*_____, *yet on the interior* _____.

EXAMPLE: *On the exterior*, Shylock appears desperate for revenge against the Christians who have wronged him, *yet on the interior* he feels a deep sense of injustice for the wrongs he has suffered.

***I want to…* explain a character's motives**

_____*is motivated not only by*_____ *but also by* _____.

EXAMPLE: Macbeth *is motivated not only by* his ambition to become king, *but also by* his desire to please Lady Macbeth.

***I want to…* explain a character's development**

By the close of the play/poem/novel, the _____ *has developed into*_____ .

EXAMPLE: *By the close of the poem*, the fearsome terrorist *has developed into* a polite and humble child who is willing to remove his shoes.

***I want to…* explain the writer's positioning of the reader**

(The writer) positions the reader/audience in favour of /against _____ *by* _____.

EXAMPLE: *Priestley positions the audience against* Mr Birling *by* revealing his buffoonery in the early scenes.

***I want to…* explain first impressions**

Our first impressions of _____ (x3).

EXAMPLE: *Our first impressions of* the Birling family are that they are rich, arrogant and 'pleased with themselves'.

***I want to…* weigh up the importance**

Even though/although _____, _____.

EXAMPLE: *Even though* Curley's Wife behaves at times like a cruel temptress, by the end of the novel we realise that she is a victim of a harsh, misogynist world.

***I want to…* deepen my analysis**

At first glance _____*; however, on closer inspection* _____.

EXAMPLE: *At first glance* the family appear to be respectable members of society; *however, on closer inspection,* we can already sense the rift between father and son.

F. Lauren, Lesson 1: Teaching and Learning Situation

Teacher: Lauren	Class: Year 8
Subject: Mathematics	No. of students: 28
Topic: Bearings	Lesson: 1 of 3

Three rules to find bearings

Lauren explained that bearings were a way of measuring angles, and that "it was slightly different to when measuring bearings to when we measure angles." She added that bearings were way for people to navigate; they were way for somebody to say, "You are this many degrees away from me, and this is the distance that you are at. People can tell where they are using bearings." Providing an instance, she explained that if a ship was coming to a country and if they said that they were coming in a bearing of 135°, it means to provide information to the people on the land where they were coming from.

She continued to demonstrate what she said to show that the information worked. She explained that if she was coming from a bearing of 45, then she faced in a particular direction. She stretched her right hand and faced towards its direction. She added that they would not say that they were coming from 45 and, at this point, requested the class to hold on to that as they will talk about that in some time.

She then gave another example, 120. With whiteboard at 90 degrees, she faced towards it making an approximate angle of 120 degrees. That meant they were coming from the direction she faced. She then faced the class at 270, which meant that they were coming from that direction, hence suggesting that it cannot practically work that way. Such a way will lead to chaos. So they needed some continuity. Hence they need to remember one thing about bearings that we always measure that from, and she stopped there to ask the students if they had got an idea. "North," came a response. Lauren was happy. She stressed, "We always measure them from the North." She continued that whenever they look at maps or

questions on bearings, they might not necessarily know where the North is. In that case, they will have to assume that the North is facing upwards. On paper that is what they will assume, though in real life North will be different each time depending upon where they face. At this point, one of the students told the class that North in real time was towards the board. He had checked using the compass.

She reiterated the point they just learnt that bearings have to be measured from North "otherwise everyone will be facing different directions as their starting point, and everyone won't have any idea of where the bearing is, and it will all be pointless."

She then asked the class to think of a pilot radioing back to an airport or an army person somewhere in the middle of a desert trying to get in contact with base or a ship in the middle of a storm and think about the means of communication they might have. "Walkie-talkie," said one among them. Lauren checked if they have used a walkie-talkie to check their familiarity with it. Several hands were up. She told another situational anecdote for students' understanding. She said that "when you use a walkie-talkie, and you kind of hear "khhhhh" and your bits and pieces coming through, you can't hear everything perfectly". What if they heard a bearing of khhhhh 35, which could be 35°, 135° or 335°? They cannot be sure and might ask to repeat it. They might repeat that they were coming at a bearing of 35, but that still might not be exact because they might be in the middle of the storm. Hence, she said that the other thing with bearing is that "you always give three figures and that way the person you will radio it to, though you will not be radioing on a day-to-day basis, they know that they need to listen out three figures." So 35 will be 035 degrees.

She then moved on to assess the students' understanding of the point just explained with what will be the bearing of 9 degrees. 009, the class was clear with the concept so far. They had learnt two things about bearings so far. These were measured from the North and

that these were provided in three figures, always. Now was the time to introduce to them the third important and final aspect of bearings.

If she was facing North and someone said that they were coming in the bearing of 045, she explained that she could measure 45° from the left or from the right, and hence, some continuity was needed there. Thus, the final part about bearings was that these are always measured clockwise. She stressed always to measure the angle from the North, clockwise. Having explained the three practical things to remember about bearings, Lauren instructed the class to take down 3 rules for bearings, which were displayed on the board.

G. Lauren, Lesson 3: Tasks

Defence Dynamics

BEARINGS

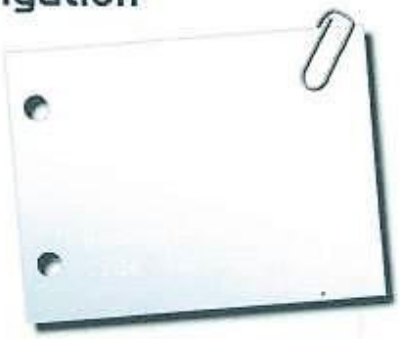
Student Worksheet 1

Briefing 1 – Low visibility navigation

Background

You are members of the Ops (Operations Team) for an RAF squadron on Quick Reaction Alert. Aircraft on QRA must be ready to deploy at short notice on reconnaissance and defence missions within the UK and your role is to make sure that pilot / navigator teams have all the information they require in flight.

Accuracy is of the utmost importance, as aircraft fly at high speeds. In this activity aircraft are flying low in fog and there is no margin for error.



Your mission

To plot the paths of two aircraft which RV (rendez-vous/meet) over Glasgow (labelled X on the map), after returning from an exercise over The Irish Sea. Each is departing from Glasgow (labelled X on the map), and is tasked with flying over one site of strategic significance before flying on to an unidentified destination to the north.

You will require: protractor, pencil, ruler

Assume 1cm = 10km.

1. **Draw the straight line route of Aircraft 1 between Glasgow and point A.**
   a) Calculate the bearing the aircraft has to take on this first leg of its journey.
   b) Noting the scale of the map, calculate the distance to be travelled (km).
2. **Now plot the aircraft's second destination – point B. Take a heading of 290° from point A towards point B which is 70km away.**
   a) What are the coordinates of this aircraft's final destination?
3. **Draw the straight line route of Aircraft 2 between Glasgow and point C.**
   a) Calculate the bearing the aircraft has to take on this first leg of its journey.
   b) Assuming a heading of 325° and that the aircraft travels 138km on the next leg of its journey, identify the co-ordinates of this aircraft's final destination D and plot it on the map.
4. **What bearing must each aircraft take to return to Glasgow? If each is travelling at 600km an hour how long does it take each of the aircraft to get back?**

H. Jeffrey, Lesson 2: Task Material

'Oh Who Is That Young Sinner'

Oh who is that young sinner with the handcuffs on his wrists?
And what has he been after that they groan and shake their fists?
And wherefore is he wearing such a conscience-stricken air?
Oh they're taking him to prison for the colour of his hair.

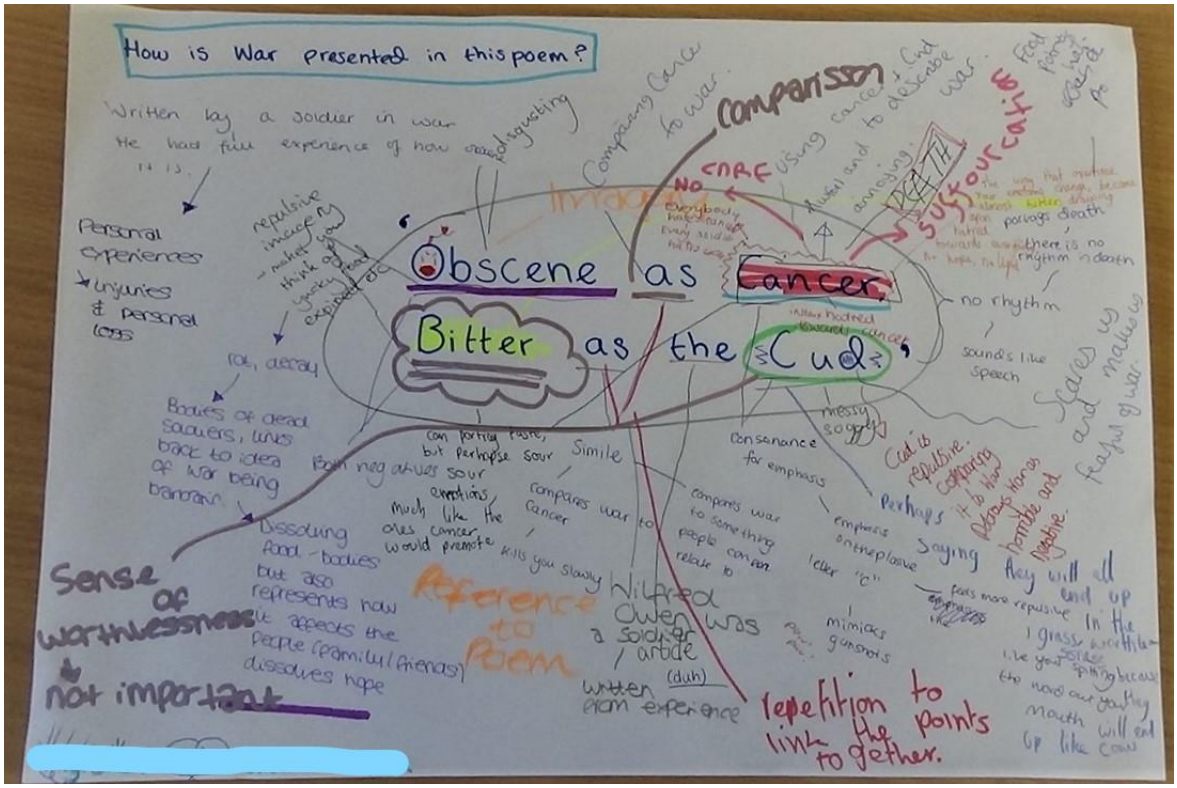
'Tis a shame to human nature, such a head of hair as his;
In the good old time 'twas hanging for the colour that it is;
Though hanging isn't bad enough and flaying would be fair
For the nameless and abominable colour of his hair.

Oh a deal of pains he's taken and a pretty price he's paid
To hide his poll or dye it of a mentionable shade;
But they've pulled the beggar's hat off for the world to see and stare,
And they're haling him to justice for the colour of his hair.

Now 'tis oakum for his fingers and the treadmill for his feet
And the quarry-gang on Portland in the cold and in the heat,
And between his spells of labour in the time he has to spare
He can curse the God that made him for the colour of his hair.

A.E. Housman (wr. 1895; pub. 1937)

I. Linda, Lesson 1: Use of ‘explosions’



J. Lakewood School: Linda's School Description

Lakewood School was an urban city all-girls' secondary school converted into an academy in 2012. Boys join the school in Sixth Form. Most of the students were White British with a small number from other ethnic backgrounds.

The Ofsted report 2015 graded the school as outstanding in effectiveness of leadership and management, and quality of teaching, learning and assessment. The Ofsted reported that the students' GCSE results were considerably above the national average; they made progress in all subjects and year groups. Teaching was excellent; it was interesting, imaginative and inspiring. The headteacher was an excellent teacher and provided opportunities for professional development. The headteacher empowered her senior leadership to try out new ideas, make key decisions and develop the school's policies. The school had a management system which defined the performance standards and policies for the teachers and with which teachers agreed. Teachers put those policies into practice consistently and combined those with their imagination. The teachers were held accountable through the system and understood that that the impact of their teaching performance on students' learning would be monitored and evaluated. One such policy that Ofsted identified was bronze, silver and gold success criteria which teachers provided for students in almost all their lessons.

Linda, an English teacher whose lessons were observed, stated something similar. According to her, there were two things vital to the school's philosophy for a good teacher: first, a teacher who cared about the outcomes of students, and taught and planned with that at the forefront of her mind; second, a teacher who promoted and achieved progress in the classroom, in terms of, putting the systems and the structures in place. Linda, like Ofsted, shared the bronze, silver, gold success criteria as one essential structure that all the teachers were expected to use, "If a member of faculty walks into a lesson with no bronze, silver,

gold, that will be classed as no good teaching." She thought that the definition of excellence in the school was, "if you doing everything that they expect of you, if you do all of those things, there is no reason you can't be an excellent teacher.

K. Valley View School: Lauren and Steve's School Description

Valley View school was a co-educational secondary school. It was an outer-city school with students coming from both affluent and economically deprived families. From the school, lessons from two mathematics teachers – Lauren and Steve – were observed. According to Steve, the school believed in achieving success for everyone. He explained during the interview that the school required its teachers to include opportunities for the students to discuss learning. To accomplish that, the school wanted its teachers to do the following: to create space during the lessons for the students to discuss in pairs or groups and participate in open discussions in the classroom in order for them to learn independently as well as with others in a group; to create challenging lessons for students to engage with the tasks that demand their active participation productively; to encourage the students to reflect and evaluate their progress over time, "Wants kids to enjoy the maths, to investigate the maths, and think a lot rather than take a passive role." Moreover, getting the teachers to think about things was the characteristic of the Mathematics Department and the school, "How you are assessing kids, how you are judging them, how you are seeing how they are doing in a very informal way, but it can be formal as well."

Lauren shared similar views, which she shared during the interview. She thought that the school was very open to departments teaching their subjects in a way the department believed was "a very good way" to teachers, "There is no top-down – this is how you need to teach, this is what lessons should look like." She explained that it was like, "Tell us what good looks like in your department so that we can see it." As a department, she said that they had spent a lot of time deciding what good looked like. For example, they decided that written feedback was not necessary. Instead, they decided to focus on "giving high-quality verbal feedback and using a lot of questioning and targeted questioning in our lessons. We think that's what good looks like in our Maths department." Such discourse also found its

place in the Ofsted report, which stated that subject leaders took key decisions, mainly about how their teachers would carry out an assessment.

According to the Ofsted report 2013, the school had ambitious headteachers and senior leaders who worked towards providing high quality teaching to all its students. Quality of teaching was good. Generally, teachers provided challenging learning experiences for students. Where teaching was best, teachers addressed misconceptions through well-developed questioning and the students learned from their mistakes. They built resilience and kept trying when faced with difficult tasks. In classrooms where teaching was not as strong, it was because the tasks were not matched to students' ability; they were either easy or too difficult. However, mathematics lessons were appreciated for excellent questioning, use of resources, planned lessons, and in which students were able to develop skills accordingly. Ofsted graded the school as good for overall effectiveness and quality of teaching.

L. The Framework of Description for Steve

Institutional Context	
Theory of instruction	The school believed in achieving success for everyone. It required its teachers to include opportunities for students to discuss learning. To achieve that the teachers must create space during the lessons for the students to discuss in pairs or groups and participate in open discussions in the classroom in order for them to learn independently as well as with others in a group; students must be encouraged to reflect and evaluate their progress over time. The department wanted that students enjoy and investigate the Maths and think a lot rather than take a passive role.
Scheme of Work (SoW)	Provided a broad topic, but what to teach within that was the teacher's prerogative. It informed of the number of lessons to be allotted for particular content; stated possible objectives and criteria for reaching those objectives; mentioned some suggestions, offering strategies to teach that; and recommended STEM website for the selection of tasks.
Teaching resources	Tasks were prepared based on his readings of the literature on base numbers which suggested the mathematics with which to engage the students when teaching the Base system.
Duration of the lesson	One hour lesson.
Class sets	Top set, based on exam results from the previous year.
Discipline in school	There did not seem any explicit discipline issues in the school at the time of observation. There were screens installed at various locations in the school suggesting the students how they could score well, the behaviours that could help them build a routine and improve learning, apart from providing vital information to them about the functioning of the school. There were no discipline issues during the lessons observed.
Teacher	
Vertical axis	There was strict hierarchy at the level of the head of the department and the rest of the teachers. Some of the teachers met once a week to discuss mathematics involved in teaching the selected topic of their interest, but attending these was not mandatory. Steve led in such meetings.
Classroom Practice	
Instructional practice	The starter task was related to a topic that was planned for six lessons block; it mainly indicated to the students their own learning; and gave them a chance to look at it more independently rather than expecting from the teacher. For the regular lesson, Steve had prepared tasks to utilise in the class. He varied his pace according to students' understanding which he assessed mainly by asking questions, using their responses to either question them further or rephrase their responses, or by moving around in the class and speaking with them. The students did individual work first and then pair work followed by whole class discussion or the other way around.
Instructional context	There was limited space in the room in the sense that it was longer in length than in width, and the whiteboard was not in the centre. So, even if the seats would be spread out to cover the length, it might be difficult for the students to see the interactive whiteboard. Hence, the seats were arranged in a three-layered horseshoe pattern so that the

	board was accessible to all students. The arrangement allowed free movement for the teacher in the outer and inner layers in comparison to the middle layer.
Regulative practice	The ten-minute starter worked as a behavioural management technique. The students raised their hands to speak in turns and even understood their teacher's gestures that suggested that he wanted them to respond to his questions. The tasks were timed. The students were aware of the routine of starting with a starter followed by a regular lesson.
Everydayness	During the time of working at the tasks, the students tended to help each other out; when in doubt, they did not hesitate to ask from their immediate peers first and then from the teacher.

M. The Framework of Description for Lauren

Institutional Context	
Theory of instruction	Same as Steve's
Scheme of Work (SoW)	Same as Steve's
Teaching resources	The tasks were selected from the STEM website which was recommended by the department; from Diagnostic Questions which she used on her own accord as it provided her with mini-quizzes to assist students with their misconceptions in the learning of bearings.
Duration of the lesson	One hour lesson.
Class sets	Top set, based on exam results from the previous year.
Discipline in school	Same as that of Steve. No discipline issues in the lessons observed.
Teacher	
Vertical axis	There was a strict hierarchy at the level of the head of the department and the rest of the teachers. Lauren was next-in-line and was given the responsibility of training the NQTs. Some of the teachers met once a week to discuss mathematics involved in teaching the selected topic of their interest, but attending these was not mandatory.
Classroom Practice	
Instructional practice	Lauren started and ended two out of three of her lessons by some form of assessment. For her, that meant to assess the present level of students' learning; and for the students, to either feel confident about what they know or assess what needed to be done. She varied her pace according her students' understanding and often instructed them to enter into a different physical reality.
Instructional context	Common tasks were assigned to all. Students were either involved in pair work or whole class discussions. For mini-quizzes, they worked individually.
Regulative practice	Lauren followed the general seating arrangement in the school. The seats were arranged in two columns, with four seats each in five rows. There was ample space for both the teacher and students to move around. The students could turn around to talk to their peers seated behind them, in front of them or beside them. Lauren could move up and down the rows and reach students seated in the middle as well. If any student was absent in the previous lesson and if the content taught in that lesson was related to the content taught in the present lesson, then the first point of contact for learning the gist of the content taught was a paired partner and then the teacher.
Everydayness	Students were an enthusiastic lot; they had their own subtle competition of having found the solution to the problems given. However, the students reached out to each other, both for seeking assistance and giving assistance. They often asked their teacher as well to check whether they were thinking in the right direction.

N. The Framework of Description for Linda

Institutional Context	
Theory of instruction	The school's philosophy for a good teacher is a teacher that cares about the outcomes of students, and teaches and plans with that at the forefront of their mind; promotes and achieves progress in the classroom; puts the systems and the structures in place, and those systems and structures are planning and differentiation. All the teachers are expected to use the gold, silver and bronze success criteria. If a member of faculty walks into a lesson with no gold, silver and bronze displayed, then their teaching will be classed as not a good teaching.
Scheme of Work (SoW)	The department informed of the texts to be used. The department provided its teachers with pink sheets to hand out to students so that they can mark their own work and improve themselves; it worked as a tool for differentiation as it helped make visible to the teachers the progress that their students were making with regards to the medal they might have reached and to which they might have responded in their writing.
Teaching resources	Linda used the resources provided by her school and department, and she incorporated those in her teaching. The success criteria were used as lesson objectives and to regulate students to think of the level they might want to achieve and work towards it.
Duration of the lesson	One hour lesson.
Class sets	Top set, based on exam results from the previous year.
Discipline in school	No discipline issues in the lessons observed.
Teacher	
Vertical axis	There existed a strict hierarchy. Teachers were required to follow the guidelines set by the department and higher management whether working collaboratively or when teaching individually in the classrooms.
Classroom Practice	
Instructional practice	Linda assigned quotes to the groups to explode. It was a mix of group discussion interspersed with interactions with the teacher; swapping of explosion sheets among groups; and the movement of students in the classroom with the purpose to read a short paragraph that others had written based on their analysis of the poems that they were reading as a class.
Instructional context	There were eight groups with four students in each group. The arrangement provided scope for students to change places and move around to observe what others had written as and when their teacher instructed them.
Regulative practice	Linda roughly timed the tasks and grouped the students according to their ability. The success criteria regulated both classroom dialogue and students thinking in terms of where they want to reach; and for the teacher, to prepare them for sitting their GCSEs.
Everydayness	Students worried for their grades and were often given confidence by their teacher that she will assist them in reaching their goals. The students felt confident when they started with the process of learning by engaging with others in groups and interacting with their teacher. The success criteria were the guiding principle for action in the class followed by several coloured sheets – pink, green and purple sheets. For this particular lesson, pink sheets were used.

O. The Framework of Description for Tyler

Institutional Context	
Theory of instruction	The school placed importance to the involvement of both teachers and students. Teaching and learning in classrooms was required to be both teacher-led and student-led. Student outcomes were highly stressed; students were pushed to work towards achieving A*.
Scheme of Work (SoW)	Received SoW from the department; it included the time period to be covered and texts to be taught within that. Selection of poems had to be made by the teachers.
Teaching resources	Apart from the SoW, Tyler used his own resources that he had developed over time; he also contributed material to the common online portal which was a common resource system for teachers within the department. For the lesson on immigration, Tyler took poems from the literature he had read during his graduation.
Duration of the lesson	40 minutes
Class sets	Top set
Discipline in school	No discipline issues were observed in the lessons.
Teacher	
Vertical axis	There was no strict hierarchy in the department. Tyler, like other teachers in the department, shared some teaching material on the portal and also maintained his individual lesson plans and materials for personal use. There were set dates for students to submit home assignments and set dates for the teachers to return the written or online feedback to students.
Classroom Practice	
Instructional practice	Whole class discussions that involved students' responding to each other's responses was central in Tyler's lessons. The students were encouraged to critique the poems that they were reading as a group and then discuss with the whole class. Different tasks were assigned to different groups in order to cover a wide range of time period and different perspectives.
Instructional context	The students were seated in a horseshoe seating arrangement during the whole class discussion; while, during group work, they took to three corners in the classroom. The group arrangement provided scope for the students to discuss the content in groups; and, for Tyler, to reach out to each group and assist them. The horseshoe arrangement enabled a whole class discussion.
Regulative practice	Tyler's lesson was fast-paced. Group discussions and consequently the groups' sharing of their reading with others were timed to manage whole class discussion after each of set of sharing. There were three sets of sharing: sharing the reading done by the group; weaving of comments and discussion from the other groups on the same reading; and, finally, discussion of all poems in the light of the discussions held. The students were provided with an extra reading to gain another perspective on the content.
Everydayness	Students were comfortable with each other and with the teacher; they were confident in expressing their inability in understanding something and asking for assistance; and they actively engaged with providing assistance to their peers and build on each other's comments.