What and how do children learn in the '*DIY: Dream, Innovate Yourself*' Programme?: A study of a curriculum innovation.

Kemble Elliott

What and how do children learn in the *'DIY: Dream, Innovate Yourself'* Programme?: A study of a curriculum innovation.

Kemble Elliott

Student Number: 690752

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Supervisor:
Lynne Slonimsky

Co-Supervisor:
Theresa Giorza

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ABSTRACT

This research is located in the interdisciplinary field of curriculum studies, drawing on both psychological and sociological theories of pedagogy. I explore classroom practice, through a qualitative study into a preparatory school curriculum innovation called ***DIY: Dream, Innovate Yourself***, which encourages children to develop skills (both topic-specific and dispositional) that prepare them for the modern world of business, where flexible thinking, creative problem solving and collaboration are high on the list of 'hiring qualities'.

Using concepts of learning, cognitive and moral development, semiotic mediation, and pedagogy, I develop an analysis of the 'what' and 'how' of mediation and learning in ***DIY: Dream, Innovate Yourself***.

The findings gathered through classroom observation and interviews with learners, suggest that *DIY* is meeting its intended aims through the programme. However, due to limitations in the data that could be collected, these findings must be treated as preliminary.

KEYWORDS:

Curriculum innovation, Zone of Proximal Development, Concept development; Moral Reasoning; Pedagogic transmission

Declaration

I declare that this research report is my own unaided work. It is submitted for the degree of Master of Education in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination at any other university.

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Kemble Elliott

_____ day of _____ , 2014

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Writing a research report is difficult. Very difficult. I completely underestimated how much of a challenge it would be to get what I know in my heart down on paper in an organised, thoughtful, comprehensive and logical manner. I have thought about these concepts for a number of years, to the extent that they have become irrevocably tied up in how I teach and feel about education. But feelings are not a great basis for a thesis. To formalise my passion into theory has been a long and torturous process.

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Kemble Elliott
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Glossary of Terms

CAPS: acronym for Curriculum and Assessment Policy Statement

DIY *DIY: Dream, Innovate Yourself* the name of the school innovation subject

ID Instructional Discourse (Bernstein)

KMR Kohlberg's Theory of Moral Reasoning

LO Learning Outcome

OBE Outcomes Based Education

RD Regulative Discourse (Bernstein)

TBR Text Based Realities (Wertsch)

ZPD Zone of Proximal Development (Vygotsky)

Chapter 1: Introduction

In the past 20 years, there have been increasing calls for change to education systems around the world (Levine, 2002; Littky, 2004; Peters, 2003; Almon & Miller, 2011). Features singled out for change have been the performance-based, teacher-driven and teacher-centred character of school systems, which measure success against external criteria. Critics argue that these features negate the individuality of children, make them subordinate to the demands of the curriculum, and expect children to perform in limited specified ways (often written) that do not allow those with other talents to shine.

An accelerated pace of change in contemporary global societies has resulted in greater demand for flexibility, autonomous decision making and the ability to organise one's personal learning. There is also a growing need for children to develop effective problem solving and thinking skills, moral reasoning and dispositions for social flourishing, and professional interactions.

In response to these two sets of conditions, I (a teacher and deputy-principal in a private primary school in Johannesburg) developed the *DIY*: *Dream, Innovate Yourself* programme (hereinafter referred to as DIY) in 2009. Significantly, DIY is a formally timetabled and assessed subject in the school's curriculum even though it is not linked to the traditional learning areas and subjects (Appendix 2: Curriculum Enactment and Social Conduct in DIY Groups, p. 8).

DIY is premised on recognition of a growing need for children to develop effective problem solving and thinking skills, as well as the moral dispositions required in professional interactions in a changing world. The programme was designed with the purpose of giving children opportunities to become independent, creative thinkers and citizens: "flexible and adaptive children" (Loyens, Magda & Rikers, 2008, p. 416) able to engage confidently and effectively with new challenges and problems in a rapidly changing world.

The focus of DIY is on enabling the development of increasingly autonomous learners who have learnt how to learn and can think flexibly. It aims to promote the development of cognitive, social and affective dispositions, rather than traditional school knowledge and skills. These dispositions include conscious awareness e.g. metacognition (Flavell, 1979), reflexivity (Vygotsky, 1981) and creativity.

To these ends DIY is learner-orientated and competence-driven, enabling exploration and development of skills and understanding through collaboration on projects based on authentic problems to which real-life solutions are sought. It is designed to offer learners well-structured learning experiences and scaffolds to promote the development of conceptual understanding, technical know-how, the dispositions and skills to develop creative responses to authentic tasks, and to work collaboratively in groups to produce tangible products.

DIY appears to have been very successful. Informal comments from high school teachers working with learners who have been through DIY (as well as learners who have not[1]) suggest that the learners who have experienced DIY think in qualitatively different ways to those who have not, are more objective about their own learning and are able to assess the learning of others with insight and honesty. Several of the teachers working with these learners at high school, have also mentioned that learners who have done DIY, have developed the dispositions of independent thinking, creative solution finding and the ability to utilise both collaborative and individual learning styles. They say that they are able to synthesise information from numerous sources, are generally more perseverant and confident, and are able to use metacognitive reflection when necessary. However, thus far these observations are merely anecdotal. A more systematic understanding of how the DIY programme works, and what and how the children learn from it, is clearly needed. This study therefore addresses the following question:

What and how do children learn in the *DIY: Dream, Innovate Yourself* programme?

The study is situated in the interdisciplinary field of curriculum studies. A qualitative study, it is informed by psychological theories of learning and development, and a sociological theory of curriculum and of pedagogy. It investigates what is 'transmitted' in the DIY programme, how it is mediated and what the learners 'acquire from' or 'learn and develop through' the programme.

The reader should note that sociological and psychological theories in the field of curriculum may use very different terms to refer to teaching and learning, and that these terms may have different conceptual significance or implications. The sociological theory I work with to explore the DIY pedagogy uses the terms 'transmission' to indicate what is taught and 'acquisition' to show changes in the learners due to the pedagogic process. Psychological theorists generally avoid the term 'acquisition' as it suggests a passive process. The psychological theory that informs my study tends to refer to these processes as 'mediation' and 'learning' and/or 'development'. I work with both sets of terminology depending on the context of the discussion.

1.1 The Institutional Setting of the Programme

The private school in which DIY is taught opened in 1999 and is situated in northern Johannesburg. It is multicultural, and has children from middle and upper class, monetarily privileged families, most of whom have at least one parent with a professional qualification.

The school, which is one of the CrawfordSchools™ group[2], has a progressive philosophy of education and teaching, guided by an ethos called 'Crawfordology' outlined in the document, *Crawfordology, Living our Vision* (See Appendix 1, p. 2). The document promotes a pivotal philosophy of learner-centredness. Given to all teachers, it highlights the institutional norms:

[1] Two sister schools, within the CrawfordSchools system were involved in his study. The first is where DIY is a subject, the second is similar in every way (ethos, uniform, subjects, Code of Conduct, teaching methodologies), except that they do not do DIY. As will be explained, it was necessary to set up a comparitive study of children who do not go through DIY in order to compare their ways of thinking and reasoning.

[2] I have received permission to use the Crawford name to identify the schools' group in which the study takes place, but have chosen to keep the specific names of the two schools (the DIY school and the comparative group school) confidential. It is only of significance that DIY occurs in one school in the group and not in others, as this offers a basis for comparison.

the beliefs, values and dispositions expected of teachers, and between teachers and children. The guiding principle is that the child is always at the forefront of educational practice and teachers are expected to 'create magic for each child in the classroom, every day' (Kemp, n.d., p. 2).

Perhaps the best expression of the thinking behind Crawfordology is explained thus:

> In a 'normal' school system natural hierarchies develop as children learn to play the game, to adapt to the system, aided sometimes by good books, good instincts or just good fortune. In the Crawford ethos the system adapts to the needs of the individual, to find and create a space where each and every child has legitimacy and value. Thus, the Crawford teacher carries an enormous responsibility, to adapt, to modify, to legitimize the system for each individual student. (Kemp, n.d., p. 4)

Teachers are called upon to create learning and teaching experiences that are valid, creative, innovative and child-centred. The guiding question that a teacher should ask herself is, "What is in the best interest of the students?" (Kemp, n.d., p. 6) Answering this question by moving away from standardised curriculum-based teaching to create opportunities for individualised learning and acquisition is encouraged.

Given its progressive orientation, the cultural practice of the schools is to give children opportunities and choices. Children are encouraged to speak publicly (e.g. make announcements in assembly) and to share opinions. They are encouraged to think independently and are taught how to disagree with respect. Respect (for self, peers, teachers, parents, materials, equipment and environment) is a core tenet of the school. Children also have choices in terms of a 'multiform', so called, as there are multiple options to choose from (e.g. green or burgundy jersey; long or short pants). They do not have to look identical. Teachers may also wear casual clothing.

The school was constructed with children in mind: broad pathways, light and airy classrooms, small classes (of not more than 25) and various specialist classes are characteristic. Subjects are varied; technology is used in the day-to-day teaching processes; the arts are encouraged and there is a well-stocked media centre. The school accommodates some learning challenges (e.g. exams are recorded onto iPads for those who need assistance with reading).

Notwithstanding the child-centred orientation in the school and its associated arrangements, the emphasis is on academic rigour. Striving for excellence is a tenet included in the school code of conduct that parents and children are expected to sign. Teachers are expected to retain their professional authority in the classroom, and the highest academic standards are promoted.

In terms of curriculum, while the broad aims, objectives and outcomes of the current Curriculum and Assessment Policy Statement (hereinafter referred to as CAPS) are followed, the curriculum is regularly exceeded in expected levels of attainment and in expectations of the levels designated per grade. It is common practice to design creative and innovative learning experiences. Exciting projects are proposed in various subjects, although they seldom expand to incorporate more than one learning area at a time. It was in this context that I introduced the DIY programme and was able to have it formally included in the curriculum.

1.2 Introduction to *DIY: Dream, Innovate Yourself*

Having briefly introduced the DIY programme, I now explain it in more detail and depth.

DIY has three timetabled 45-minute lessons in a six-day cycle from Grades 4 to 7. It is a formally assessed 'subject', included in the formal school report. However, it is not based on traditional school subjects, nor is it a traditional Learning Area. Driven by the posing of authentic learning problems, DIY is aimed at building conceptual resources and an understanding of procedures for problem solving. It also aims to promote the development of dispositions for co-operation, and creative and collective problem solving. Although DIY does not have prescribed or specific subject content, and works outside the subject content and procedures of the official national curriculum, it might draw on skills ascribed to conventional subjects (e.g. creating a budget for a project could be connected to the Mathematics syllabus).

The focus of learning in DIY is to engage the active use of imagination and creativity espoused by many practitioners and theorists (Egan & Nadaner, 1988; Robinson, 2006), both of which are deemed to be vital for modern citizens to possess. The children are encouraged to look for unusual, original and creative solutions to problems, and to develop innovative thinking practices. This happens in an authentic learning environment (Lave, 1996; Barab & Kirschner, 2001) through "learning by doing" (Lave, 2011, p. 4).

However, it is not simply discovery learning. DIY combines open-ended, real life problems with knowledge building opportunities, often requiring the development of 'cumulative knowledge' (Maton, 2009), as well as the transfer of knowledge to new contexts with increasing levels of abstraction. Although it focuses on creating opportunities that have an authentic application, the DIY programme attempts to construct structured and scaffolded tasks to create a pathway that develops knowledge and procedures, as well as opportunities for creative, innovative, original solutions. The programme also aims to develop metacognitive reflexivity (Vygotsky, 1981) and the disposition of self-regulation (Vygotsky, 1981), as well as procedural knowledge not related to any specific field of learning.

In these ways it is quite similar to the progressive Reggio Emilia school of thought on education, which calls it an 'emergent curriculum' in their early learning programmes (Edwards, Gandini & Forman, 1998).

In summary, the programme initially includes thoughtfully structured tasks, with a gradual dropping of scaffolding, and incorporates both vertical and horizontal discourses (Bernstein, 2000)[3].

It is noted here that, as an add-on subject, DIY does not carry responsibility for transmitting discipline-specific knowledge, but can rely on the knowledge gained in various subjects to provide the necessary base for its authentic projects. It is also acknowledged that this offers an

[3] Bernstein's theories will be unpacked in greater detail later in this study, but for clarity at this point, horizontal discourses are those that include everyday knowledge that is often taken for granted, whilst vertical discourses are designed to systematise thinking through developing abstractions utilising ordering principles and generalisations.

important limitation to the claims made in this study in terms of knowledge. As will be seen, much development appears to be dispositional rather than knowledge driven.

1.2.1 Design of DIY Projects

DIY in each grade usually addresses three or four authentic problems spread over the course of the school year. Each problem is structured as a project for completion and may span up to six weeks. Problems encountered, and projects which address them, are based on topics of interest to the children or on other important needs or issues of relevance and importance identified by the teachers, often with a real world relevance and application. These may range from designing the branded school bus, to understanding the significance of a code of conduct and translating the school's Code of Conduct for younger grades (the focus of this research), to raising money for charity, to designing a shirt for the sports team, etc. The problems allow for "individual variability in solutions and produce less agreement on the acceptability of solutions when compared to well-structured problems" (Hong, 1998, p 3), inviting learners to consider many points of view.

Once a problem for exploration has been identified and chosen, one of the teachers designs the intended curriculum for the project. To design the module the teacher, or group of teachers, generally goes through a number of steps including:

- identification of a problem/area of interest/need that is well defined, but has many possible creative solutions
- specification of the conceptual and procedural, dispositional knowledge pertinent to task, as well as factual knowledge where relevant and applicable
- analysis of task demands that need addressing and how they should be clearly conceptualised and sequenced to create a scaffolded pathway for learning specific skills related to the nature of the problem
- identification of ways for dispositions of metacognition, self-regulation and reflexivity to be developed meaningfully, in manageable ways over time
- development of a controlled and tightly framed introduction to the tasks and knowledge initially, which is opened up as the project progresses, to allow for development and demonstration of a growth in skills.

This becomes the planned or intended curriculum that creates "conditions of possibility or affordances" (Greeno, 1994) to enable the development of skills and dispositions towards learning how to learn, and finding novel solutions. The intended curriculum often begins with accessing the children's horizontal discourse of a field, e.g. looking at familiar brands and choosing which is their favourite, then moving the learning towards a more vertical discourse, by exposing them to the theoretical aspects of branding and how it can be used to influence people, and how to access this sphere of influence consciously.

DIY classes are usually organised into small learning groups. Each grade is divided into groups of between six and 12 children. This creates opportunities for learning through lower child/tutor ratios, individual attention and opportunities to explore a problem individually and collaboratively.

The overall module for a particular problem is designed and led by a teacher, but each group is mediated and facilitated by a 'tutor', so called to emphasise the role change that comes with working in a small group[4]. The role of the tutor is to guide, without necessarily having or providing answers. During DIY lessons the tutors are seated either at the tables with their groups or at the edges of the classroom, ready to assist with focusing children, providing resources or clarifying. The learning opportunities are designed to encourage exploration, discovery and creative responses in the classroom.

The small collaborative groups generally have access to various sources of information: experts in the field/s related to the problem or projects that address the problem via Internet, library, tutor and fellow members of the group. All these influence the mediation available to the learner to understand the significance of the problem and to develop solutions to it.

The tutorship group offers affordances (Greeno, 1994) for development. It provides opportunities for learning from and with peers in a way that does not occur in the conventional classroom. "In the context of supportive communication and assistance, students are encouraged to experiment with new ideas and critically re-examine their assumptions – a form of interaction that seems to hold promise for improving students' metacognitive awareness and regulation" (Goos, Galbraith & Renshaw, 2002, p. 196). Moreover, "interaction need not be based purely upon agreement and cooperation, but may also include disagreement and conflict" (Goos et al., 2002, p. 197).

The curriculum is enacted via the following process: each problem for analysis (hereafter called a 'project') begins with a presentation and introduction to the whole grade by one of the tutors, who takes the lead in the project. Most lessons begin with a briefing, which outlines what has to be achieved by the end of the session, and discussion on tasks and activities designed to advance understanding of different conceptual or technical aspects related to the project. Once this has happened, the tutorship groups are encouraged to work independently to address the task, sometimes with and sometimes without mediation from their tutor. The tasks (which are usually defined with overt evaluative criteria in the form of assessment rubrics) follow a clearly defined path as they build conceptual and practical resources that enable creative solutions to be found over time. These solutions are presented to the whole grade and sometimes to the staff, parents or professionals in the field of enquiry, who may at times join the lessons to offer knowledge or techniques needed to address aspects of the project's task demands. Stages of the project are assessed in various ways, including tutor, peer, group, self, parent and 'professional outsider' assessment (e.g. designers who ultimately convert the design from picture to product on the school bus). Voting is frequently a way for ideas or products to be chosen (e.g. choosing the winning design used to build an actual playground space). An important component of all these aspects of learning is the development of social conduct (roles and responsibilities) in groups. This arrangement creates a relaxed social order in the class and does not foreground the teacher/tutor's know-how.

[4] When I refer to the teacher, it indicates the person who devised the lesson and takes the helm in terms of guiding the learning process of the whole project forward for the entire grade. In the small groups, 'tutor' has been used to indicate the fundamentally different role of supporting the groups as they explore their specific, original solution to the project task.

Figure 1: Children working in tutorship groups in the DIY classroom

In summary, DIY is a well-structured curriculum with emphasis on group activities designed to promote autonomy and metacognition. It has a 'what' and a 'how', with a clear aim to promote the discovery of open-ended solutions to problems. I am interested in understanding the 'what' and 'how' of both what is transmitted/taught and what is acquired/learnt, and how they occur.

1.3 Aims of the Study

I explained earlier that the question addressed in this study is, 'What and how do children learn in the DIY programme?' The study seeks to develop a principled description of mediation and evidence of learning over time.

I concentrate on one project in the DIY curriculum for Grade 6; this involved the school Code of Conduct. I observe one small group of learners as they engage in the curriculum for this project.

To answer the 'what' of the question effectively, I examine the form and content of what is mediated or taught; this requires analysis of the substantive content as well as the assessment prescribed by the DIY project. To capture the 'how' of the question, I focus on the form and content of the mediation as the children are tracked through interactions in the classroom, and how they change over time. To capture the development of individual learners, I monitor evidence of change over time and the increasing quality of the children's knowledge as it develops, using Bloom's Taxonomy of Learning Domains (refer to p. 17 of this report) as an indicator. It is difficult to attribute all development to one programme, but it appears that DIY (the only functionally different programme that the children experience) has a marked influence on their learning.

My main question thus has two sub-questions:

1. What is transmitted/mediated in the curriculum (form and content) and how is it made available to the DIY children?

2. Is there evidence of learning and development (in changes of form and content of teacher/peer mediation) in and through the course, and does it change over time?

To develop a conceptual framework for the study, in the next section of this report I discuss literature pertaining to curriculum, pedagogy and learning. I outline theories of child development and how children learn at various stages, with a particular focus on the development of moral reasoning (Kohlberg, 1973). This will be explored in greater depth as I explore theories of metacognition and link them to expected development for Grade 6s (who are the subject of the study). While looking at evidence to understand what is learnt, I shall recruit Bernstein's (2000) theory of Pedagogic Practice and the Pedagogic Device.

Chapter 2: Literature Review

2. Introduction

To study the DIY programme effectively, two intertwined areas of the pedagogy need to be investigated. The first deals with what is transmitted/mediated in the curriculum and how this is made available to the children; the second explores what is learnt and how it happens during the processes of the DIY classroom.

Considerable literature in the fields of psychology and sociology, and more in the field of curriculum, is of potential relevance to this study. In this section I describe concepts that enable me to explore and understand mediation in the programme, and the children's learning and development over time. I also discuss metacognition and moral development.

Initially my impulse was to explore DIY through conceptual development and development of metacognition, but as will become clear later from my conceptual framework, the project on which the research study is based revolves around rules and codes of conduct, it therefore became necessary to broaden my gaze to include the development of moral reasoning. Finally, I examine a sociological theory of curriculum and pedagogy that may help to describe the form and content of mediation in DIY.

Before we can understand how learning happens, it is important to consider aspects of the development of thinking and reasoning in children. Focusing on children aged between 11 and 13 provides a context to the study, as the project under analysis involves Grade 6 (and later, Grade 7) children.

2.1 Theories of Child Development – An Overview

Several theorists (Piaget, 1928/1959, 1950, 1976, 1962/1999; Kohlberg, 1973; Vygotsky, 1981; Lipman, Sharp & Oscanyon, 1984) have proffered distinct but overlapping models of child development, sometimes putting more emphasis on one aspect or another, but essentially agreeing that there appears to be a definite sequence of stages or progression, where the development of one stage rests on the integration and mastery of the stage(s) that precede it, in "universally regular evolutions of meaning" (Kegan, 1982, p. 50), although the rate of development may vary across contexts or domains. Piaget and Vygotsky offer constructivist theories of learning and development insofar as they agree that a child has to interact in a social setting to learn, but disagree on what the primary mechanism is for learning to occur, and whether development precedes learning or vice versa. Kohlberg extended Piaget's work on development into the realm of moral development.

Jean Piaget (1959) proposes that development comes before learning. Although a constructivist, he emphasizes the biological functions of assimilation and accommodation. He further suggests that emergent biological changes and mechanisms create possibilities for the development of new forms of interaction with the physical, social and cultural environment, and thereby the development of new forms of thinking and reasoning. He proposes that children go through different levels of development and that higher levels build upon or re-structure earlier ones, thus supporting a generic sequential development in every child.

Educationally, Piaget believes development precedes learning and that a child has to be confronted with some form of 'conflict' that provokes her[5] to undo her assumptions about what she already knows, and construct new ways of looking at things. He is clear that the child cannot be 'taught', but must first construct knowledge and understanding first by acting on the physical environment, then - once language develops - on representations of action (concrete operational thought) and finally on representations (operational thought). It is in these interactions that the child encounters mismatches between what she knows and new demands, and therefore has to accommodate to the new. I shall not go into Piaget's theory in depth; what is significant, is his view that the child's own activities provoke new developments, which create the possibility for new learning.

This contrasts with Lev Vygotsky (1981), who believes that learning has to happen first, for development of thinking and concepts to occur. Vygotsky emphasizes the role of sociocultural relationships. He proposes that sign mediation of cultural practices offers children psychological tools. This enables the child to learn new ways of functioning, which promote development. He contends that once the child has learnt to use the cultural mediation that others employ to regulate her attention and activities, she begins consciously to regulate her own activities. It is then possible for her to mediate further learning, no matter what her age. Vygotsky thus contends that learning, rather than biology, leads to development.

Being interested in how the mediation offered by DIY promotes development rather than how development supports learning (as is Piaget's contention), I shall work predominantly with Vygotsky's sociocultural theory of learning and development. This theory frames the way I conceptualize the relationship between what is taught and transmitted, and the children's learning. It also offers me key analytic constructs.

2.2 Vygotsky's Socio-Cultural Perspective: The Instrumental Method

Vygotsky (1981) argues that signs and symbols mediate uniquely human forms of functioning, and that these are fundamental for the transmission of culture and shared experience. He maintains that humans become socialised through the artificial mediation of various signs, which are taught because they hold meaning and significance in that culture. These signs are a product of "historical development and are a form of behaviour unique to humans" (Vygotsky, 1981, p. 137).

He proposed that, for learning to happen, the atavistic stimulus-response mechanism must be interrupted by utilising a psychological tool, which creates an "artificial instrumental act" (Vygotsky, 1981, p. 138). "[I]n the instrumental act, a new intermediate link – the psychological tool … becomes the structural center (i.e. the feature that functionally determines all the processes that form the instrumental act) [and] is inserted between the object and the psychological operation toward which it is directed" (Vygotsky, 1981, p. 139).

Signs as psychological tools (e.g. language in all its forms, counting and number manipulation, the arts and all signs) "alter the flow and structure of mental functions … by

[5] I have chosen to use the convention of 'she' to refer to a child, rather than the cumbersome 'he/she' or 's/he'. This is always intended to refer to male and female children.

determining the structure of a new instrumental act, just as a technical tool alters the process of a natural adaptation by determining the form of labor operations" (Vygotsky, 1981, p. 137). Significant others mediate the child's conduct and activities, thereby interrupting instinctive stimulus-response behaviour. Children subsequently begin to mediate independently.

Vygotsky proposes the law of cultural development, as:

> [E]very function in the child's cultural development appears twice: first, between people (inter-psychological) and then inside the child (intra-psychological). This applies equally to voluntary attention, to logical memory, and to the formation of ideas. All the higher functions originate as actual relationships between individuals (Vygotsky, 1978, p. 57).

So, sociocultural mediation promotes the development of volitional consciousness and knowledge. Yuriy Karpov (2005), a Neo-Vygotskian theorist, explains Vygotsky's conceptualisation:

> According to Vygotsky and his Russian followers, the social environment is not just a context in which children develop and to which they struggle to adapt. Rather than that, adults, as representatives of children's social environment, supply them with so-called psychological tools, which, being acquired and internalized, come to mediate children's mental processes. From this perspective, human mental processes are not independently 'constructed' by children (as constructivists would say), nor do they 'unfold' as a result of children's maturation (as nativists would hold), nor are they inculcated into children by adults (as behaviorists would hold). Rather than that, the development of mental processes is *mediated* by adults in the context of social interactions with children. (Karpov, 2005; pp. 10-11)

In order to understand how sign mediation allows for development in learning day-to-day practices, an understanding of Vygotsky's revolutionary theory of the Zone of Proximal Development (Vygotsky, 1981; Davydov, 1967; Wertsch, 1985; Karpov, 2005; Bodrova & Leong, 2007) is necessary. Hereinafter, I shall refer to the Zone of Proximal Development as the ZPD.

2.2.1. The Zone of Proximal Development

Briefly, the ZPD is the space where ability is fluid, moving between already established abilities/skills/actions and new levels made possible by mediation. Vygotsky conceptualises it as "the distance between the 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" (L.V. Vygotsky, as cited in Wertsch, 1985, p. 8). Over time, the child narrows the gap between what she knows and what is to be learnt. This moves her ZPD forward, incrementally developing concepts through peer and teacher regulation of her thinking, as well as developing her own ability to self-regulate her activities independently. As she gains confidence, she shifts from other, to self-regulation.

Thus, any learning task or act of instruction creates a ZPD, "involving mutual adjustment and appropriation of ideas rather than a simple transfer of information and skills from teacher to learner" (Goos et al., 2002, p. 195). Understanding how a child's ZPD can be managed so that it is neither too big (where acquisition becomes almost impossible) nor too small (where almost no new learning happens), and having an understanding of what could block learning, is valuable when assessing the learning. Awareness that the ZPD can be mediated by teachers and peers, provides an opportunity for programmes such as DIY.

James Wertsch's (1981) theory of semiotic mediation and the ZPD builds on Vygotsky's idea of "sign systems act[ing] as mediating devices" (Wertsch, 1981, p. 134). He proposed that children enter into new task settings with a definition of the situation that does not necessarily cohere with the task demands or with the situation definition that adults and more capable peers have of the task and setting. By 'situation definition' he means, "the way in which a setting or context is represented – that is, defined – by those who are operating in that setting" (Wertsch, 1985, p. 8). He expands on Vygotsky's notion by explaining that this "typically involves the adult's representing objects and events in one way and the child's representing them in another" (Wertsch, 1985, p. 8). One needs to be aware of how big the gap is between what the children already know, and what is expected by way of development. It is only when there is a change in understanding on the part of the learner that "intersubjectivity" (Wertsch, 1985, p. 12) can be attained, which will allow for a "situation re-definition" (Wertsch, 1985, p. 11), which moves the ZPD ever forward

In this study I attempt to track the children's situation definitions of concepts and activities in the project.

2.2.2. Mediation

I have established that, according to Vygotsky, a child has to be guided by adults (or knowers), who externalise their own knowledge of a tool and present it to the child to demonstrate how to use it. Feuerstein, M.B. Hoffman, Rand, Jensen, Tzuriel and D.B Hoffman (1986) characterise this as, "the adult caregiver interpose[ing] himself or herself between the child and the environment. The adult mediator intentionally filters and focuses the stimuli, ordering and organising them, regulating their intensity, frequency and sequence" (Feuerstein et al., 1986, p. 50).

"Adults *mediate* the children's acquisition and mastery of new psychological tools, which become internalized and come to *mediate* the children's mental processes" (Karpov, 2005, p. 60) (Karpov's emphasis). It is essential to develop these psychological tools if a child is to be able to mediate her own mental processes and to develop metacognition and self-reflection, both of which will be explored in the context of DIY in this study.

Karpov's succinct explanation of the mastery of these tools is useful here:

> Children's mastery of psychological tools, which leads to the development of their higher mental processes, is a process that has two components. The first deals with an adult's handing over a new psychological tool to the child and

> mediating the child's mastery of it. … The second component of the process of the child's mastery of psychological tools deals with the internalisation of these tools. … The child appropriates this tool and uses it initially in the same form of an external device as it was presented. As the child increasingly masters the tool, it gets internalized and turns into an internal mediator of the child's mental processes. (Karpov, 2005, p. 19)

The child works with the mediating means through practice, eventually internalising it and making it her own through a process of first appropriating it (often by copying the adult's demonstration) and then mastering it. Once mastered, sign mediation becomes a psychological tool, part of the child's mental processes, and is used 'unthinkingly' from then on. In this way the child becomes autonomous, self-reliant and independent of the adult's mediation; able to use the tool that has been internalised to successfully navigate new problems posed. This gives the child a platform from which to learn new skills or more complicated ones, all the while incrementally shifting her ZPD forward. It is Feuerstein et al.'s contention that "[o]nce the child has experienced mediated learning interaction and learned to focus, observe and differentiate, he or she will spontaneously continue to interact with things actively rather than passively" (Feuerstein et al., 1986, p. 50).

This underscores Vygotsky's belief that learning comes before development. The instruments that the child eventually needs to form knowledge independently are introduced to her over time. So, "[e]ducation can be defined as the artificial development of the child; it is the artificial mastery of the natural processes of development" (Vygotsky, 1981, p. 141). The 'artificial development' of concepts, and how they are formed, is central to this study. Added to this, if mediation creates a ZPD, and if the child gradually begins to regulate her own activities, then, as she develops new forms of functioning, the nature and extent of mediation should change. The greater the control of the teacher, the less autonomy the child should have and vice versa. Thus, the ZPD is an important area of focus for this study too.

For Vygotsky, participation in day-to-day sociocultural activities coupled with changes at different ages enables children to develop what he calls "spontaneous concepts" whereas, through school learning, children develop "true concepts".

2.2.3 Concept Development

Vygotsky (1981) proposes that a child goes through three stages of concept development, each of which systematically moves her towards the generalisation and abstraction that are necessary to form a true concept. When she learns something new, she has to find a way to represent what she knows already to inform what she doesn't yet know, thus creating a new situation definition.

In forming concepts, children initially work unsystematically. Instead of developing organised categories to understand ideas, they lump things together with impressions that are idiosyncratic, accidental, and based on everyday observations. Vygotsky calls these impressions "syncretic conglomerations" (Davydov, 1967, p. 44): concrete understandings of the world, where the child does not consider any attribute of the idea apart from the obvious.

As the child moves into what Vygotsky calls "complexes" (Davydov, 1967, p.44), she is still unable to organise the features of the idea into a hierarchical order and moves unsystematically from one to the next. Lack of systematicity makes it impossible to transfer knowledge to another situation. Karpov explains that, "*Spontaneous concepts* are the results of generalization and internalization of everyday personal experience in the absence of systematic instruction. Therefore, such concepts are unsystematic, empirical, not conscious, and often wrong" (Karpov, 2005, p. 171).

In the second stage of concept development the mediation of scientific concepts requires visible pedagogy, where the vital communication of verbal symbols by the knower enables the child to name things and to mimic understanding, without necessarily understanding the concept. Frequently, the child has now developed what Vygotsky characterises as "pseudo-concepts" (Davydov, 1967, p. 45). At this stage though, the child is still locked into a concrete understanding of the idea (e.g. a child can count in 2s, but needs to use marbles to do so accurately). Only when the child starts to isolate the abstract elements of the concept and to consider them apart from the concrete, does a 'potential concept' begin to emerge. However, this must be coupled with exposure to schooling in which children are required to work with what Vygotsky refers to as "scientific concepts" (Davydov, 1967, p. 45). These are systematized bodies of knowledge and concepts that have been developed and formalized over the course of history. The mark of scientific concepts is that they link concepts into vertical and horizontal relationships.

Once isolation of abstract elements occurs it sets the stage for a true concept to develop, i.e. the child is able to recognise "the concept itself better than the object" (Davydov, 1967, p. 45), and to move from the generalised abstraction of the word to being able to apply it to another concrete situation. She can now consciously apply what she has learnt in one situation to another by systematising her thinking, and making connections between concepts. A concept "appears when a series of abstracted signs is newly re-synthesised" and "abstract synthesis becomes the basic form of thought" (Davydov, 1967, p. 46).

'Scientific' concepts, as opposed to 'everyday' generalisations, thus require verbal mediation and a conscious awareness of thinking. A true concept cannot exist in isolation. It has to be anchored in a system of other concepts, where it works in relation to them like pieces of a puzzle, each of which contributes to the whole picture. As Davydov points out, "[t]he abstraction and generalisation of one's thoughts [is] different in principle from the abstraction and generalisation of things" (Davydov, 1967, p. 48).

It is Vygotsky's contention that scientific concepts can develop only "within a specially organized program of instruction in scientific knowledge" (i.e. school). Prior to school, children have only syncretic conglomerations. The active development of scientific concepts (Karpov, 2003) needs the systematisation and mediation of the school environment, which allows children to develop the ability to abstract their thinking and master their learning. Karpov's description of Vygotsky's theory explains that "[o]nce scientific concepts have been acquired, they transform students' everyday life knowledge: the students' spontaneous concepts become structured and conscious" (Karpov, 2003, p. 66), giving the child the ability to be a "theorist" rather than a "practitioner" (Karpov, 2005, p. 172). This enables her to

become reflective of her learning and more independent of her personal experience; to facilitate a more theoretical approach, which frees her of having to experience everything first-hand for herself. In other words, the child must be systematically exposed to scientific concepts at some point and have systematic instruction of some sort, to scaffold and mediate the learning experience. In DIY, the system is premised on the children being given a clear pathway to achieve the learning, but the instructions for how the child is to navigate the pathway are less overt.

Two strands of learning come together to illustrate whether a concept has been effectively learnt. The first is the ability to memorise and repeat knowledge (e.g. being able to name and explain a theorem in mathematics, or to explain what a noun is and give an example). The second is the ability to master the concept through definition: to use it to answer questions to prove knowledge by applying it to new problems of a similar nature.

It should be noted that neither of these options requires an understanding of the field of study as a whole, or truly scientific knowledge. So, while a child might be able to show she understands a concept, and can even use it to solve a range of problems, she is unable to explain its importance outside the limited range of how she is expected to use it. Karpov comments that, "neither the acquisition of scientific concepts nor the mastery of procedural knowledge in itself should be viewed as a desirable outcome of school instruction" (Karpov, 2005, p. 181). As valuable as the teaching of scientific thinking is by schools, Karpov suggests that there must be a combination of scientific concepts and procedural knowledge for learning to be truly effective and for 'true scientific knowledge' to be gained.

2.2.3.1 Wertsch's Concept of Text-based Realities

As mentioned earlier, Wertsch (1991) extends Vygotsky's concept of sign and semiotic mediation. He also proposes the concept of "text based realities" (hereinafter referred to as TBRs) to explain how learning in schools promotes rationality. Briefly, a TBR is a form of communication where "sociocultural forces and cognition create each other" (Wertsch, 1991, p. 84). In other words, what is seen to be important, "necessary and natural" (Wertsch, 1991, p. 73) to know in society in terms of rational thought, is actually a socially constructed reality, that the child came to learn through mediating semiotically presented messages. To do this she is "socialised into mastering discourse structured in accordance [with four] concrete properties" (Wertsch, 1991, p. 74) through various 'texts'.

Wertsch proposes that to participate in TBRs the child has to learn to decipher them by developing four indicators:

> ***Depersonalisation:*** where the speaker is able to move away from personal examples towards the objectivity of generalisation and abstraction, which creates "publicly accessible and ratified reality" (Wertsch, 1991, p. 75).
>
> ***Boundedness:*** where one agrees to work in an "[o]bjectively identifiable text-based reality (TBR), …implicitly agree[ing] to stay within the boundaries of its 'space'" (Wertsch, 1991, p. 76).

Conscious Reflection: whereby the child intellectualises voluntary attention and logical memory, creating distinctions firstly between '***sign tokens'*** (concrete, specific references in time or space) and '***sign types'*** (abstract/decontextualised references); and secondly between ***forms*** and ***meanings.*** These distinctions include synonyms, antonyms, and hyponyms. Wertsch maintains "form and content of semiotic systems such as natural language may be taken as objects of reflection in text-based realities" (Wertsch, 1991, p. 77).

Systematicity: here, ideas are not isolated but create interconnected systems.
When 'in' a TBR, "one can perform a set of operations on one object in order to define another" (Wertsch, 1991, p. 80).

The ability to master mental processes (Wertsch, 1981) and to control behaviour, focusing attention on your own engagement with an activity (whether during a project or as a means to assess it), is a central theme in Wertsch's theory.

Psychological tools as "artificial formations [which] by their nature ... are social, not organic or individual … are directed toward the mastery or control of behaviour of processes – someone else's or one's own" (Wertsch, 1981, p. 137). The regulative nature of these psychological tools "recreate[s] and reorganize[s] the whole structure of behaviour just as a technical tool recreates the structure of labour operations" (Wertsch, 1981, p. 139).

Wertsch's theory provides a useful way to identify examples of developing concepts semiotically, and of analysing conceptual development, metacognition and reflexivity in data, through "variation in the complexity of knowledge and cognitive processes being taught" (Naidoo & Green, 2010, p. 12). I have included his indicators as part of my analysis of data, but to understand why and how a child may not be able to access a semiotic or symbolic form, I have recruited Thompson's theory of symbolic forms, which offers more precision.

2.2.3.2. Thompson's theory of Symbolic Forms

Thompson's theory of the characteristics of symbolic forms is relevant as he suggests that all symbolic forms entail five characteristics: intentionality, conventionality, structure, referentiality and context.

The ***Intentionality*** characteristic of a symbolic form is that it is "produced, constructed or employed by a subject who, in producing or employing such forms, is pursuing certain aims of purposes and is seeking to express to himself or herself, what he or she 'means' or 'intends', in and by the forms thus produced" (Thompson, 1990, p. 138). Depending on the level of intentionality, and whether it is available to the child in terms of her ZPD and situation definition, it will impact on her ability to decode the form.

The **C*onventionality*** aspect of symbolic forms arises from the fact that "the production, construction or employment of symbolic forms, as well as the interpretations of symbolic forms by the subjects who receive them … are processes that typically involve the application

of rules, codes or conventions of various kinds" (Thompson, 1990, p. 139). Interestingly, conventionality does not require someone to be "aware of these rules or to be able to formulate them clearly and accurately if called upon to do so" (Thompson, 1990, p. 140). These conventions are often "implicit and taken-for-granted schemes for generating and interpreting symbolic forms" (Thompson, 1990, p. 140). This knowledge is often tacit in nature, even though it is open to correction and sanction.

The ***Structural*** aspect of Thompson's theory incorporates the concept that "symbolic forms are constructions which display an articulated structure" (Thompson, 1990, p. 141). They can often be dismantled to make them more accessible and simpler to decode, and can be analysed according to their interrelatedness. Symbolic forms are "commonly constructed with structural features and systematic elements, so that by analysing their features and elements we can deepen our understanding of the meaning conveyed by symbolic forms" (Thompson, 1990, p. 142).

Referentiality points to the fact that a symbolic form always refers to something. They often stand for or represent something else. A child in a painting may represent innocence, for example; or use of the word 'I' has significance only if we can refer to who the 'I' is in the context.

The ***Contextual*** aspect is the last of the symbolic forms sited by Thompson. This refers to the "specific social-historical context and processes with which, and by means of which, [the text] is produced, transmitted and received" (Thompson, 1990, p. 145). Often it is the context that gives clues to the person decoding the message, from which inferences and understandings can be drawn.

Through their form and content, Thompson's characteristics of symbolic forms offer a method for analysing acts of transmission from the teacher and acts of acquisition by the learner. Once the form and content had been explored, a more detailed differentiation for levels of metacognition was needed.

2.2.3.3 Bloom's Taxonomy[6] of Learning Domains

As a final resource for analysing the development of metacognition and higher levels of understanding I recruited the revised version of Bloom's Taxonomy (Bloom, Engelhart, Furst, Hill & Krathwohl, 1956) suggested by Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, Raths, and Wittrock (2001), as "The Taxonomy Table [helps to develop] course[s] in three very specific ways. First, it [gives] a common language with which to translate and discuss … standards…. Second, it [helps us] understand how our subjects overlap and how we can develop conceptual and procedural knowledge concurrently. Third, the Taxonomy Table has given us a new outlook on assessment and has allowed us to create assignments and projects that require students to operate at more complex levels of thinking" (Ferguson, 2002, p. 243).

[6] Although Bloom worked with the other theorists named, and the Taxonomy should strictly be called 'Bloom et al.'s Taxonomy,' I have chosen the more recognisable 'Bloom's' as this is the way it is referred to generally.

The revised taxonomy (as with the older version) assumes that once a level has been reached it subsumes the one before it, and "[u]sing the table to classify objectives, activities, and assessments provides a clear, concise, visual representation of a particular course or unit" (Krathwohl, 2002, p. 218).

In my analysis I used the taxonomy to map various levels of thinking in order to show shifts in the kinds of thinking happening at various stages of the learning process. Using the six categories and moving from the simplest to the most complex, I was able to reflect the concept of a progressive development of skills.

DIY was developed in recognition of a growing need for children to develop effective problem solving and thinking skills, moral reasoning and dispositions for professional interaction and social flourishing. As the DIY project researched in this study was also on the school's Code of Conduct, it was important to consider the development of moral reasoning.

2.3. Lawrence Kohlberg's Theory of the Development of Moral Reasoning

Lawrence Kohlberg (1973) refined Jean Piaget's theory of the development of moral judgement (Piaget, 1928/1959), which revolved around the watershed age of 11 (before and after). Although this definition simplifies Piaget's theory, it makes it accessible by helping to identify the age at which children use consequence to action to guide their choices (specifically, being punished) and the age at which they develop the ability to judge according to intentions and to understand rules, thus becoming more able to explore the ambiguity in some moral choices. They find, for instance, that ideas that seem the same (e.g. 'guideline' and 'rule') acquire nuances of meaning when relating to one another.

Piaget noticed specific changes in thinking and reasoning that occur before 10 and after 12 years old, identifying that two-year window as a time of significant change and development in moral thinking. Kohlberg's refined version of Piaget's theory divides it into six stages, summarised here as a useful data analysis tool in this research.

As shown in Figure 2, three main levels are identified, each broken into two sub-stages. In the first stage, the child is aware of the consequences of being caught, and is concerned about the punishment, which becomes the deterrent, or raison d'etre. By stage two the child sees that there may be more than one point of view, but motivation to behave can be controlled with promise of reward. Stage three shows a shift towards concern for the wellbeing of others and a development of interpersonal skills (care, love, empathy and trust), together with a belief that everyone feels the same. There is a shift from not questioning authority to understanding that things are relative. At this point, the child believes that people should behave well: live up to the expectations of others (family and/or society). At the fourth stage, the child becomes aware of the needs of society as a whole, as opposed to the individual. She has become a member of society in her own mind. The emphasis now shifts to obeying laws from the perspective of society and moral order. Stage five heralds theorisation and abstraction based on personal experiences, and an ability to generalise about what a society should uphold. The child now recognises that various groups within a society may have different needs, but that all people have the same basic needs (rights). Democratic laws and systems for improving society are appreciated as ways of creating the society that 'ought to be', i.e. she understands the concept of 'a good society', and becomes aware that the needs of society and individual needs

are balanced via democratic procedures. Stage six, the final stage of Kohlberg's model, is governed by universal principles. Civil disobedience is justified when democratic solutions do not work. Such a solution requires not only impartiality, but also the principle that everyone is accorded full and equal respect.

Figure 2: Kohlberg's Stages of Moral Development

	Level/Stage	Explanation	Stage of Development
Level 1: Pre-conventional	Level I; Stage 1 Obedience/ Punishment	Obedience is practiced solely as a way to avoid punishment.	Pre-nursery school age
	Level I; Stage 2 Self-Interest	Reward becomes the motivating factor: the child is good, so as to gain personal benefits.	Nursery school age
Level 2: Conventional	Level II; Stage 3 Conformity & Interpersonal Accord	The child seeks approval for behaviour. Being named 'a good girl' motivates her, as does creating a friendly environment with others ('playing nicely').	School-going age
	Level II; Stage 4 Authority & Social Order	Interpersonal skills are developed together with a sense of rules being immovable and absolute; the purpose of being good or making the right decisions is to maintain the social order; an understanding of 'society' emerges and of oneself as a member of society.	Pre-teen
Level 3 Post-conventional or principled	Level III; Stage 5 Social Contract	A new perception emerges - that things being legal and moral are not necessarily one and the same. There is an understanding that universal and utilitarian rules make life better for all.	Early teens
	Level III; Stage 6: Universal Principles	Morality is based on transcendent principles; one is prepared to take a stand against something even if it does not benefit one personally (e.g. Gandhi and Mandela)	Adult

It appears that moral reasoning cannot occur without metacognition (the ability to think about one's thinking). For example, to see something from another's point of view, one has first to be aware of one's own point of view. Likewise, to understand what constitutes 'a good society', one must be able to generalise one's understanding of what society is. So, to develop moral reasoning one must have the ability to be self-reflexive and have attained a level of metacognitive awareness.

Up to this point in the discussion I have focused on generative mechanisms of learning and on cognitive, metacognitive and moral development. I noted earlier that constructivist theories agree that development follows a definite sequence of stages but that rate of development may vary across contexts or domains.

2.4 Theories of Metacognition

Thus far, I have discussed theories of learning and development. Exposure to scientific concepts and the properties of learning in text-based realities enable the child to develop conscious awareness of her own knowledge and thinking, so the conceptual development that follows also promotes the development of metacognition.

The most recognised definition of metacognition is the ability to 'think about one's thinking' and 'know about one's knowing', a conscious act that requires one to step out of thinking *in* the activity in which one is engaged and focus on how one can think *about* the act. Eleanora

Papaleontiou-Louca's broadened understanding of metacognition, which includes "knowledge of one's knowledge, processes and cognitive and affective states; and the ability to consciously and deliberately monitor and regulate one's knowledge processes and cognitive and affective states" (Papaleontiou-Louca, E, 2008, p. 3), clearly explains the process of actively monitoring one's thinking. This is a starting-point especially when exploring the idea with young children, but additional aspects of being able to monitor and control one's thinking as described by Matinez (2006), assist with clarifying the notion.

A useful metaphor for demonstrating the differences between day-to-day 'in-problem thinking' (automatic), and 'about-problem thinking' (conscious monitoring and controlling – i.e. metacognition) is that of a driver. The driver is able to manoeuvre the vehicle effectively every day, but does much of the driving automatically. It is only when she is asked to take a new driving test, or has to teach someone else how to drive, that she has to think about the way she drives: to become conscious of each movement of the wheel, each gear change and each signal to other drivers – their efficacy, 'correctness' and suitability in the circumstances. She has to think *about* her driving, rather than just doing it. Similarly, a person who is using metacognitive thinking has to reflect on the way they are 'driving' their brain. It is important to note, however, that one type of thinking (whether automatic or conscious) is no better than the other. Both are needed to perform optimally. One of the motivations for instituting DIY was that, unfortunately, school seems to focus on the former rather than the latter.

Flavell comments that "young children are quite limited in their knowledge and cognition about cognitive phenomena, or in their metacognition, and do relatively little monitoring of their own memory, comprehension and other cognitive enterprises" (Flavell, 1979, p. 906), but that it is possible to develop these skills. This is one of the foci of DIY, as it is assumed that active development of these skills prepares children for further academic challenges, as well as developing competent, autonomous and self-regulatory citizens.

I agree with Flavell that it is:

> hard to believe that children who do more cognitive monitoring would not learn better both in and out of school than children who do less. I also think that increasing the quantity and quality of children's metacognitive knowledge and monitoring skills through systematic training may be feasible as well as desirable' (Flavell, 1979, p. 910).

Flavell implies that exposure to scientific concepts is not sufficient. It is also necessary to help children to learn to monitor their own thinking. This raises the question, why is metacognition not foregrounded in preparatory and high school education, especially since it appears that "'knowing about knowing' develops with age and experience" (Garner & Alexander, 1989, p. 143) and would benefit from being introduced early in a child's learning career? Michael Martinez supports this argument, saying: "Students should know the meaning and importance of metacognition, and the development of the capacity for it ought to be an explicit goal for both teacher and student.… Most obviously, students must have the opportunity to practice and so must be placed in situations that require metacognition" (Martinez, 2006, p. 968). It is this 'placing in metacognitive situations' that seems to pose problems in conventional education, as

metacognitive awareness on the part of the teacher should be embedded in the objectives of the curriculum and is less measureable in terms of marks and assessments.

While I do not intend to get into a discussion about the limitations of marking and assessment of learning, that which is more difficult to quantify (and thus convert to a symbol, mark or average) is more difficult to report on quickly and efficiently. It is also more difficult to explain and rationalise in discussions with parents, teachers and the children themselves. Suffice it to say, that assessing how effectively children are able to make their learning an object of reflection as opposed to making it an object of application – i.e. demonstrating their ability to 'do' the learning task – is more complex and less easily measureable.

Metacognition, it appears, is important: a vital component for the development of citizens who are reflective and independent thinkers; people able to put themselves in the shoes of others and be aware of their actions, motivations and ideas. How to teach metacognition is not as clear, although a systematic study of DIY may provide at least a partial answer, as it actively supports the development of metacognitive thinking as a disposition and skill worth developing.

One of the main assumptions about DIY is that it promotes a different way of thinking for learning and that it provides opportunities to consciously 'reflect on action' in addition to being able to 'reflect in action'. 'Reflecting in action' is the kind of thinking that occurs when you are engaged in learning or performing a task: 'thinking on your feet', as Donald Schön characterises it (Schön, 1983). When, for example, you are involved in solving a comprehension question, your thinking will most likely be engaged with understanding the question and applying your understanding to the answer, without necessarily being engaged with strategies to answer the question, which often happens automatically. It is only when you question the strategy used to answer the question – 'Did I reread the text?', 'Am I making assumptions?', 'Have I understood what the question is asking me to do?' – that you begin to engage metacognitive skills, which enable you to 'reflect about action'. Conscious awareness allows reflection on the object of learning and one's own activities within the learning experience.

As Donald Schön explains, "Reflection-in-action has a critical function, questioning the assumptional structure of knowing-in-action. We think critically about the thinking that has got us […here…] and we may, in the process, restructure strategies of actions, understandings of phenomena, or ways of framing problems" (Schön, 1987, p. 28).

2.4.1 Conscious Self-Regulation and Reflexivity

Although there is general agreement about the nature of metacognition (Flavell, 1979; Zimmerman; 1995; Bernstein; 2000), the related concepts of conscious self-regulation and reflexivity are contested. Does one have to be able to think reflexively before one can consciously self-regulate one's own thinking, or must one be able to consciously self-regulate before one has the ability to think reflexively? The answer may still be unclear, but it is generally agreed that both skills are needed to be a thoughtful, autonomous citizen.

Being able to 'watch oneself thinking' – to survey the kind of thinking that one is using, e.g. 'Do I need to plan?', 'Am I generating ideas?', 'Should I link ideas together by putting them in a logical, progressive order?' – is important, and sometimes described as "reflection" (El'konin, 1972; Davydov, 1967). Zuckerman provides a detailed definition of reflection that describes its complexities as the ability to:

> (a) to consider the goals, motives, methods and means of one's own and other people's action and thoughts; the mental facet of this ability is sometimes called *metacognition*; (b) to take other people's point of view; view things from perspectives other than one's own; and (c) to understand oneself; study one's own strong points and limitations in order to find the ways to excel or to accept one's shortcomings' (Zuckerman, 2004, p. 10).

She further explains that "[i]ntrospection is one part of this remarkable human faculty, the power for self-changing and transcending one's limitations is another component of the human ability for reflection" (Zuckerman, 2004, p 10).

Metacognition, reflection and introspection extend and enhance one another like mirrors angled to catch endless impressions of the primary object; each distinct, but remarkably similar. Fox and Riconscente (2008) suggest that, "metacognition and self-regulation are parallel and intertwining constructs that are clearly distinct yet mutually entailed both developmentally and in their functions in human thought and behavior. Neither subsumes not subordinates the other" (p. 386). Kaplan (2008) adds that, "metacognition, self-regulation and self-regulated learning[7] are not distinct concepts. Rather, they are subtypes of the same general abstract phenomenon of self-regulated action…[of which many types] are more or less appropriate to different tasks, in different domains, in different sociocultural contexts and for different students", (p. 483). Effectively, the ability to consciously regulate thinking and reflexivity are the inseparable skills of being able to control yourself, your attention and your thinking.

Fox and Riconscente provide a helpful framework for understanding the development of these "entwined constructs" (Fox & Riconscente, 2008) by comparing and contrasting the works of James, Piaget and Vygotsky. They trace the development of metacognition and self-regulation as concepts over the last century and a half. Each of the three theorists under investigation uses slightly different terms and explores the main concepts with different emphases. For the purposes of this study, I shall not explore James, but move directly to Piaget.

Fox & Riconscente suggest that "metacognition and self-regulation are fundamentally knowledge of and control of other and object, a viewing of one's own thoughts and actions as having the same position and following the same rules as relations with these external realities" (Fox & Riconscente, 2008, p. 378). In Piaget's view, "Arrival at metacognitive thought involves transforming the child's social and intellectual epistemic egocentrism into the adult's

[7] Kaplan makes the distinction between self-regulation and self-regulated learning, suggesting that we all have the ability to regulate our thinking, and often do so depending on the task we are engaged in. However, self-regulated learning is specific to someone who is a learner/student and pertains to the kind of self-regulation necessary in a learning situation. (Kaplan, 2008).

decentered, relativistic, and socialized thought" and self-regulation "takes the form of intention, the deliberate direction of thoughts and problem-solving actions. With regard to affect, self-regulation takes the form of will, or control of one's desires and emotions" (Fox & Riconscente, 2008, p. 379).

In contrast, Vygotsky views the internalization of self-regulation and reflexivity as skills grown out of social interaction through language. "This internalization promotes increasing abstraction, which moves to the level of conscious abstractions or scientific concepts during the social institution of school instruction, in which culturally developed bodies of systematized knowledge are introduced" (Fox & Riconscente, 2008, p. 383). In his opinion self-regulation requires conscious awareness: the control necessary for a conscious act being reliant on self-regulation.

Whether conscious self-regulation and reflexivity are developed through habit or by working in collaborative groups with peers, as Piaget recommends, or through formal schooling, as Vygotsky posits, clearly mastery of these skills is an important component of independent thought.

2.4.2 The Development of Metacognition and Reflexivity

Vygotsky (1986) suggests that it is the kinds of tasks that are set at school, together with the repetition and practice needed to master them, that promote the development of metacognition and reflective consciousness. Specifically, the tasks needed to move the child towards abstraction and generalization. This allows for mastery of thought and thought processes. From here, the child is expected to be able to take abstractions of consciousness and reapply them to concrete situations, to move from the general and abstract back to the specific and concrete.

> The greatest difficulty of all is the application of a concept, finally grasped and formulated on the abstract level, to new concrete situations that must be viewed in these abstract terms—a kind of transfer usually mastered only toward the end of the adolescent period' (Vygotsky 1986, p. 142).

In Vygotsky's model there are three broad stages of the development of metacognition and abstraction: 1. Initially the child's attention is controlled by adults who indicate, though words, when to focus. 2. The child then learns to direct the attention of others through verbal stimuli, and 3. Finally, her own attention is initially directed outwards in the form of private speech and then inwards through inner speech and thought.

2.4.3 A Note on Learning Activity

The studies of metacognitive thinking of El'konin (1972), Davydov (1999), Davydov, Slobodchikov and Tsukerman, (2003) and Zuckerman (2004) all suggest that Learning Activity – a method of education designed to promote the development of reflexive thinking in young children – significantly enhances the ability to think metacognitively and independently. Their methodologies require the child to become aware of the 'thing' that is being learnt as something to be explored and understood by analysing, identifying, suggesting general laws

that might underlie the problem, presenting assumptions, testing assumptions and defending the assumptions (Zuckerman, 2004). Instead of passively receiving information from the teacher, this process of exploration has remarkable results in generating metacognitive ability, especially if it is practiced in a collaborative group. Where 13- and 14-year-old children were tested against others, a marked increase in their skills was demonstrated because they had been trained in metacognitive thinking (Zuckerman, 2004). The collaborative aspects of DIY and its presentation of opportunities for the generation of ill-structured solutions (Kitchener, 1983) to problems (i.e. those that have multiple solutions as opposed to one 'right answer') resonate with the findings of El'konin (1972).

Zuckerman accuses the general education system of not providing the tools necessary to achieve metacognitive skills, and of being guilty of

> (a) putting the teacher exclusively in charge of defining and controlling the curriculum;
> (b) promoting the myth that the teacher's knowledge is the 'ultimate truth', and
> (c) encouraging 'black and white' thinking (Zuckerman, 2004, p. 11).

She advocates for changing these habits as early as possible in the education system, so as to avoid entrenching them in children, which makes them all the more difficult to rectify later. DIY is an attempt to break these 'bad habits' of education, by introducing the means to develop metacognition and reflection.

Also important to the mode of learning encouraged in DIY are small collaborative groups. These arrangements for learning are relevant to the study of metacognitive growth, as "[w]hen cooperative learning is organised in small groups, the children learn independently to organise the debate – that is, to hold onto the sought after whole, part of which is grasped by each participant in the joint work, but which does not 'belong' to any of them personally" (Davydov et al., 2003, p. 67).

2.5. Period of Development Relevant to Grades in which DIY is taught

The period of development most relevant to this study is what Karpov characterises as 'Middle Childhood', where 'learning at school [is the] children's leading activity' (Karpov, 2005, p. 171). I explained earlier that the instruction and teaching that occurs in schools is the 'main avenue for mediated learning and, therefore … the major contributor to children's cognitive development during the period of middle childhood' (Karpov, 2005, p. 171).

It is widely acknowledged, that when adolescence occurs (between 11 and 13) children not only develop sexually (Erikson, 1968; Vygotsky, 1986; Karpov, 2003), but formal-logical ability becomes fully developed too, through the mediation of society (classroom community; school; home; friends).

According to the theories of child development covered (Piaget, 1950; Kohlberg, 1958; Vygotsky, 1981; Lipman et al., 1984), one would expect children aged 11 or so to be at the second and third stages that Kohlberg describes, where they begin to gain a conceptualisation of the rules of society.

At this stage an individual is generally able to perceive that she is a small cog in the large engine of the world and that much of her understanding is built on things that she has not necessarily experienced first-hand. Also, the ability to self-reflect is developed, where "reflection on … feelings, abilities, competencies and their place in the world, the existence of which they have just 'discovered'" (Karpov, 2003, p. 205) is realised. The adolescent is able to see herself as an autonomous human being, yet part of a community too. The "transformation of the social consciousness into self-consciousness, however, is not a process of a passive adoption by adolescents of social values and norms. … [L]ike other psychological tools, these components of social consciousness can be mastered and internalized only during the course of their application for solving relevant problems" (Karpov, 2003, p. 210). While Vygotsky's focus is on the influence of the teacher over the child, the neo-Vygotskian movement contends that "interactions with peers [are] instrumental in the development of self-consciousness as the major achievement of adolescence" (Karpov, 2003, p. 211) too.

It is noted that expectations of children and their abilities have changed dramatically in the past few years, as pointed out by Davydov, Slobodchikov and Tsukerman (2003), and it is common to expect a child of nine or 10 (Grade 4) to be able to direct her own learning, and to be an agent of construction and transformation in this regard.

> [This] ability to study or teach oneself signifies the ability to overcome one's own limitations not only in the field of concrete knowledge and habits but in any sphere of activity of human relations, in particular in relations with oneself (Davydov et al., 2003, p. 63).

To do this, one must be able to reflect on one's own learning and must understand one's limitations. Until the 1960s, this ability to reflect was considered beyond the capabilities of a pre-teen child (six to 11). Children of this age were considered empirical and unable to actively engage in their own learning, or to develop skills and concepts needed to think scientifically. This is no longer the case, although, generally the learning at school is still controlled and monitored by the teacher, rather than the young child.

The subjects of this research, a class of Grade 6 DIY children, are at a stage of intellectual and moral development that coincides with the metacognitive ability and level of conscious self-regulation necessary to deal with the learning that the teacher proposes. They are thus well poised to learn about the abstractions of the Code of Conduct and generalisation of rules.

The objective of the DIY project is well suited to this age group, not only because they are asked to assume the role of Counsellor (which shares many features with prefectship) in their Grade 7 year, but also because this role fits the development of their reasoning, i.e. it requires moral reasoning and the ability to think about their thinking (metacognition).

As I am interested in finding out how the DIY creates a ZPD for the children's cognitive, metacognitive and moral development, it is necessary to develop a means of studying what is mediated in the DIY curriculum and how it is mediated. I therefore turn to a theory of pedagogic transmission in a curriculum.

2.6. Bernstein's Pedagogic Practice and the Pedagogic Device

Basil Bernstein's (2000) sociological theory of curriculum and pedagogy offers a language of description for describing what happens in the 'transmission' and 'acquisition' of knowledge in any pedagogic situation. This covers both the process (how) of a curriculum's dissemination, as well as the content (what), including an understanding of the broader ethos of how the curriculum "continuously regulates the ideal universe of potential pedagogic meanings in such a way as to restrict or enhance their realisations" (Bernstein, 2000).

Bernstein argues that all curricula are transmitted symbolically through discourse. He explains that pedagogic discourse "embeds rules which create skills of one kind or another and rules regulating their relationship to each other, and rules which create social order" (Bernstein, 2000, p. 32) and how "instructional discourse is embedded in the regulative discourse" (Bernstein 2000, p. 32) which transmit knowledge, skills, and values.

Pedagogic practice within a classroom is guided by the broader ethos of the school and how it "continuously regulates the ideal universe of potential pedagogic meanings" (Bernstein, 2000). Bernstein's theory of pedagogy enables an understanding of how the ethos of the school influences what occurs in the classroom.

Bernstein (2000) contends that whatever is included in the curriculum is a recontextualization of knowledge that has been deemed important enough to be taught in the prevailing social context. According to Bernstein, education incorporates three aspects: pedagogy (the 'how'), content (the 'what') and evaluation. What is taught, the way it is taught and how it is assessed all reflect the type of transmission (teaching) that occurs. Bernstein (2004) refers to these three aspects of pedagogic practice as the hierarchical rules (relating to the relationship between the teacher and students), the sequence/pace rules (relating to how quickly and in what order the curriculum is delivered) and criterial rules (dealing with how the work that has been taught/learnt is assessed and judged).

2.6.1 Horizontal and Vertical Discourses

As with Vygotsky, Bernstein acknowledges that learning happens in social contexts, both spontaneous and organised. When a child is learning in everyday experience, she is taught through connections that occur organically: informal and unstructured 'teaching' that happens in social contexts. Consider a child learning to bake in her grandmother's kitchen. Although the grandmother is teaching her how to make a cake, there is no formal curriculum although there is substantive content (ingredients, quantities, the sequence in which to combine them and how long the mix should bake). The child learns what she needs to, as she needs it, in a common-sense way.

Contrast this with a student learning the concepts of propulsion for a jet engine. The structured knowledge that needs to be taught is systematic and sequential. To successfully build a jet engine the student has to have developed a considerable amount of substantive theoretical

knowledge first; in other words, she needs to know the knowledge, before she can apply it in an "uncommonsense" way (Hoadley, 2006, p. 16).

The spontaneous teaching of the grandmother is what Bernstein calls the "horizontal discourse … entail[ing] a set of strategies which are local, segmentally organised, context specific and dependent" (Bernstein, 2000, p. 157), which correlates with Vygotsky's everyday knowledge. This kind of "meaning is dependent on its social context, so knowledge acquired in one context does not necessarily have meaning or relevance in other contexts" (Maton, 2009, p. 44). Davydov expresses it as "everyday (empirical, spontaneous) concepts … appear[ing] as the child collides with real things, with their concrete properties … [creating] a path from the concrete to the abstract" (Davydov, 1967, p. 47). These collisions indicate only a partial understanding and are often not transferable to other situations. The child believes that her experience of the world is the only one, and that everybody understands what has happened to her in the same way that she does. Horizontal discourse is not transferable to other contexts but, as with pseudo-concepts, becomes the "foundation for the acquisition of *scientific concepts*" (Karpov, 2005, p. 171) which "represent the generalization of the experience of humankind that is fixed in science (understood in the broadest sense of the term to include both natural and social sciences as well as the humanities), and they are acquired by students consciously and according to a certain system" (Karpov, 2005, p. 172).

Bernstein (2000) labels the systematic structuring of knowledge found in schools as 'vertical'. It is necessary to teach abstract knowledge, such as jet propulsion, in a "vertical discourse … [characterised by] scholarly, professional and educational knowledge … [wh]ere meaning is less dependent on relevance to its context and instead is related to other meanings hierarchically" (Maton, 2009, p. 44). Vertical discourse becomes more abstract and specialised over time and can be transferred to various contexts. "Put another way, pedagogy in this view inducts learners into a 'school' way of organizing experience and making meaning" (Hoadley, 2006, p. 16).

Whether knowledge is horizontal or vertical in nature, different modes may be used to transmit it to the child.

2.6.2 Classification and Framing

Bernstein provides a formula for measuring the strength or weakness of power and control that a teacher applies in a given transmission in a classroom. As Hoadley succinctly explains, "Bernstein's concept of classification (power) deals with the 'what' of what is being taught: the organisation or structural aspects of the pedagogic practice…includ[ing] the boundaries between agents, spaces and discourses" (Hoadley, 2006, p. 17), i.e. what is being given importance. "It is classification which orients the speaker to what is expected and what is legitimate given the context" (Hoadley, 2006, p. 20).

Framing deals with how the teaching and learning is happening, and how it changes over time. It focuses on who has the locus of control over what is said and who says it, i.e. who is in charge of the sequence, pace, evaluation and hierarchical rules.

2.6.3 The Regulative and Instructional Discourses

Bernstein posits that within framing there are two types of discourse: "two systems of rules [that] regulat[e], … rules of the social order and rules of the discursive order" (Naidoo & Green, 2010, p. 11). Bernstein refers to these as the Regulative Discourse (RD) and the Instructional Discourse respectively (Bernstein, 1996, p. 49).

The RD is the "discourse of social order" (Bernstein, 1996, p. 46), explained here by Singh:

> The regulative discourse constitutes the social division of labour for knowledge production, transmission and acquisition. Consequently, the regulative discourse sets the limits and possibilities for what is thinkable and unthinkable in relation to school knowledge, student and teacher identities, and classroom order. (Singh, 1997, p. 6)

In contrast, the ID is "a discourse of skill of various kinds and their relation to each other" (Bernstein, 1996, p. 46) and is concerned with the transmission and acquisition of what is being taught.

Bernstein (ibid.) argued that the ID is always embedded in the RD. The RD is seen to be the dominant discourse because, often without the teacher being aware of it, it conveys something of her understanding of the world, her views on society, how she feels about education and even what she believes to be right and wrong. According to Ivinson, the "teacher's instructional discourse is underpinned by a social and political necessity to educate students as if they will become the teacher's representation of the 'ideal pupil/citizen'" (Ivinson, 2002, p. 9). Singh adds: "teachers may recontextualise discourses from the family/community/ peer groups of students for purposes of social control, in order to make the regulative and moral discourses of the school/classroom more effective" (Singh, 2002, p. 577).

Figure 3: The two systems of framing that regulate the classroom

FRAMING
CONTROLS BOTH

The rules of discursive order that govern the Instructional Discourse (ID)	**The rules of social order that govern the Regulative Discourse (RD)**
This deals with who has control over: • Selection of knowledge. Who decides what is learnt? • Pacing of knowledge. Who decides how much time is spent, and on what? • Sequencing of knowledge. Who decides the order of what is taught? • Criteria for assessment. Who decides what is valid, and how do they assess this?	This deals with control over: • How knowledge is transmitted. Is the teacher in sole control, or is order maintained through mutual control (between teacher and children), e.g. through collaborative small groups? • What is acceptable behaviour in a given situation? • Is the teacher standing and lecturing or are children working collaboratively?

When framing is strong in the Instructional Discourse, the teacher "has explicit control" (Bernstein, 1996, p. 27). When framing is weak, "the acquirer has more apparent control" (Bernstein, 1996, p. 27).
While there is constant interplay between the ID and RD in a classroom, for the purposes of this study the RD holds more relevance than the ID. Framing provides me with a tool to assess who has control over the mediation at any given time, and whether it changes over the course of the project. It also highlights how, over time, changing framing influences the efficacy of the acquisition of the child. Using Bernstein's measures of 'strong' and 'weak' framing, I am able to show how the teacher/tutor employs varied framing to do different things and achieve different results.

To identify which discourse is uppermost at any given time, it is useful to refer to how the teacher is speaking. When a classroom is run using a regulative register she is often perceived as affirming students, through phrases like 'okay', 'good job' and 'yes, I agree'. A "value is at work...to do both with establishing respect for the teacher and with the values of the students respecting each other and learning to work together harmoniously" (Christie, 1995, p. 211). When a teacher employs the performance register, she is often focused on the content and knowledge.

How the teacher engages the children and whether she shares the intentions of the lesson(s) reveals the modes of pedagogy, and whether they are overt or hidden.

2.6.4 Visible and Invisible Pedagogies

The concept of 'visible' and 'invisible' pedagogies is another of Bernstein's (2000) contributions to the literature. He theorises that when pedagogy is visible, it makes use of explicit regulation and instruction. What the teacher wants the children to achieve or do is clearly stated in commands such as, 'I want you to complete this task by doing…' or information such as, 'When we add numbers together we do this…'. Much of the teaching revolves around making the knowledge and intellectual skills required overt and obvious. When it is invisible, the child is expected to infer the behaviour needed to complete the task, and sometimes even the parameters of the task itself.

Invisible pedagogies often work hand-in-hand with competence models of education. The assumption here is that the learner knows what to do and how, and is empowered to complete the tasks. The teaching style does not need to be dominant, and can move into the background (become invisible), where it implicitly regulates and instructs. Foregrounded in this mode are the dispositions of good conduct, behaviour, character and manners. This is relevant in the study of DIY, which appears to be a competence model that often uses invisible pedagogic practice.

Devika Naidoo (2011) suggests that, "invisible pedagogies emphasise acquisition – competence. The emphasis is on the competence of the child – upon what is present rather than what is absent and what is possible in the future" (Naidoo, 2011, p. 5). In an invisible pedagogy the hierarchical rules (that govern relationships between teachers and children), sequencing rules (what the child is meant to learn and in what order) and pacing rules (how much time the child has to master the content) are all largely implicit, and the evaluation criteria that govern them are also competence- rather than performance-based.

In a visible pedagogy the rules are largely explicit. The children are shown what to focus their attention on, and how. They know what they are expected to achieve. But in an invisible pedagogy the rules are largely implicit, leaving the children to infer what is being asked of them, what are the objects of reflection. What counts as 'valid' – attitudes, values, behaviours and conduct, knowledge and skills – is left to the children to deduce for themselves. Bernstein points out, however, that this may exclude or disadvantage children who are unable work out objects of reflection, or what to focus on, particularly children who lack the 'middle class' behaviours dominant in certain learning institutions.

2.6.5 Competence and Performance Pedagogic Modalities

Bernstein subsequently reformulated the concepts of visible and invisible pedagogy to distinguish them into two main modalities of transmission: competence models and performance models.

In a competence model, of which DIY appears to be an example, the student is centre-stage and there is an awareness of her individual skills, talents, needs and challenges, rather than the focus being on the specialised discourse, or subject being taught.

Competence models, Bernstein suggests, offer "democracy of acquisition"; "creativ[ity] in the construction of a valid world of meanings and practice"; "an emphasis on the subject of self-regulating" as a "tacit, invisible act"; "an emancipatory flavour" and "a shift in temporal perspective to the present tense" (Bernstein, 1996, p. 54). He clarifies this by stating that, "according to competence theories there is an in-built procedural democracy, an in-built creativity, and in-built virtuous self -regulation. And if it is not in-built, the procedures arise out of, and contribute to social practice, with a creative potential" (Bernstein, 1996, p. 54).

In addition, competence models of education monitor the individual learner's progress: her gains in knowledge and skills by the end of a process. Evaluation is often both tacit and implicit. The learner has power to decide how and when she learns, and can sometimes even choose the order in which she wants to learn it. In performance models the subject and its criteria are the driving forces behind what is taught, and the learner's needs are secondary. Here the focus is on the teacher and the demands of a curriculum in which specific knowledge and skills are paramount.

"Within any classroom we would expect to find a patterning of practice which might tend more towards one of these modalities than the other" (Ivinson, 2002, pp. 5-6).

A third model, theorised by Morais (2002), suggests a mixed pedagogy that combines aspects of competence and performance models to create a "mixed pedagogic practice of weak and strong classifications and framings, depending on given aspects of those practices, [which] lead students to acquire recognition of school contexts and realisation in those contexts" (Morais, 2002, p. 560).

Where learning takes place in the formal, organised context of the classroom, the teacher needs to weigh up how best to create an effective 'transmission experience' based on the subject, the time available and the order in which the material is to be taught.

In the next section of the report I explore the significance of the concepts discussed for this study and the DIY project under analysis.

Chapter 3: Code of Conduct Module: Description and Design Logic

In this chapter I will give a principled and theoretical account of the design logic of the curriculum of the Code of Conduct Project. This will enable me to gain insight into the intentionality behind the teacher's selection of the topic, as well as her expectations. I will use the theoretical tools outlined in the previous chapter to give a deeper understanding and to extend the concepts into the practical application. Before I discuss the significance of the abovementioned set of concepts for the study, it is important to briefly introduce the authentic structure of the module: a study of the school's Code of Conduct.

The objective of the Code of Conduct project is well suited to this age group, not only because the children are asked to assume the role of Counsellor - similar to a prefect - in the following year (Grade 7), but also because this role fits the development of their reasoning, i.e. it requires moral reasoning and the ability to think about their thinking (metacognition).

3.1 The Code of Conduct Project Design

The teacher developed the project in response to revelations that children did not understand the Code of Conduct (itself a symbolic form), even though there was a general assumption that they did. Because of this assumption, it is taken for granted that the children have understood, accepted and internalised its rules.

The teacher identified a need to explore why there was a lack of understanding and compliance regarding the school's Code of Conduct[8]. The most obvious aspect of this was that, even though the Code of Conduct was read to the children at the beginning of each school year, with time for discussion of its relevant aspects (as well as appearing in the school diary), a number of them were not following the rules and several expressed a lack of knowledge and/or understanding when asked to explain how rules had been broken.

The objective of the DIY project was for children to decode the Code of Conduct, and to consolidate and translate their knowledge by developing a real life application through presenting what they had learnt to children of their own age and younger. Originally, a booklet was proposed to fulfil this purpose.

To clarify the rationale for this project, the following extract from the Code of Conduct[9] indicates the tone and the style of the writing. While it appears to be overtly available to the children, the language is very formal and implies a legal contract, using a symbolic form that they seem unable to access.

[8] Insights that I gained about the project were gathered through the planning and briefing sessions before the project began, and in discussion with this teacher/tutor. Being her direct supervisor, she shared the process of developing the lesson with me.

[9] The full Preparatory Schools Code of Conduct Document has been included in Appendix 7: Crawford Code of Conduct, p. 27.

Figure 4: Extract from Code of Conduct:

1. STATEMENT OF INTENT:

At Crawford Preparatory Schools we endeavour to promote positive behaviour and interaction amongst all our pupils and staff. In this vein, each school practices a system of positive reinforcement to encourage all our creative and talented pupils to realise their full potential within a healthy, balanced and safe environment.

2. PURPOSE

2.1 The Code of Conduct governs the conduct of all pupils and the relationship between the School and its pupils.
2.2 A commitment to excellence in all areas of endeavour forms the basis of the Code of Conduct.

As can be seen, unless a document such as this is mediated for the children, it is doomed to be misunderstood, misinterpreted, ignored or relegated to the status of 'something that affects others, but not me'.

Perceiving that, while learners may comprehend particular rules, they did not have a concept of rules (and what they do) in general, the teacher attempted to generate a new understanding by promoting the concepts of 'code', 'rule/rules' and 'conduct' through activities, such as a card game and a game making process.

3.1.1 Intended Conceptual Development in the Code of Conduct lesson design

Although the teacher did not use the language of the theories explored below, she understood that the children's comprehension of the Code of Conduct did not match the required depth of insight that a symbolic code like this demands.

In Vygotskian terms, the teacher understood that the children had spontaneous conceptions of the Code of Conduct, but lacked a conceptual understanding of the meaning and significance of a code of conduct in general. The 'socio-cultural' implications of the Code of Conduct had to be manifested first between the children and the school (and adults who expect a certain pattern of behaviour). Secondly they had to be manifested on the "psychological plane", as only through the structured mediation of more competent knowers of the Code of Conduct would the children be able to assimilate it.

Karpov's assertion that the "traditional system of school instruction often promotes empirical thinking [which] often leads to misconceptions" (Karpov, 2003, p. 70) is congruent with much developing knowledge and skill, of which the Code of Conduct is an example.

For the teacher, the children's understanding of the Code of Conduct is empirical and they have made meaning based on what they have individually observed or experienced. The school assumes a level of knowledge (based largely on general compliance) that has not been taught, but is inferred. The children therefore developed misconceptions that left them without the ability to theorise about conduct in general. It was evident that the children had constructed an empirical view of the rules and how they applied to them as individuals, as the rules were

applied in concrete ways with reference to specific situations, e.g. 'I punched someone because he punched me', rather than as abstract ideas, e.g. 'What are rules and why do we have them?'

It would seem that for adults to expect children to understand and integrate the school Code of Conduct from Grade 4 (nine to 10 years old) creates too big a ZPD (Wertsch, 1985). The adults' expectations cannot be reached; the children's situation definition has failed to match what is required of them in the task of decoding it.

However, once a more manageable ZPD and the requisite situation definition had been created though the module design, and the children had had the Code of Conduct mediated for them (by teacher, tutor and peers) the conditions of possibility for them to move from other to self-regulation, were created. This allowed them to distantiate from individual rules into generalisations of rules through metacognitive practice and enabled them to become capable peers, who in turn were able to mediate the learning for others by producing a game to teach it.

To measure this new capability and its development throughout the project, the teacher's module design logic included various assessment documents.

3.1.1.1 Intended Conceptual Development in the Code of Conduct lesson design through Assessment

As has been stated, the main purpose of the project module was to engender a deeper understanding of the Code of Conduct, together with the requisite metacognitive tools. The ultimate goal was the development of children who understood and saw the need for the rules and regulations that were espoused in the code, and through this understanding were able to pass it on to others.

Appreciation of dispositions like citizenship, responsibility, effective time management, organisation and metacognitive awareness, which encourages self-reflection, runs through the design logic of the module and is reinforced in the assessment documents (Refer to Appendix 6: Code of Conduct Assessment Document, p. 19).

At the beginning of the project the assessment documents are handed out. These are referred to throughout a task, and the children are encouraged to consult the documents to assist them to complete it successfully. When assessment occurs, tutor-, peer- and self-assessment is encouraged, and occasionally parent- and 'external'-assessments are used too. External assessor may be by the management of the school, an expert in the field or a teacher from another subject. When children assess themselves and/or their peers, they are expected to discuss their assessment in some detail and justify their choices.

Those who assess are required to provide a comment at the end of each assessment, and the children may query the way that they have been assessed, offering evidence that may mitigate for a higher mark. When children assess themselves or peers it is likewise expected that they are able to explain their chosen ranking, and at the end of every assessment reflect upon the question, 'What can be improved?' Much time is spent explaining that it is always the child's work that is being assessed, not their character. This overt development of conscious self-

awareness and self-monitoring - being able to honestly and dispassionately assess one's own efforts - as well as the development of other-awareness and other-monitoring, adds another dimension to the module design. It also presupposes that the children are competent and capable both in their execution and assessment of tasks.

The assessment documents collected as part of the data will be explored later, as these offer an interesting insight into what is intended to be developed, and the kind of pedagogy employed to do so. Assessments by a variety of people make it difficult to fit the project into either a competence- or performance-based pedagogy. Neither the child nor the teacher has complete control of the outcome. I shall be in a better position to see where the Code of Conduct module fits, as an example of DIY pedagogic practice, once I analyse the data from the classroom.

3.1.2 Metacognition in the Code of Conduct lesson design

I mentioned earlier that metacognition is a key focus of this study. In the Code of Conduct module the teacher intended to create opportunities to build metacognitive experiences through structured activities. Using the simple tool of a rule-finding card game she allowed learners to think about approaches to a task, to monitor their own understanding and to evaluate their progress as they went along; the accessing of metacognitive resources as a way of building a conceptualisation of 'rules', is a main purpose and objective of the curriculum.

The process of building and constructing a game for others to play creates an opportunity for the children to think about how they will incorporate rules in general in a game (e.g. who is going to take turns and how) and to focus on how they will incorporate the specific words and rules of the Code of Conduct to make them accessible to younger learners.

Both activities gave the children the scaffolds with which to explore their own ability, and that of others, to understand the concept of rules through metacognitive knowledge (knowledge that can be used to control cognitive processes) and metacognitive experiences and regulation.

One more point on metacognition is salient with regard to the methodologies supported in DIY and the teacher's design of this module. Davydov et al. (2003) comment on learning in a small group cooperative environment where "the children learn independently to organize the debate – that is, to hold onto the sought after whole, part of which is grasped by each participant in the joint work but which does not 'belong' to any of them personally" (Davydov et al., 2003, p. 67). This allows the whole group to analyse the learning and to reflect together – "the agent of reflection is not individualized; reflection exists in an interpsychic form" (Davydov et al., 2003, p. 67).

Davydov et al. contend that moving the child into individual reflective practice is more difficult to monitor. They found that even when the percentage of children who were able to exhibit the traits of independent reflexivity increased, they were still greatly influenced by the way the teacher posed the question or task. This made the teacher the "the agent or initiator" (Davydov et al., 2003, p. 68) of the reflexivity. This indicates a "gap between reflexive ability and the ability to teach oneself how to learn" (Davydov et al., 2003, p. 69). And even though

the children who were initiated into being reflective by the teacher were more effective learners, they appeared to be unable to take charge of their own learning independently.
The design of small tutorship groups in the DIY process seems to offer a way to allow children to initiate their own learning. It was used to good effect in the design of the Code of Conduct project, as it allowed opportunities for learning in collaboration, which in turn seems to have created opportunities for children to mediate their own and others' learning. Evidence for this will be explored through the data.

3.1.3 Moral Reasoning in the Code of Conduct lesson design

According to the theories of child development covered (Piaget, 1928/1959; Kohlberg, 1973; Vygotsky 1981), one would expect children aged 11 or so to be at the second and third stages or moral development that Kohlberg describes, where they begin to gain a conceptualisation of the rules of society. The Grade 6 subjects of this research would be expected to be at a stage of intellectual and moral development that coincides with the metacognitive ability and level of conscious self-regulation necessary to deal with the learning that the teacher proposes. They are thus well poised to learn about the abstractions of the Code of Conduct and generalisation of rules that are required for moral reasoning.

Using Kohlberg's stages of moral reasoning (Kohlberg, 1973) as a guide to understand how the children engage with the Code of Conduct, it is not surprising that Grade 4s are unable to engage with the code in the expected way, as they are at the 'pre-conventional' stage of moral development, where obedience and punishment exist as polar opposites (stages 1 and 2), while the Code of Conduct itself seems to have been developed for those already at the 'Post-Conventional' stage, where social contracts are balanced against individual rights, and an understanding of the universal concepts of rules and conduct have been developed (stages 5 and 6).

Frustrated at the lack of compliance with the Code of Conduct generally, especially as she reasoned that the children had been introduced to the Code of Conduct in the conventional way by discussion and 'reading through', the teacher sought to find a way to 'teach' the Code of Conduct as a means to develop moral reasoning and 'buy in'.

To explain what a code of conduct is (i.e. its meaning and significance) is difficult, unless one creates activities that enable an understanding of what rules are, and do. The teacher created a focus of attention on authentic tasks that zones in on the Code of Conduct as a symbolic form that, in turn, conveys the expected codes of behaviour. Using Vygotskian terms to explain her reasoning, it is clear that she thought that the Code of Conduct and all it implies could only become true concepts for the children if the concept of 'rules' was developed first, and then anchored in a web of meanings: 'rules', 'code', 'conduct' and the lexicon of the Code of Conduct. She therefore created tasks to enable the children to "give up an existing situation definition in favour of a qualitatively new one" (Wertsch, 1985, p. 11).

Taking this aim and intentionality into consideration, the teacher developed a card game that asked the children to work out, or discover, the rules as they went along. To win the game,

children had to decipher the rule that the leader of the game had implemented. This made rules the object of their reflection from the beginning of the project.

The next step necessitated children engaging with the terminology in the Code of Conduct. They worked in groups to develop a common understanding of phrases and words used in the Code of Conduct. Phrases and words such as 'statement of intent', 'endeavour', 'in this vein', and 'philosophy' (Appendix 5, p. 18) were taken from the existing document. The children were tasked with finding out what these meant and putting them into their own words. This was followed by a discussion with the tutor to check that all terms were understood. The children then had to develop a board game to teach others what the terms meant. When the games were completed (with rules and expected codes of conduct of their own) they were played by the team that developed them and then by another team. This part of the module was designed to deepen understanding and build metacognitive reflexivity.

Only by understanding the importance of 'rules' *as an idea,* and then exploring each phrase in the Code of Conduct, are the children able to create nuances of meaning that are progressively brought into relationship with one another. Nuances and shades of meaning can only be thrown into relief when a child has understood the signs.

3.1.4. 'Ill-structured problem, well-structured path' in the Code of Conduct lesson design

Given the design logic described, it should be clear that although DIY is neither school subject, nor learning area, the formal curriculum has a well-structured path that leads the learners systematically towards a deeper understanding of the chosen object of reflection. The tasks are clearly scaffolded and incremental: designed to make knowledge and concepts more accessible for children often consciously exploring them in a way that is closer to everyday, or horizontal, concepts.

An ill-structured (or ill-defined) learning problem (Kitchener, 1983) is one in which the path to the solution is not necessarily clear, and there is latitude within which to find a suitable solution. Xun Ge succinctly characterises ill-structured problems as having the following criteria:

> (a) have vaguely stated goals and constraints, some problem elements missing or unclear; (b) do not have unambiguous right or wrong answers but fall on a range of acceptability; (c) possess multiple solutions, solution paths, or no solutions at all; (d) require children to justify and defend their solutions by means of argument; (e) possess multiple criteria for evaluations solutions. (Xun Ge, 2013, p. 216)

Unlike traditional 'one-correct-answer' situations still frequently encountered in the classroom, DIY projects are designed to fit these criteria and constructed to give opportunities for various solutions. Once each group comes up with their answer to the challenges of a project, it is presented to the other tutorship groups and, depending on the outcome of the project, the design/solution/final product that wins the most votes is the one used in the real life context.

Xun Ge (2013) observes that learners appear to struggle with the application of learning from one subject to another. Although her research focuses on providing learning opportunities for university students, this points to an inability to self-regulate learning: an aspect of conventional education that has particularly bothered me in preparatory school children. The ability to use what one knows from one context and apply it to another appears to be lacking in children who are taught in separate subjects that do not 'cross pollinate'. According to Xun Ge, it is for this reason that 'educational researchers have been increasingly emphasizing the importance of creating an open-ended learning environment to engage students in complex, ill-structured problem-solving activities' (Xun Ge, 2013, p. 213). DIY in general and the Code of Conduct module in particular were created in response to similar concerns, and attempt to allow children to develop their own solutions to problems.

Xun Ge goes on to explain that in learning situations such as this:

> (1) the problem drives the learning; students will learn domain knowledge in the process of solving the problem, which is their learning goal, rather than solving a problem as an application of learning; (2) students will see the meaningfulness and relevance of school knowledge in their day-to-day life; and (3) ill-structured problem-solving activities facilitate knowledge transfer by contextualizing knowledge in authentic situations. (Xun Ge, 2013, p. 213)

Depending on the skills of the children, she emphasises the need for scaffolded learning experiences "traditionally…provided through mentoring, modelling and social interactions provided by an adult, a teacher, a domain expert or a more capable peer" (Xun Ge, 2013, p. 219), as it is easy to become overwhelmed when you lack metacognitive awareness and the skills necessary with this kind of task. Although, through surveys and on-line learning experiences, Xun Ge refers to ways for technology to provide the scaffolded learning environment, what is relevant in the study of DIY is that the focus is on real-life learning.

Although the problems being addressed may be ill-structured (Xun Ge, 2013), the process to explore them is clearly focused and systematic, creating a well-structured path for the learners to navigate.

3.1.5 A note on Competence and performance modes in the Code of Conduct lesson design

As explained in my literature review, competence models of education attempt to focus on the learner's individual gains in knowledge and skills that are seen at the end of a process. Evaluation is often both tacit and implicit. The learner has power to decide the pace and can sometimes even choose the order in which she wants to learn. In performance-based pedagogies the focus is on the teacher and the demands of a curriculum in which specific knowledge and skills are important.

In her lesson design for the Code of Conduct module, it is significant that the teacher had a definite 'curriculum' that she wanted covered and specific assessment criteria that she expected to be met (Refer to Appendix 3: Detailed Breakdown of lesson progression for Code of Conduct Lesson, p. 12 and Appendix 6: Code of Conduct Assessment Documents, p.19), indicating a well-structured pathway that is more performance orientated. However,

individualised outcomes to challenges, implies ill-structured tasks that fit more easily into a competence mode.

The strands I address in this study offer a conceptual framework within which to explore first, the learning of the child; second, the transmission and mediation of the teacher; and third, a way to monitor changes over time by tracking changes in levels of metacognition. Together, they allow me to create a methodology for answering my question: What and how do Children Learn in the ***'DIY: Dream, Innovate Yourself'*** Programme?

Chapter 4: Research Methodology

Moll, Bradbury, Winkler, Thsule, van Moore, Slonimsky and Gultig (2001) propose that, "In order for children to learn, they must engage in some kind of activity that provides pathways for them to move from the known to the unknown" (p. 17). It is my contention that the pedagogic design of DIY provides a unique and exciting pathway for children to engage in real-life learning experiences.

To determine whether the design principles of small tutor-guided, collaborative groups, investigating real-life learning projects, is significant, and whether the process of perceived growth in autonomy and reflexivity occurs, it is necessary to track development over time, using a qualitative research methodology. I also investigate the children's ability to organise themselves to solve their own problems and whether this, together with other skills and dispositions, becomes habitually transferable.

To understand any teaching process, however, an exploration of its curriculum is necessary.

Bernstein (1990) suggests that any curriculum is comprised of three messages systems:

- ***knowledge transmitted*** (the 'what' of the curriculum that is considered important to include),
- ***pedagogy*** (the methods used to teach the chosen curriculum, i.e. 'the how')
- and ***evaluative criteria*** (what is assessed or tested).

Detailed analysis of the 'what' and 'how' of the teaching process in DIY thus necessitated a qualitative case study of the data.

4.1 Qualitative Case Study

This study develops a qualitative analysis of DIY through the detailed case study of a small group over one project (Appendix 3: Detailed Breakdown of lesson progression for proposed Code of Conduct Lesson, p. 12 and Appendix 4: Code of Conduct DIY lesson for DIY, p. 14).

Case studies that analyse people and events holistically provide an opportunity to approach research by exploring the "meaning of lived experiences" (Macmillan & Schumacher, 2010, p. 22). For detailed analysis one needs to look at the relevant data from various perspectives: constructing layers of meaning to avoid skewing the reading of it towards one's own preconceptions. A qualitative study allowed me to explore the development of certain knowledge, while observing the DIY methodology: teaching and learning experiences, and their development.

Initially I envisioned my methodology as a quantitative analysis of utterances to track the developing ZPD, but this limited the rich text to a one-dimensional reference rather than revealing the nuances that come from exploring utterances in context (i.e. contextualising how children respond to various stimuli, and noting the differences revealed through a multi-layered

approach). Approaching the task from a qualitative standpoint allowed me to gain deeper understanding of the learning that was revealed through the data gathered.

A study of a project about codes and rules required recruiting methods of analysis aimed at tracking the development of knowledge (the 'what'), through children's experiences. I transcribed and analysed audio and video clips, which track concept development in various ways (verbal iterations; facial expressions; gestures such as nodding and eye contact). Recorded experiences, were transcribed and analysed, and a few months later reflected upon by the children themselves.

The DIY children were tasked with making the school's Code of Conduct more understandable and suitable for younger children. The "seeking of meaningful structures" (Rosenthal, 2004, p. 4) in the Code of Conduct, so as to understand and appropriate them, "evolving from general to specific, from vague and global to precise and local" (Rosenthal, 2004, p. 4) is the purpose of the project. The purpose of this research was to find meaning and evidence of concept development in the small changes over time, so as to track the shifting ZPD.

Exploring how mediation of learning is framed to investigate the concept of 'a rule'- making 'the rules' relevant and appropriate to children's own lives and experience of the school culture - was tracked through various tools. Over time, this tracking indicated the 'how' of the teaching/learning.

Conceptually, children's understanding of rules and codes incorporates common sense, or everyday understandings that adults think children have grasped. It is taken for granted by the school, parents, teachers, and even the children, that the Code of Conduct is understood. When children appropriate the knowledge of 'code of conduct' they make common-sense understandings of it. Yet, when they are asked to explain their behaviour in the context of the code, it is evident that while they have appropriated some of the language (e.g. 'I broke the rules in the Code of Conduct'), they have not assimilated a deeper knowledge (e.g. being unable to explain the language used in the code, even for something as apparently simple as 'conduct'). They have a superficial understanding and seem to make meaning from the context, or previous knowledge, rather than engaging with the concepts embedded in the code.

Using Vygotsky's theories of the ZPD, sign mediation, concept development and metacognition (Vygotsky, 1986) this is explored in more depth by attempting to understand the various stages of developing a concept by tracking the children's learning as they are exposed to the Code of Conduct itself, its language and its expectations, as well as their understanding of what rules are in general.

4.2 The Sample

There were a number of limitations in the gathering of material in this research. Some lessons were not recorded owing to logistical limitations; some of the lessons that were recorded could not be transcribed, as the ambient noise caused by several groups working in one space interfered with audibility. Interrupted lessons further impeded production of the 'final product' (concrete evidence of learning). Imagined originally as a booklet, the product was subsequently

found to work better as a poster. The board games relating to booklet and poster also took longer to make than expected.[10] Therefore, it became necessary to explore other options to track the learning of the children.

The playing of the games became the 'real life application' in which the children had to explain the rules of their games, as well as how they were relevant to the Code of Conduct, to each other's DIY groups. This had implications for what I could research and necessitated the post-research interviews a year later with both the DIY group and the comparison group at our sister school.

The sample in this study has been broken into a number of groups, the first of which operates in the 'small tutorship group'.

A large part of learning in the DIY process is the affordance (Greeno, 1994) of the tutorship group of no more than 12 children. This allows opportunities for learning from and with peers in a way that does not occur in the conventional classroom. The concept of developing "socially mediated metacognition" (Goos, Galbraith & Renshaw, 2002, p. 196), where students mediate their own and each other's metacognitive activity, has import for DIY, as much of the learning happens through interaction with peers. "In the context of supportive communication and assistance, students are encouraged to experiment with new ideas and critically re-examine their assumptions – a form of interaction that seems to hold promise for improving students' metacognitive awareness and regulation" (Goos et al., 2002, p. 196). As Goos et al., point out this may entail disagreement and possibly even conflict. The small tutorship group comprised: Samples 1A, 1B and 1C in various formations.

4.2.1 Sample 1A: DIY Tutorship Group

The first sample comprised a tutorship group of 10 children (C1, C2, L, J, S1, N, C3, B, S2, A and the tutor). Although I had no preference as to which DIY group would become the object of study, when discussing it with the teacher who devised the lesson (and who had already agreed to be part of the study), she offered to assist with the research as tutor of the chosen group as well. The teacher/tutor for the group under study is in her mid-forties, from a middle-class, English speaking background. She is a trained teacher who is also the school counsellor, with over twenty years of teaching experience. As such, she became both the person leading the learning experience on the Code of Conduct project (i.e. the teacher) and the tutor of the group that became the focus of this study. I spoke to her on two occasions to explore the contents of the module, which gave me insight into the projected path of the learning.

No pre-interview was done with the children, so my study of them began from the moment that concepts of the Code of Conduct were introduced. The tutorship group was observed at various stages throughout the project: the beginning phase (introduction to Code of Conduct and rules through the card game), the middle phase (during which the children reproduced their knowledge with a board game of their own) and an interview eight months later, to ascertain

[10] In 2013 the project was run again with the Grade 6s of that year. Appendix 8.1 – 8.3, p. 29 shows three examples of their final products. A professional designer coordinated the children's ideas into one poster. The poster (Appendix 8.4, p. 32) was subsequently distributed by the (then) Grade 7s of 2014, who used it to introduce the Code of Conduct to younger grades in the school. Copies of the poster are now displayed in every classroom.

what - if anything- had changed in the children's thinking. These three phases allowed the 'how' of learning to be investigated.

As the tutorship group worked on this DIY project, I tracked the children's concept development (their understanding of the need for rules in a school Code of Conduct, and the codes and intricacies embedded in them), i.e. metacognitivity and reflexivity. This involved studying small changes in the tutorship group that occurred over time.

Table 1: Demographic and Biographical Information of DIY children involved in study:

C1 – White, English speaking girl, academically strong (12)
C2 – White, English speaking girl, academically strong (12)
L – Black, Zulu first language boy, but generally conversant in English, achieves average marks in academics (12)
J – White, English speaking boy, academically weak, though intelligent (13)
S1 – Portuguese first language, English speaking girl, academically average (12)
N – Filipino and English mixed heritage, girl, academically above average (13)
C3 – Coloured, English speaking girl, academically above average
B – White, English speaking girl, very strong academically (11)
S2 – White, Afrikaans first language boy, weak academically although of above average intelligence. (12)
A – White, American born, English speaking boy, strong academically, reserved and shy (12)

4.2.2. Sample 1B: Three learners with varying ability

I chose three children (C2, J and L) from the tutorship group to track in greater detail. Had I tracked all ten learners it would have resulted in too much data. These three were chosen for their varied abilities, to highlight differences and explore similarities in their learning.

Table 2: Sample 1B – three children studied

C2	J	L
C2 is a child who 'gets' school. She is organised, engaged, participates readily in all aspects of the curriculum and gets the positive feedback that makes her willing to continue with her behaviours. She does well academically and is involved in both cultural and sporting pursuits. In many ways, she is the model student.	J has learning difficulties, most notably in reading. He is intelligent, but often does not do as well as he could academically, as he faces challenges of comprehension and synthesis of knowledge, especially in English. He struggles to transfer learning from one area to another. He is an excellent sportsman and is recognised as a talented tennis player.	L is a quiet, observant learner. He does not participate unless asked to do so. He does well in those aspects of the curriculum that call for recall of previously learned information, but is challenged by higher order tasks that require independent application of knowledge. He has learnt to give the teacher what he thinks she wants and is somewhat flummoxed when asked to give his own understanding. Although he has been at the school since he was 6 and has a reasonably good grasp of English, his home language is Sotho.

4.2.3. Sample 1C: Follow-up interview with some original DIY Tutorship group members

Eight months after the project, when the children were in Grade 7, a 40-minute follow-up interview was included to ascertain the 'what' of the learning and evidence of changes over time: that is, what had evidently been learnt and internalised after some time. I invited the children from Sample 1A (i.e. the original tutorship group) to an informal interview. Some could not attend, as they could not miss the lesson, and L was absent from school. Thus from the original tutorship group of 10, only 6 children (C1, C2, J, S1, B and N) attended the interview. L was interviewed separately when he returned to school. By tracking children's utterances, I aim to reveal their changing understanding of the Code of Conduct over time.

When I began working with the transcribed data it became obvious that some kind of comparison would need to be found, against which to compare and contrast evidence. Thus a comparative group was sought [11].

4.2.4. Sample 2: Comparison group, which has not done DIY

The school in which DIY occurs is taught is one of a group of schools, the nearest of which is 4.5 km away. These two schools are well suited to comparative analysis, being the two main feeder schools for the same high school. Both schools fall under the same Code of Conduct (Appendix 7, p. 27) and are inspired by Crawfordology (Appendix 1, p. 2). Both schools fall into the same socio-economic grouping and children from both have transferred to the other school seamlessly (due to logistical factors such as moving to another suburb). Both schools have diverse populations, where all races, ethnicities and religious groups are represented. The children in both schools are from fairly privileged families and the parents generally aspire to their children going on to tertiary education.

Table 3: Demographic and Biographical information on non-DIY children from sister school

SS– White, English speaking boy, articulate and thoughtful (13)
M – White, English speaking girl, shares ideas easily (13)
D – Coloured, English speaking girl, quiet and observant (13)
Q– Black, Zulu first language girl, very proficient in English (12)
X– Indian, English speaking girl (12)
Y – Black, Zulu first language boy, proficient in English (13)

Note: I have no information about the children's academic profiles, as I do not teach them.

Although DIY is offered only in the school under analysis, almost every other aspect of the schooling experience of children in the sister school is identical ('multiform'; inter-school sporting and cultural events; office of counsellor in Grade 7 and the Code of Conduct itself). That the DIY programme is taught at one school but not the other is arguably the greatest

[11] The timing of the comparison interview and number of children involved, as well as the singularity of the interview (i.e. a single interview at the end of my analysis journey) will be addressed in the limitations chapter of this research report. It is noted that it would have been optimal had there been 'before', 'during' and 'after' interviews to track metacognitive development of the DIY and comparison groups throughout the process.

differentiator in the day-to-day educational experience of the children, and an ideal basis for comparing and contrasting the two groups interviewed.

A group interview with the comparison group of six Grade 7s from the sister school was analysed for similarities and differences that reveal metacognitive awareness in the manner they engage with the Code of Conduct, without having gone through the process of the DIY lesson. This provided insight as to whether the DIY programme's aims (to provide authentic learning experiences that support the development of metacognition, reflexivity and self-regulation), are supported by the data.

The comparison group was made up of 6 children (K, May, D, Q, M and Y[12]), all in Grade 7. Like the DIY group, these children were chosen according to availability at the time of the interview, mixed gender, mixed race groups and varied academic abilities. The researcher did not choose the children. The comparison school's Deputy Principal was requested to choose candidates that he felt would match the criteria. None of the comparison group had been through a learning experience like DIY, but in all other ways their educational experience has been similar.

4.2.5 Sample 3: Assessment Rubrics from Code of Conduct Project

As has been previously mentioned, Bernstein (1990) suggests that any curriculum comprises three messages systems. The knowledge and the pedagogic practice will be explored through previous samples. The third message system (that of evaluative criteria) is explored by analysing the tools and measures for assessment.

The final sample comprises eight assessment rubrics (Appendix 6: Code of Conduct Assessment Documents, p. 19) used throughout the Code of Conduct project. An analysis of the evaluation tools will reveal whether the curriculum is premised on a competence or performance model, whether it uses predominantly RD or ID, and if the nature of the intended curriculum is visible or invisible.

It is noted here that DIY is not situated in the field of reproduction (Bernstein, 2000), i.e. it is not a subject with a clearly defined, specialised body of knowledge that has to be learnt and tested. It is a process aimed at teaching dispositions that are reflected in its 'Learning Outcomes'. Chosen originally from the Critical Outcomes (Outcomes Based Education and Curriculum, 2005), the following are used to assess the learning that occurs in the Grade 6 DIY classroom.

They are:

LO 1 – Identifies and solves problems
LO 2 – Works with others and communicates effectively using a variety of skills
LO 3 – Organises and manages self responsibly
LO 4 – Collects, analyses and critically evaluates information

[12] To protect anonymity, the letters denoting the children from the DIY school and the names of the children from the comparison school are all aliases.

The way that these four outcomes are assessed throughout the project will reveal information about the pedagogic practice: whether it is competence or performance based, and whether the curriculum is visible or invisible.

4.3 Ethics Clearance

I completed the required ethics clearance documents and protocols, and was granted ethics clearance by the University of Witswatersrand School of Education Ethics Committee (Ethics Clearance Number: 2012ECE215). Ethics documents were developed for all aspects of the study: interviewing, note taking, recording, filming and permission from school. These were given to all parties and only when all documents were returned was the study commenced.

The school principal was approached and the scope of the project discussed. He gave permission for the study to take place in 2012. When he resigned and a new principal was appointed, he too was approached and gave permission for the study to continue.

When it became necessary later in the study to find a comparative group, I requested permission to approach children from a sister school within the educational group of schools. The principal of this school granted permission for the study to be expanded. A group of children with similar academic abilities and cultural make up was selected and constituted by the school. I did not know them and had nothing to do with their selection, save to give a description of the *DIY* group's varied abilities and cultural make up. The comparison group was provided with all the relevant documentation and the scope of the study was explained. All documents were returned before the interview was arranged. The comparison group interview, conducted in the Deputy Principal's office, was 40 minutes long.

In all interview situations the purpose of the study and the ethical treatment of the material gathered was discussed and participants were given the opportunity to leave the study at any time, if they so wished.

4.3.1 Potential Ethical Issues

Because I initiated *DIY: Dream, Innovate Yourself* at the school where I am a Deputy Principal, I explained to the children and the teacher/tutor involved that I was interested to find out how it worked and that the purpose of the study was to observe the processes of learning/acquisition and teaching/transmission. I made clear that there would be no link to marks, discipline, reports or appraisal, and that I was an impartial observer of classroom practice. I explained that the notes and recordings taken would be treated confidentially and that all participants were guaranteed anonymity.

All children's names were either changed (as with the comparison group) or coded (as with the DIY group). I am the only person who has access to the code. No one can identify the children in any way, and all the children in the study have now left our school. In a photograph used to illustrate how the children work in the DIY classroom, I obscured the image so that no children can be identified, again ensuring their anonymity.

The teacher and tutors are not referred to by name and the code is only relevant to me; their anonymity too is guaranteed.

Throughout the study, I had to challenge myself to explore the DIY lesson from the position of 'not knowing', so as to understand its processes and procedures from a new perspective. To remain unbiased and 'uninformed', i.e. to approach the data as evidence, rather than knowledge based on experience, was not easy. However, as I became more versed in the theoretical standpoints, I found that they provided a new way of looking at DIY from the point of view of the researcher. This offered fresh insights into the pedagogy, both its strengths and weaknesses, and how it will be implemented in DIY in the future.

Knowing the children and being in charge of their academic progress could have presented ethical dilemmas, but these were dealt with by choosing a grade and topic (The Code of Conduct project) I did not teach. Although I oversee the teaching methodologies we use in DIY, I explained to the teacher involved that she would not be assessed or judged in any way on this project. She was comfortable with this arrangement and open to being given feedback by having the completed research study to read. If it is suitable, the intention is to use the research study as a springboard for educational change in DIY, and as a basis for discussion on how methods of instruction within the DIY teachers' group can be improved. We will also use this research to train new teachers in the methodologies of DIY.

Initially, I considered hiding the school group's name. However, having consulted the person in charge of administration in the school group, and with his approval, I have chosen to use the Crawford name. However, I have not revealed the names of the two specific schools within the group. Where, examples of the children's work are used (Appendix 8, p. 29) I have been careful to hide reference to the schools that were studied.

4.4. Data Collection

Initially it was intended that between 15 and 17 lessons would be used to enact the Code of Conduct curriculum. I had hoped to record them all, but owing to a number of circumstances was unable to. As the project ran out of time, some lessons were conflated and combined, some were too noisy to transcribe for analysis and the intended product, a booklet, could not be achieved [13].

While following the chosen tutorship group (Sample 1A), I had originally hoped to record each lesson in the Code of Conduct project from beginning to end, but this proved impractical for reasons already described. Enough material to allow for analysis of teaching and learning occurred at the beginning, in the middle and in a follow up interview on the project, however, and proved interesting in terms of assessing growth in metacognitive reasoning.

The data I collected came from three sources: direct observation of teacher/tutor and children (in whole class; in small groups with and without tutor), follow-up interviews (with DIY group

[13] Refer to Appendix 3: Detailed Breakdown of lesson progression for proposed Code of Conduct Lesson, p. 12

members and Comparison Group) and assessment rubrics used in the Code of Conduct project The following table provides a detailed breakdown of the lessons:

Table 4: Lessons/Activities used to track shifting situation definition and ZPD

LESSON	ACTIVITY	EVENT	DATE	APPENDIX
Lesson 1	Card Game	Teacher introduces card game as means to make rules the object of reflection	17 August 2012	Appendix 9.1: 17 August 2012, p. 32
Lesson 2	Exploring Language of Code of Conduct	Children explore Code of Conduct language independently in small collaborative groups. Code of Conduct becomes object of reflection and the intended curriculum to be learnt and assimilated, so that next stage can happen.	17 August 2012	Appendix 9.1: 17 August 2012, p. 47
Lesson 5	Discussion of Code of Conduct	Follow-up lesson involving discussion with tutor on language: Code of Conduct and its terminology is made overt.	4 September 2012	Appendix 9.2: 4 September 2012, p. 56
Lesson 6 & 7	Making Games	Children devise games in groups.	10 September 2012	Appendix 9.3: p. 71
Lesson 8	Playing Self Made Board Games	Code of Conduct is reinforced as children teach each other their games.	26 September 2012	Appendix 9.4, 26 September 2012, p. 74
Follow up Interview	Interview with children in Grade 7	In their Grade 7 year, children are asked to reflect on their learning during interview with researcher. Majority of children attended a group interview. L was absent, so had an individual interview.	7 August 2013	Appendix 9.7: 7 August 2013, p. 108
Comparison Interview	Interview with comparison school	A similar group that had not done the Code of Conduct lesson, but was expected to adhere to Code, is interviewed.	21 October 2013	Appendix 9.8: 21 October 2013

This provided the starting point, the centre point and the end point of the concept development for those in the DIY group, as well as scope for analysis, using the comparison group.

When collecting research data, I sat in the classrooms as a silent observer. Although as the Deputy Principal at their school I know the children in the DIY group, I had explained that I was doing research and I would be watching to see what and how they were learning about a project in their DIY lessons.

The development of tracking instruments proved challenging as many facets of learning that can be tracked and might reveal different aspects or even biases towards the learning process. To narrow my focus, I concentrated on how to tackle my main question about the 'what' and 'how' of learning in the DIY programme.

I focused on two sub-questions:

1. What is transmitted/mediated in the curriculum (form and content) and how is it made available to the DIY children?

2. Is there evidence of learning and development (in changes of form and content of teacher/peer mediation) in and through the course, and does it change over time?

The teacher/tutor was tracked to record how closely she regulated the children's behaviour, and to analyse the instructional discourse, through observing what form this regulation and instruction took. Tracking her input over time and observing any changes in control and

mediation was useful in ascertaining the main bias of the pedagogic practice, especially as it contrasted with the children' increase in knowledge and independence.

The transcription of sessions (both the lessons from 2012 and the interviews from 2013) offered an opportunity to explore the research questions.

At any given time, the learning was noted according to one or more theories:

- ***Concept development –*** development of conscious understanding of rules through tracking the shifting ZPD (understanding of 'rules'; how they pertain to me; why I should follow them; Code of Conduct and how it is relevant to me and others). A close study using Vygotsky's theories.

- ***Knowledge*** – factual, procedural, and forms of thinking, including metacognition – and its development

- ***Regulation of self and other*** (Bernstein, 2000) Framing (e.g. teacher regulating children; children regulating each other; children regulating selves; children regulating tutor) and shifts in how this happens

- ***Metacognitive awareness*** using Wertsch's theory of Semiotic Mediation to explore the form and content of metacognition (1981) and ***Bloom's Taxonomy*** to determine the level at which metacognition is achieved

- ***Development of Moral Reasoning*** referring to Kohlberg's Theory (1973).

This cluster of theories allowed me to develop an analysis of the theoretical concepts revealed in the transcripts of lessons and interviews.

4.5 Developing Qualitative Tracking Tools for Analysis

The focus on the Code of Conduct data and supporting data was to find evidence of changing understanding around concepts and metacognitive behaviours that supposedly develop through authentic learning (Van Oers & Wardekker, 1999). Examples of the kinds of evidence referred to are episodes that point to thinking about thinking and knowing about knowing; asking questions for clarification; going over information for self or others; redefining of an idea; seeing changes in thinking; refining of ideas to gain finer distinctions, etc. These examples in the data allow for the construction of abstractions that extend into the theoretical domain, while at the same time remaining bound to the concrete evidence from which they are drawn.

The main purpose of this theoretical approach to data is to generate new understandings, in this case about the DIY programme methodology (in teaching/transmission and learning/acquisition) and to explore how they may form patterns that construct the reality of the 'what' and 'how' in the DIY classroom.

There are two types of learning, as explored by Bert Van Oers and Willem Wardekker (1999):

'Learning as a microgenetic process' - characterised by small, incremental improvements in learning that develop fluency, automaticity, proficiency and eventually, mastery, without much scope for personal input and creativity and *'Learning as an expansion of an activity'* – characterised by learning and exploring new options and elaborating on new concepts. This kind of learning relates to both the personal and cultural aspects of learning. For it to become "truly authentic, it must also encourage a participant to become an autonomous and critical agent, not just a competent robot" (Van Oers & Wardekker, 1999, p. 232).

In this study I am looking at both kinds of learning in combination. I look at incremental change over time, as the ability of the learner develops, making her more autonomous and competent in her own right, and I explore 'learning as an expansion of an activity' with the emphasis in DIY on creating real life projects, or 'authentic learning' opportunities.

Van Oers and Wardekker claim that "[a]uthenticity amounts to an ideal of making a personal version of a sociocultural practice, integrating personal interests (sense) and cultural values (meanings); in other words, authenticity refers to a personal capacity for critically participating in some cultural practice" (Van Oers & Wardekker, 1999, p. 231). Significantly, they add that authenticity "is not a natural quality of human existence but a quality that must be acquired in a person's cultural development" (Van Oers & Wardekker, 1999, p. 231), that is, through school. Their methodology requires the learner to become aware of the 'thing' being learnt as something to be explored and understood by analysing, identifying and suggesting general laws that might underlie the problem; presenting assumptions; testing assumptions and defending the assumptions (Zuckerman, 2004).

Other theorists (Lave, 2001; Lave & Wenger, 1990) suggest that as one develops one's skills to authentically engage with the world one becomes more critical, more independent and more self-responsible. However, Van Oers & Wardekker maintain that it is interrelated: "by learning to participate in an independent way, the self, the personality, is being constructed simultaneously (Wardekker, 1996)" (Van Oers & Wardekker, 1999, p. 231). This focus on independent participation is highlighted in the data.

4.5.1 Developing the Tracking Codes

After transcribing the recordings I created structured observation tools, guided by Vygotsky's theory of concept development and Kohlberg's theory of Moral Development. I also recruited Thompson's theory of semiotic mediation and Bloom's Taxonomy of the development of metacognition. Once coded, all these tools clarified the similarities and differences between the learning of individual children: both those involved in DIY and those in the comparison group.

The various structured observations were designed to track change over time, which Victor Rosenthal describes as "the *development* on a brief *present-time* scale of a percept, a thought, an object of imagination, or an expression" (Rosenthal, V, 2004, p. 1) (author's original emphasis). The germs of the concept 'rules', and related concepts, were tracked in the three children's verbatim exchanges, to ascertain to what extent, and at which points, DIY

participants develop new ways of looking at things (i.e. concepts), regulate their own thinking and shift to higher levels of generalisation and abstraction.

The main focus of this study is learning and development, which points to the ZPD and what is mediated in the *DIY* programme. To explore it thoroughly, I recruited a number of theories to construct a conceptual framework. I began analysis by looking at Curriculum Transmission and Pedagogic Practice (Bernstein, 2000).

I also explored the evaluation within the project as a way of determining the pedagogic discourse in action. I then tracked the teacher/tutor from the beginning of the project, observing how she mediated the learning through prompts, instructions, information and assessment, and observing the kinds of sentences she used (command/instruction, statement, question and exclamation).

At the beginning of this research the assumption was made that the children would become more self-regulatory and that the teacher would be able to withdraw mediation as the project progressed, having seen the children develop the concepts necessary for understanding the Code of Conduct ('code', 'conduct', 'rule', 'the need for rules'), etc. I therefore explored how, over time, her relaxation of control indicated a shifting ZPD (Vygotsky, 1981) in the children, linked to concept development. Her pedagogic Discourse, Regulative and Instructional, was also analysed.

Much of the methodology behind *DIY* revolves around making the curriculum implicit rather than explicit. The concepts are often introduced in games or activities that expose the learning rather than the direct instruction that dominates in a performance based classroom. The bias is therefore towards an invisible curriculum.

4.5.2 Focus on Content and Form

As I coded the transcripts, I chose to pay attention to the form and content of what was said, as a means to excavate them for concept development, metacognition self-reflexivity and moral development. Once this had been done a further measure, to refine the findings, was necessary.

To analyse the pedagogy of the teacher/tutor I created a tracking tool that highlights aspects of the teaching, from the kinds of sentences used (statements, questions, instructions and commands/interjections) to the indicators of metacognitive activity described by Wertsch (1990).

Wertsch's theory was used to reveal the development of authentic learning, specifically in the analysis of the teaching and learning in DIY. It provided a frame that allowed for tracking through his four indicators of evidence of metacognitive activity and reflexivity: depersonalisation, boundedness, conscious reflection and systematicity. All of these work within the Zone of Proximal Development (ZPD), where ideas and concepts are developed in the mind and consciousness of the learner, and constantly move her learning forward. If one is to develop the requisite skills to master reflexivity, Wertsch (1991) proposes that one should be able to utilise any and all of the four indicators of conscious reflection. In the table below, each

of the four indicators is simplified to create a set of easy-to-use symbols (themselves evidence of symbolic mediation) with which to explore the data collected.

These four indicators were applied to analyse both the pedagogical transmission of the teacher and the acquisition of the learner. Using them, what emerged once the transcripts had been analysed was a clear reflection of the kinds of thinking that were used in various lessons, and how the thinking changed and developed over time. By tracking the instances of these four markers, I was able to show a shift in thinking in some of the data.

Table 5: Text Based Realities (TBRs)

Using the four indicators of conscious reflection in Text Based Realities (TBRs), this table creates an easy reference for analysing the thinking revealed in utterances.

Indicator 1	*Indicator 2*	*Indicator 3*	*Indicator 4*
Depersonalisation (D)	**Boundedness (B)**	**Conscious Reflection (CR)**	**Systematicity (S)**
Characterised by the speaker being able to move away from the personal examples that are specific to herself and her experience, or specific to the object of reflection. Depersonalisation allows for generalisation; it is objective rather than subjective; it is 'publicly accessible and ratified reality' (Wertsch, 1991, p. 75)	Each text has 'bounds' within which logical connections are made and are accessible to the group. If we agree to work in an '[o]bjectively identifiable text-based reality (TBR), we implicitly agree to stay within the boundaries of its "space"' (Wertsch, 1991, p. 76)	Intellectualises voluntary attention and logical memory; and creates distinctions: 1. Between ***sign tokens*** – (concrete, specific references in time or space) and ***sign types*** (abstract/ decontextualised references). 2. Between ***forms*** and ***meanings*** – distinctions that include synonyms, antonyms, hyponyms; 'Form and content of semiotic systems such as natural language may be taken as objects of reflection in text-based realities' (Wertsch, 1991, p. 77)	Ideas are not isolated but create webs – 'systematic interconnectedness' is developed by refining distinctions between things. When 'in' a TBR 'one can perform a set of operations on one object in order to define another' (Wertsch, 1991, p. 80)

4.5.3 Focus on Knowledge

It is relevant to look at the kind of thinking that occurs over time; it is also necessary to look at what is being thought about, and how. Dimensions of Thinking: A Framework for Curriculum and Instruction (Marzano, Brandt, Hughes, Jones, Presseisen, Rankin, and Suhor, 1988) offers a way to look at various types of knowledge. Their theory is cited in Town's analysis of Metacognition and Its Development. This provides useful points of reference for understanding the types of knowledge used in any learning experience:

> (a) executive control, which evaluates current state of knowledge;
>
> (b) declarative knowledge, which is being conscious of the facts surrounding a situation;
>
> (c) conditional knowledge, which describes why a strategy works;
>
> (d) procedural knowledge, which has to do with various actions performed in a task.

Being able to name kinds of knowledge is useful as a way to categorise the learning that happens, but it is not sufficient. To investigate whether knowledge in fact changes, Anderson

et al.'s revised Bloom's Taxonomy is useful for categorising and systematising the various learning opportunities. By overlaying the levels that are suggested in Bloom's Taxonomy with Marzano et al.'s types of knowledge, I am able to construct a nuanced assessment of the levels of metacognition reached, and the kinds of knowledge utilised to measure them.

4.5.4 Using Bloom's revised taxonomy to determine levels of differentiation in metacognition

Once the form and content had been explored, a more detailed differentiation for levels of metacognition was needed. Anderson et al.'s revision of Bloom's Taxonomy of Learning Domains (Bloom, Engelhart, Furst, Hill & Krathwohl, 1956; Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, Raths & Wittrock, 2000; Pohl, 2000), allows fine distinctions between the kinds of thinking required for different intellectual skills. I map various levels of thinking used by developing a colour code to show a shift in the kinds of thinking happening at various stages of the learning process. Using the six categories and moving from the simplest to the most difficult and complex, I created a system (using the colours of the rainbow: violet, blue; green, yellow, orange and red) that reflected the concept of a progressive development of skills.

Anderson's Revised taxonomy reveals the character of learning opportunities: whether they are generative and whether they develop the metacognitive skills they are thought to. If children are able to develop their 'thinking about thinking', and 'knowing about knowing' after having explored the 'well-structured problem' (Kitchener, 1983) presented in DIY, as well as being given the opportunity to present an 'ill structured solution' (Kitchener, 1983), which will be assessed, there should be evidence that can be tracked over time.

Bloom's taxonomy (revised by Anderson et al., 2001) offers a levelled differentiation between factual (basic facts), conceptual (interrelationships), procedural (how to do something) and metacognitive knowledge (knowledge of cognition in general, including one's own cognition). The last of these, knowledge of cognition, has six levels of development: remember (memory), understand (meaning), apply (using knowledge), analyse (exploring relationships between elements), evaluate (making judgements) and create (reconstitution of knowledge to form a new whole).

To ascertain whether children developed higher levels of metacognitive awareness during the DIY process, I explored the verbs that reveal the character of the level: whether these are generative and whether they develop the metacognitive skills they are thought to (Refer to Table 2: Anderson et al.'s Modified table of Bloom's Learning Domains, 2001, p. 57). This way, metacognitive development can be tracked through an ill-structured learning problem.

It is generally accepted that one has to achieve the first level of the taxonomy before one is able to achieve the second. By looking at the intensity of colour (i.e. level) throughout the transcripts, I was able to code any subtle changes. As the code words reflected in the transcripts and tracking documents, I chose the 'main' verb in each category, suggested by Anderson et al. (2000), together with the main noun that Bloom used for each of the levels.

Table 6: Anderson et al.'s (2000) Modified table of Bloom's Learning Domains

Level	**Main Verb** (as found in Anderson et al.'s table, 2000)	**Behaviours indicating level achieved**
Level 1: Remember Knowledge	Arrange; Define; Describe; Duplicate; Identify; Label; List; Match; Memorize; Name; Order; Outline; Recognise; Relate; Recall; Repeat; Reproduce; Select; State	Remembers and can recall information; knows.
Level 2: Demonstrate Comprehension	Classify; Convert; Defend; Describe; Discuss; Distinguish; Estimate; Explain; Express; Extend; Generalized; Give example(s); Identify ;Indicate; Infer; Locate; Paraphrase; Predict; Recognise; Rewrite; Review; Select; Summarize Translate	Explains in own words.
Level 3: Apply knowledge	Apply; Change; Choose; Compute; Demonstrate; Discover; Dramatize; Employ; Illustrate; Interpret; Manipulate; Modify; Operate; Practice; Predict; Prepare; Produce; Relate; Schedule; Show; Sketch; Solve; Use;	Applies learning to new situations.
Level 4: Analyse Generalisations	Analyse; Appraise; Breakdown; Calculate; Categorize; Compare; Contrast; Criticize; Diagram; Differentiate; Discriminate Distinguish; Examine; Experiment; Identify; Illustrate; Infer; Model; Outline; Point out; Question; Relate; Select; Separate; Subdivide; Test	Separates concepts into parts so structure may be understood. Shows difference between facts & inferences.
Level 5: Synthesise Solutions	Arrange; Assemble; Categorize; Collect; Combine; Comply; Compose; Construct; Create; Design; Develop; Devise; Explain; Formulate; Generate; Plan; Prepare; Rearrange; Reconstruct; Relate; Reorganize; Revise; Rewrite; Set up; Summarize; Synthesize; Tell; Write	Puts parts together to form a whole, with emphasis on new meaning or structure.
Level 6: Evaluate Judgements	Appraise; Argue; Assess; Attach; Choose; Compare; Conclude; Contrast; Defend; Describe; Discriminate; Evaluate; Explain; Judge; Justify; Interpret; Relate; Predict; Rate; Select; Summarize; Support; Value	Suggests solutions Makes judgments about value of ideas/materials.

My first research question focuses on the interaction between teacher and children, through mediation. It traces the delicate dance that calls for the teacher to lead and demonstrate at times, and for the children to follow until they can test their learning, and the learning of others, by applying it independently to other situations.

The 'how' of the teaching and learning is explored (a look at the social relationships in the classroom as well as the transmission of curriculum), and how it is made available to the children in terms of power relationships between teacher and children.

Here I attempted to analyse the relation between the teacher's pedagogic practice and the students' growth in understanding of the Code of Conduct. Morais, Neves, & Pires (2004) explain how '[teachers] can implement pedagogic practices with low levels of conceptual demand' (Morais et al, 2004, p. 2), by asking pupils to regurgitate factual knowledge and prove low-level understanding and observation. This occurs in a lesson when the teacher asks questions and has specific answers in mind. More profitably, teachers 'can seek to implement pedagogic practices involving high levels of conceptual demand' (Morais et al., 2004, p. 2) which ask for conceptual thinking, knowledge application and developing conceptual competence, including problem solving. This is given the scope to develop in lessons that call for collaborative learning, with open-ended solutions to problems.

Also considered is how the teacher's content and form of mediation changes over time, and whether the children begin to spontaneously self-regulate their own and other's activities as they develop knowledge and skills, and demonstrate their learning independently.

I described the Code of Conduct design logic in Chapter 2. In this chapter I explored the Code of Conduct project, as an example of the DIY process. I drew links to the theory, i.e. concept development by tracking the ZPD; regulation, through teacher, peers and self; growing metacognitive awareness, using Wertsch's theory of Semiotic Mediation to expose the form and content of the metacognitive activity; recruited Bloom's Taxonomy to score the level of cognition achieved; and highlighted instances of self-reflexivity and how it shows evidence of developing moral reasoning, using Kohlberg's Theory (1973).

In Chapter 5, I explore the analysis of the data gathered and evidence of the children's increasing ability to explain the Code of Conduct concepts with confidence. Here I seek to explore the conceptual demands of the Code of Conduct, in terms of knowledge and the children's ability to explain their learning independently.

Chapter 5: Analysis and Results

This study is a descriptive analysis of the interaction of teacher/tutor with children, and children with children, in a curriculum innovation. Data analysis of the material gathered to find answers to the research questions will be covered in this chapter, its purpose being to explicate what it is that the teacher does to transmit knowledge and skill, and how children, as individual learners, assimilate the learning to answer the questions posed at the beginning of this study:

1. What is transmitted/mediated in the curriculum (form and content) and how is it made available to DIY children?

2. Is there evidence of learning and development (in changes of form and content of teacher/peer mediation) in and through the course, and does it change over time?

These questions ask for different lenses to be applied to the data. In the first question, the attention falls on transmission and mediation, i.e. the activities of the teacher/tutor and how she controls and mediates the unfolding of the project.

The second question calls for attention to what the children acquire/learn and how they learn it; how they develop the concepts required in the curriculum set. It seeks to describe and analyse their growing autonomy and ability to be self-reflexive.

I acknowledge that separating transmission/teaching from acquisition/learning is a false construct. However the data, and complexity of the analysis it requires, necessitates moving between the two, shifting the reader's attention to focus on these two opposing aspects of the teaching/acquisition process. Where I have separated them, I have done so only to capture the intricacies of the learning/teaching relationship and the elusive space between the two which, when appropriately matched, creates the ZPD.

If one explores the two strands from the perspective of the enacted curriculum itself (the teacher's pedagogy, including evaluation techniques, both content and form, and the children's acquisition of skills) it is possible to reveal the complexities of both the process and the incremental changes that occur through its various parts.

In Chapter 3 I outlined the teacher's design of the Code of Conduct module. Here I shall focus on what and how she mediates over time, to enact the curriculum. I will relate this at various points with the 'what' and 'how' of the acquisition of the learners to illustrate both aspects. I shall then discuss how the curriculum is enacted through examining the assessment protocol of the module.

5.1 The Code of Conduct Project Outline of enacted lessons

The Code of Conduct module was originally intended to span a number of tasks, but owing to time constraints those listed below are the ones that were enacted. (For more information on the Code of Conduct Lessons, refer to Appendix 3: Detailed breakdown of lesson progression for proposed Code of Conduct lesson, p. 12)

'I have a secret' card game[14] **(1 x 45 minute lesson): The teacher introduced a card game to make children aware of the need for rules to be overt, and tohelp them understand that a rule guides and focuses attention, and/or behaviour.**

Exploring the Language of the Code of Conduct **(3 x 45 minute lessons): Small tutorship groups looked up words in the Code of Conduct to expose them to the language. *'Assessment 1 - Tutor Assessment of learner in group discussion' (Refer to Appendix 6: Code of Conduct Assessment Documents, p.19)* was conducted after this activity. (Two of these lessons were gathered as evidence for this research.)**

Reporting back on Language of Code of Conduct (1 x 45 minute lesson): Children reported back with presentations that used rhyme, mime, public speaking and humour.

Creating our own Code of Conduct Board Game – designing and making **(5 x 45 minute lessons): Children designed and made a board game about the Code of Conduct. The tutor assessed the work through observation and using the *'Assessment 2 - Tutor Assessment – Group Game'* rubric. (Two lessons recorded, but not used owing to ambient noise)**

Playing our own and each other's games (1 x 45 minute lessons): In this lesson each group played their own game and those of others. *(Assessments 3 & 4 were not completed)*

Reflecting on Learning: (1 x 45 minute lesson): This lesson was brought forward in the project as the kinds of assessment could still be completed, even though the project was not. *360-degree assessment was completed with the self, peer, group, tutor and an outsider (Assessments 5 – 8).*

5.2 Initial Transmission and Mediation

When introducing the learning module about the Code of Conduct, the teacher does not mention it at all, but introduces a card game. As explained earlier, her aim is make rules and their purpose the object of reflection through a supposedly rule-less card game. This clearly RD-based, invisible pedagogy will ultimately reveal the concept of rules and their purpose, which, in turn, will highlight the need for rules in general, and how they are relevant to the Code of Conduct. The children observe while the teacher and other tutors play the first round of the game, to model how to play. The teacher begins:[15]

Teacher: I am going to play a card. I am the only one who knows the secret. Mr P *(referring to another tutor)* will you deal the card out for us? Okay, I am going to play the first card, and as the others play I will say 'yes' or 'no', and you will have to work out what the rule is. If I say 'no', the

[14] The lessons that have provided the data for this research, have been put in bold.

[15] For full transcript of the lesson refer to Appendix 9.1 TRANSCRIPTION of LESSONS for Grade 6 'Dreamagination' group, p. 34.

player has to take the card back. ***You are going to use your powers of deduction to work out the rules.***

It is only in the last sentence of the quote that the teacher gives the children a clue about what they are meant to be focusing on: 'You are going to use your powers of deduction to work out the rules.' This brief shift into the explicit Instructional Discourse points to the subject of the lesson (rules), but does not explain how the children should deduce, or work out, the answer. Without further explanation it is left to them to discover what the object of the lesson is. This is not made overt, e.g. 'We are learning about the Code of Conduct, which is actually a set of rules. We first need to know what rules are and why they are important, so we are going to start with a game that makes us focus on rules themselves.'

The supposedly rule-less game actually contains a number of invisible rules (e.g. the cards are dealt out equally; the person who is 'on' begins; the game is played in a circular fashion; the person who is 'on' has to comment on each card played by stating whether it is right or wrong according to their secret rule; all the other players have to take turns at guessing the secret). However, these rules are not the point of playing the game; decoding the 'secret rule' is the objective. The teacher assumes and takes for granted that the children know the other rules from previous experience of card games. They appear to understand the idea of guessing a secret rule, but the teacher does not explain the point of doing so, which is to make rules the object of attention. This is so that they can develop 'rules' as a concept to understand their purpose and significance.

In the analysis of the transcript, as I show later, it became evident that some of her assumptions were incorrect. Some children observed the game without understanding the convention of 'the card as mediator of the idea of rules' and were therefore engaged not only in learning about rules in general but also in how a card game is played. They did not have the competence assumed by the teacher or the pedagogic model used, and the shifts in mediation from teacher to peer did not assist them.

Much of what the children are supposed to learn is implicit, not explained. The card game is an example of invisible pedagogy (Bernstein 2000). A helpful stimulus and scaffold for the majority of children it is intended to provide them the means to explore rules.

5.3 Initial Acquisition

The only way for the children to learn the rules of the game is to observe and copy what can be seen. Having the teachers demonstrate the game provides an example for the children. Once they have observed, the children are able to imitate and 'learn how to play as they go along'. They often correct and guide, mediating each other's conduct and understanding of the game: 'But it's my turn', 'Go then', 'I need six cards'.

When children are asked to discover the made-up rule in the card game, the frustration at not knowing where to begin, or how to make meaning of each person's played card, is evident (e.g. 'I don't know what this rule is either. This is frustrating'; 'I can't even notice a pattern. It's just a jumble!'; 'Ah, I can't explain!'; 'It's so unfair and frustrating!').

As the children play, the teacher, as the tutor of their small group, draws attention to aspects of the game that help them to notice the rules. It is these clues that transmit what she wants them to see (e.g. 'Check the cards that have been played before you guess rules'; 'Good thinking, C2! Now try to work out the rule'; 'I like the way you guys are thinking. You are starting to look at patterns.'). In this way she transmits her purpose invisibly.

At this point the children begin to mediate their own learning by trying to organise what they know, to inform what they do not know (e.g. 'It has to be red, then black?'; 'I think the joker has something to do with it.'; 'You're only allowed spades,' followed immediately by another child saying, 'But there's a heart.'). As soon as they become more systematic and thoughtful in their approach it helps them to focus on the object of the exercise, which is to work out the rule.

The teacher allows the children to discover examples of rules and how they guide us, giving invisible clues along the way. This sets up the ability to recognise the rules in the Code of Conduct later on. Once they have worked out the idea 'rule', they can begin to understand the function of a rule as a common understanding, a generalisation or concept that we all agree upon.

It is only through the 'I-have-a-secret-rule' card game that the children's understanding of 'rules' as an *idea* seems to start developing; only through the metacognitive challenge of reflecting on rules rather than focusing on 'following the rules', do they begin to think about the abstract concept of rules. It is this isolation of 'rule' as an abstraction that allows for "concreteness [to] dissolve" (Davydov, 1967, p. 46). It systematises the children's thinking and creates the possibility of being able to apply one's learning to another situation, a "precondition for unification of abstract attributes ('rule' in this instance) into a concept" (Davydov, 1967, p. 46). By asking the children to guess the rule chosen for the game, the teacher makes the game a means to practise metacognitive reflexivity.

5.4 Mediation in the Code of Conduct lesson enactment

Throughout the mediation process of this project the role of 'mediator' changes from teacher (in a large group) to tutor and peers (in a small group) to self-mediation and other mediation (in a small group without tutor), and back again. It is thus almost impossible to separate the roles of the teacher and the children; they switch back and forth both in lessons and over the whole project. As an example of this, the table below shows how the roles shift between teacher/tutor, child and peer.

Table 7: What is mediated, and by whom, in the Code of Conduct Project:
KEY:

*	'main' mediator in each instance
	purely teacher mediated activity
	mixed mediation of tutor and peers

Date	Task	Mediation
17 August 2012		
Introduction	Listen	*Teacher
Card Game	Observe teacher Play game	Teacher and other tutors *Peers in small group
Discussion about Rules	Listen and participate	*Tutor Peers in whole grade group
(6 children) Small group	Discuss Code of Conduct words in small group	Tutor *Peers
4 September 2012		
Introduction of board game activity	Listen to instructions	*Teacher
(12 children) Small group breakaway	Share Code of Conduct words with tutor in small group	* Tutor Peers
Small group planning (6 children)	Devise and plan Code of Conduct Board Game	Tutor *Peers
7th to 23th September 2012		
Making of board game (6 children)	Write rules for game Design game Test game in small group	Tutor *Peers
26th September 2012		
Playing board games (Entire grade)	Set up and play board games with own group and another group	Tutors *Peers
Follow up interview 7th August 2013		
Interview with researcher (5 children)	Participation sharing of thinking and knowledge	*Researcher *Peers

The situation definition of the children as a group and as individuals is moved forward through the tasks, mediated by the teacher, the tutor and the peer group. Feedback and instruction, as well as evaluation, is most notably experienced through the tutor and peers in the small group. The importance of the small collaborative groups and how they add to the RD will be dealt with more fully later. Suffice it to say that both the teacher's and the children's regulation of learning impacts the end product. The ZPD of the children is drawn forward and the environment of learning allows many opportunities to question, discuss, develop and internalise knowledge. Not only does the child benefit from the small group mediation that allows personal attention from the tutor, she also feels the support that comes from the peer-mediated experiences.

Throughout the learning process the teacher models appropriate language and metacognitive awareness, using phrases such as 'I hadn't thought of it like that', rather than saying 'No, that was wrong'. The children discover that there might be more than one point of view. By providing definitions of phrases after the children have been allowed to try to develop their own understandings of words, she scaffolds their learning while empowering them to understand their personal ability to solve problems. The use of questions such as, 'Could you

go back a step and explain your thinking?' assists children to build an understanding of organised thinking. This reflexive and metacognitive learning, which is the true object of the lesson, is supported by the implicit pedagogy that the teacher employs.

The following extract from the transcript shows how the mediation between the teacher/tutor and the children was tracked over time, using analysis of the sentence types in utterances to indicate pedagogic mode.[16]

Table 8: Example of Tracking Teacher/Tutor's Mediation

KEY
Bold indicates statements
Italics indicates command/instruction
Red indicates question
Green indicates exclamation/interjection (e.g. Aha! Okay.)
Blue highlight indicates metacognitive reasoning task
If more than one is used at a time, then both codes are applied e.g. *Right…5…4…3…2…1 zip it!*
Which indicates an exclamation and command/instruction.

Wertsch's Indicators of Metacognition and Reflection are indicated as
Depersonalisation (D)
Boundedness (B)
Conscious Reflection (CR) (TOKEN and/or TYPE; FORM and/or MEANING
Systematicity (S)

Example of Tracking Tool for Teacher/Tutor[17]

Observation/children's utterances if relevant	Evidence	Tracking of Mediation	Conclusions
17 August 2013: Discussion after Card Game			
	54321…ZIP Thank you…. *K (a child from another group) put the cards into the box quietly.* Everybody … could you have played this game if there were no rules?	RD Command/ instruction; Question **(S)**	The object of attention is still invisible to the children and can only be inferred around the activities and the kinds of questions the teacher asks, to focus their attention; introduces the idea of having a system. Metacognitive reasoning: Children are asked to think about what they did in the game and how it was influenced by lack of rules.
For the first time, teacher asks the children to contemplate what rules are, and what they are for.	**If the rules keep changing, it causes confusion. We keep talking about rules,** but what are they?	RD Statement **(S)** Question **(CR)**	Teacher begins to unveil the purpose, but how it is linked to Code of Conduct is unclear – SYSTEMATICITY is introduced; asks children to reflect on the TYPE

[16] In addition to the 'sentence-type' code, a code was developed from Wertsch's theory of Text Based Realities (1991), which gave a tool for identifying the development of metacognitive awareness through his indicators of depersonalisation, boundedness, conscious reflection and systematicity. The more richly the text reflects these four dispositions, the more evident is the presence of metacognitive activity.

[17] For entire transcript of lesson and tracking, refer to Appendix 9.5 Tracking Teacher/Tutor's Transmission and Mediation: p. 76.

Child: Something to keep you safe… Teacher repeats the question, asking for an explanation of what a rule is for.	Teacher: Aha! That's a good one! **That's what a rule does. Even in a game it keeps you from fighting.** But, what is a rule?	RD Exclamation **(B)** Statement x2 Question **(S)** **(CR)**	Refocuses attention on a definition of rules. Children have to infer the importance. Reinforces the BOUNDEDNESS with positive feedback Reinforces Conscious Reflection by redirecting attention to purpose of game and discussion
In this part of the lesson teacher often repeats or reframes what a child has said, to ensure that it is clear for everyone.	Okay! **It's a guideline to follow. That's why we need rules. Without rules there will be chaos and people… could cheat… there would be a lot of fighting and no one would know what to do.** *(Points at child with hand up)*	RD Exclamation **(B)** **(CR)** Statement x3	Regulates with 'okay' and repetition; reinforces the BOUNDEDNESS of the conversation Asks children to consider a world without rules and introduces consequences, thus consciously reflect
Child's explanation for a rule, "It's to lead us in the right direction".	Teacher: I like that one!	RD Exclamation **(B)**	Teacher regulates with positive affirmation the BOUNDEDNESS; the discussion on rules reveals the purpose, but through inference rather than by giving a defined answer.
As an explanation for rules, a child says, "You can bend them, but you can't break them."	Teacher: How would you bend a rule? *Give me an example.*	RD Question Instruction **(B) (CR)**	Teacher shapes answers and asks for clarification. Asks for a TOKEN of the TYPE thus consciously reflecting on what is meant by 'bending a rule'
Child 2, "Like…if there's… like…" (his thinking is not clear and teacher regulates his unstructured thought).	Teacher: *Think clearly*. *(Points to another child)*	RD Instruction **(B) (CR)**	Teacher provides metacognitive prompt, encouraging child to organise thoughts before speaking; introduces BOUNDEDNESS, keep the discussion on track.
Child 3: The rule … the rule that you shouldn't lie, ever. But you might hurt someone's feelings, so need to tell a little white lie.	Good example, M! **You understood, when they came to you, that the rule 'you shouldn't lie,' might have to be bent. Boys, one day, when you are married, if (your wife) asks, "Do I look fat in this? …" (General laughter.)**	RD **(CR)** Exclamation **(B)** Statement x2 **(S)**	Gives TOKEN of TYPE; uses a token to create connections and distinctions within the SYSTEM 'rules'; Reinforces BOUNDEDNESS; Creates a MEANING from the FORM
J comments, "But, Mrs L, you need to tell them, so they fix it!" "What if I am walking around and my zip is undone? Won't I be more embarrassed if you don't tell the truth? People will laugh at you!"	J, does telling white lies hurt someone?	RD Question **(S)** **(CR)**	Asks learner to make distinctions about when it is okay to tell 'white lies'; Creates a MEANING from the FORM Requires children to think of examples and infer meanings and answers, thus creating a system for understanding lies.
Child offers, "You should rather be honest."	**X, I was just about to say something similar.**	RD Statement **(B)**	Positive feedback for staying BOUNDED

Child 5: If someone can't dance... and they go for *SA's got talent*…and she can't dance. I should tell her, for both of us.	**Another important life point.**	RD Statement **(B)**	Positive feedback of BOUNDEDNESS regulates attention of children to focus on what she 'wants' from the discussion.
Child 8: What if there is a person who is terribly bad? Like a cook versus cook and the nasty person's food is better than your friend's.	*Tell me something about the rules.* (She listens to comment on left) **You're confusing me.**	RD Command Statement **(B)**	Regulates child who has strayed from BOUNDARIES of conversation

Based on the way the teacher engages with the learners, she has presumed a competence and autonomy that is afforded them in their small group discussions. She makes almost no propositional statements, relying rather on questions and supportive, regulative exhortations. Generally, questions are prompts to think about what one will answer, or to focus one's attention on what has already been said. They make one think. Commands most often regulate conduct, but in this environment the commands often imply a metacognitive slant, e.g. 'think clearly'. Statements are generally propositional, dealing with the factual content of what is being taught. In this instance, however, they are skewed towards regulating thinking conduct and behaviour, rather than teaching specific content, e.g. 'It's a guideline to follow. That's why we need rules. Without rules there will be chaos and people… could cheat… there would be a lot of fighting and no one would know what to do' and 'You're confusing me'.

Very little checking of what the children are doing occurs. There is an expectation that they will complete what they have been asked to do.

5.4.1 Exploring Mediation of teacher/tutor through Regulative Discourse

In the first Code of Conduct lesson (Appendix 9: Transcript 17 August 2012, p.33), the teacher is in charge of the activities and, as such, she is 'the voice to be listened to'. This enables regulative order to be achieved through the hierarchical rule (Bernstein, 1990). She guides the exploration of rules forward, even though she does not enforce her control with a detailed curriculum. Throughout the lessons, however, the boundaries of this hierarchy shift from teacher-in-charge-of-child, to child-in-charge-of-child (in the game), to child-in-charge-of-self (writing notes in books) and back.

The constituted object of the lesson (i.e. understanding the Code of Conduct and making it more explicit) is not explained at all. The first lesson of the card game is a vehicle for exploring and exposing the concept of rules and their importance. The purpose of the lesson is to highlight the concept of rules in general, which will eventually become relevant to the importance of rules in the Code of Conduct specifically. The children are expected to be able to infer meaning and knowledge from the game. The card game is an exercise in hypothetical thinking that asks children to construct an understanding about the abstract concept of 'rules' in general, in order to apply this to concrete, specific rules in the Code of Conduct.

The teacher's mediation throughout the opening lesson is almost all in the regulative mode, reinforcing the competence-based pedagogy that the school supports. She uses the card game as a semiotic tool to illustrate the concept of rules. She regulates attention through phrases

such as: ‘Okay, I am going to play the first card and as the others play I will say, “yes” or “no” and you have to work out what the rule is. If I say, “no”, the player has to take the card back’ and ‘Have you all got cards? Look at your cards. S, have you got a rule? Think of a rule’. Virtually no propositional statement is made and there is very little evaluative commentary either. All of this points to an implicit, invisible pedagogy. The primary ordering principles are focused on conduct and relationships, set up in the absence of overt criteria of what the children are meant to be learning.

The teacher employs an implicit pedagogy that only becomes explicit (visible) at the end of the first lesson where she focuses on the meaning of rules. ‘You’re going to brainstorm and mind map these in your groups. Write three questions: What is a rule? Why are rules needed? Give examples in everyday life. You can brainstorm, mind map or list. If you need to, break into two smaller groups in your tutorship group.’ Even with explicit questions that explores the concept of rules, the purpose of the Code of Conduct lesson is not yet revealed.

Another marker of the teacher’s initial bias towards a Regulative Discourse mode is found in the way she creates the conditions for developing metacognitive awareness. Her ID is, in fact, characterised by a more explicit RD. She makes references to ‘making a note in your minds’, ‘try to see the pattern’ and ‘now, try to work out the rule’. All these ask the children to think about what they are thinking, and focus their attention on how they are meant to be engaging their thinking in the task. The teacher thus makes the activity a way to consciously reflect, by putting up ‘route markers’ for the children.

In later lessons the RD and the invisible pedagogy are revealed through how the teacher guides the children, especially in the small group activities. She uses little explicit evaluation and limited content, but implies that they have done well by using phrases such as, ‘good thinking’, ‘I like that one’, ‘that is what I was going to say’ and ‘okay’. She also guides them to ‘think clearly’, or makes them rethink answers with comments such as, ‘expand on that rule’ and ‘I haven’t heard it described like that’. Each of these phrases guides the children, either by giving them positive feedback that implies they are ‘right’ and should continue in that way, or ‘wrong’ by pointing out that they are not on the right track and need to shift their thinking to another focus. She does not tell a child that they are wrong directly. She does not use fear or shame. Again, the pedagogy is implicit and operates invisibly via tacit but unspoken understandings that influence the children’ actions and thinking.

I have looked at the teacher’s mediation of the learning and how it shifts and changes over time. In the DIY process, however, much of the learning happens in the small collaborative groups, where the children regulate and shape their own, and each other’s learning.

5.4.2 Exploring Mediation of Collaborative Peer Groups through Regulative Discourse

When exploring the second research question, 'What is learnt and how does it happen in the processes of the DIY classroom?' I needed to become aware of the development of concepts in the children; linked to the projected learning of the Code of Conduct lesson, these included 'What is a rule?', 'Why are rules necessary?', 'What is the Code of Conduct?', 'What is the purpose of the Code of Conduct?')

Being given the affordance (Greeno, 1994) of small tutorship groups creates conditions for learning through "socially mediated metacognition" (Goos, Galbraith & Renshaw, 2002), where students mediate their own and each other's metacognitive activity. As has been mentioned before, "[i]n the context of supportive communication and assistance, students are encouraged to experiment with new ideas and critically re-examine their assumptions" (Goos et al., 2002, p. 196). In discussion this can take the form of either agreeing or disagreeing.

In the 'I have a secret' card game, the very format allows one child to regulate the others with a simple 'yes' or 'no', thus guiding them to explore what the rule might be. This focus on the common intention asks for the assistance and support advocated by Goos et al.

Phrases such as 'here are your cards', 'play now', 'I am thinking' indicate that the roles of regulator and regulated shift constantly, and that all the children benefit from learning from peers. The small group environment gives the children the opportunity to gain information and understanding from all member of their group. Effectively, they create a situation definition mediated not only by the tutor, but by nine other 'knowers', and as the children develop their own knowledge and understanding they develop that of the others. Their learning therefore becomes 'collective' as each person's insight compensates for, and builds on, that of the others.

When the children are left to explore without the constant intervention of the teacher/tutor (e.g. in the game; in the discussions about words) they regulate each other, often using similar phrases to those of the teacher, imitating and mirroring what she has modelled (Refer to Appendix 9, from p. 47). They observe each other, copying and guiding, exploring and 'trying out' in equal measure (e.g. 'As a group we need to learn how to work together'; 'That's a good suggestion'; 'We can all have a turn'; 'That's smart'; 'We're getting side tracked'; 'Let's quickly think'). It appears to be just as important to experience one's own contribution as it is to experience the contribution of others. Both reinforce and augment the teacher's transmission and, in some instances, are even more effective. This allows the children to move from the initial 'other regulation' of the teacher and peers in groups, to 'self-regulation'.

Consider the two following episodes. Both are situated in the collaborative tutorship group, where children regulate themselves and others:

Table 9: Episode 1, Cracking the Code

Episode 1:

In the card game, almost every utterance regulates others. The main focus is on cracking the code of the 'secret', in which the 'yes' and 'no' regulation is part of the game. However, there are further regulations that remind, reinforce, question or check still more regulations, as evidenced in the episode below. S1 has been 'on' for a while, and as they play their cards the children are beginning to see patterns in her regulative 'yes' and 'no' answers.

Episode 1: Cracking the secret	**Regulatory Action**
S1: S2?	S1 ***reminds*** S2 to play by asking him an implicit question.
S2: L?	S2 ***reminds*** L to play first, so that he can go.
S1: Yes...	S1 ***gives a positive answer*** to L, telling him his card is correct.
L: Must he pass to the left?	L ***checks*** the rules for S2's 'play'.
S1: S2, here.	S1 ***shows*** S2 where to play his card, ***demonstrating*** the correct order in which to play.
C2: *(To N)* Here are your cards	C2 ***shows*** cards to N so that she can play.
J: Yoh! That's bad.	Looks at L's cards and makes a comment, implying a bad choice, and so ***introduces doubt***.
N: I am worried about this.	N ***shows uncertainty*** in response to J's comment
J: I am just joking.	J ***modifies*** what he said, to reveal a joke.
S1: Yes…yes… no … no …no… yes… no…yes.	S1 continues to ***regulate*** each 'turn' as the cards are played.
C3: It has to do with being over the 8!	C3 ***hypothesises*** at what the rule may be. Tries to ***systematise*** clues and ***shares*** her thinking.
S1: No *(in answer to a guess)* Yes *(to card being played)* No *(all smiling at each other and making eye contact)*	S1 makes a mistake, as C3's guess is in fact correct. She continues to watch cards being played and ***does not reinforce hypothesis,*** allowing game to continue.
S2: We're all guessing. It's wrong, but I don't know why.	S2 ***Focuses attention*** of other players. Based on information gathered, does not understand why previous guess is wrong.

Table 10: Episode 2: Decoding the Code

Episode 2:

In the second episode, the children are working independently in their small group, using tools such as a dictionary, discussion and Internet searches to research various phrases in the Code of Conduct. In order to come up with definitions in their own words, they have to explore phrases and words. The tutor is nearby and listening, assessing each child (Appendix 6: Assessment 1, p 19). The children are trying to come up with a definition for 'rule', and to brainstorm as many ideas as possible around the concept.

Episode 2: Decoding the Code	**Regulatory Action**
B: Shouldn't we look in a dictionary?	B ***suggests*** a solution to the problem of finding a definition
L is engaged in the group, but does not offer any comment. He participates and writes things down, and looks up in a dictionary etc., but does not speak.	Does ***not offer regulation***, but ***regulates self*** to do the work. Listens to the regulation of others, and is ***regulated*** by them (by copying their behaviour, e.g. making notes).
J: That's smart.	***Offers positive feedback***.
N: It guides us.	***Defines*** 'rule'.
J: Like the Code of Conduct.	***Makes a connection***, building systematicity through conscious reflection. Creates a ***token from a type***. Also creates ***synonym*** relationship between 'rules' and 'code of conduct'; ***generalises and abstracts***.
N: What do you call it? The Constitution.	***Makes another connection***, creating further ***refinements*** to the concept of 'rule'. Creates another ***synonym relationship*** between 'rule' and 'constitution'; ***adds generalisation and abstraction.***
S1: The rules at work.	***Makes a third connection***, tying 'rules' to the world of 'work', thus ***building depersonalisation, boundedness***, ***conscious reflection and systematicity***.
J: You can't murder something.	Offers a ***sign token*** rule as an example of rules in general, but ***fails to generalise or move into the abstract.***
B: *(Reading from dictionary)* 'Having authority or control over people'.	Offers dictionary definition to clarify, ***builds systematicity.***
C2: We're missing the point.	Regulates B, by ***reminding*** that they are meant to be putting the definition into their own words.
B: But it gives us an idea.	***Regulates by pointing out (arguing)*** that a starting point is useful and focuses attention and understanding
N: Rules keep you safe.	***Gives a reason*** for why we should have rules, while trying to define them. Gives meaning to the concept, building ***systematicity.***
C2: We're getting side-tracked.	***Regulates behaviour*** by calling their attention to the point.
J: But we can have lots of ideas.	***Argues in support of the digressions*** as a form of learning and as a means to completing the brainstorm activity.
N: The constitution has specific rules.	Understands the difference between the Constitution (type) and each of its rules (tokens), showing awareness of ***systems; making connections; conscious awareness; depersonalises; remains bounded.***
B: Write down 'specific rules'.	***Regulates activity,*** reminding each child to write down the ideas from the brainstorm.
J: If you play on the jungle gym, you should not be on for too long.	Offers another school rule (token); ***fails to depersonalise or abstract***; uses concrete.

In these two examples of collaborative work it is clearly evident that the children constantly shape their own experiences and those of others. Individual reflection of each child as well as that of peers augments a large proportion of regulation in DIY lessons. This is as important to

the learning as the mediation of the teacher/tutor is. Whether the children comment on behaviour (e.g. taking a turn in the game or focusing attention) or on the object of reflection (rules, in this instance), they support and reinforce the regulative mediation of the teacher.

The 'building in' of reflective activity in the form and content of what the children are learning seems to provide ample opportunity to clarify their own situation definitions. Not only do they reflect on their own learning, they often also reflect on the learning of others without realising it. This engenders awareness of the conventions of the concept, and how the parts come together as a whole. In addition, the children check and reflect on their own knowledge and skills. The act of checking their knowledge and confirming or clarifying it with others so that everyone understands, seems also to build their ability to think metacognitively.

It is unclear whether an activity such as the DIY card game would lay the foundation for habitual reflexive thinking, but children shown how to play the game learnt to reflect on rules and the Code of Conduct with a confidence not apparent in the control group (discussed later). By using RD rather than ID, the teacher appears to create circumstances in which the game creates conditions for learning the concept 'rules'.

5.4.3 Exploring Mediation of teacher/tutor through Instructional Discourse

When the teacher briefly uses the instructional discourse in the first lesson, she focuses on the task at hand (the game) rather than venturing into making the object of the lesson visible by saying; 'You are going to use your powers of deduction to work out the rules.' She does not expand on this with a comment such as, 'Rules are important to remember and help us to keep order.'

Her focus on the metacognitive habit of deducing information is a direct instruction, but does not explain the purpose of what the children are doing, and what it is to assist them to learn. The pedagogy thus remains invisible and implicit.

The teacher makes the game and the children's experiences of the game the 'text' for analysis. As she presents the next task, defining rules, she briefly becomes very explicit; without explaining it, she is expecting them to use their experience of playing a game, supposedly without rules, to inform their understanding of why rules are relevant and important. From that point she makes the leap to the rules in the Code of Conduct, which need decoding. The children are left to draw the conclusion that the definition of rules, and the reasons for their relevance, will become evident as the Code of Conduct is explored.

However, in the lesson where terms and phrases within the Code of Conduct are discussed and analysed for meaning (Appendix 9.2: Transcript 4 September 2012, p. 54), there is a stark and notable shift from the RD to the ID, especially when the teacher changes her role to tutor and engages with her small group to define words and phrases in the Code of Conduct that will be used in the creation of the board game. She tightens the boundaries of discussion and activity in the task. This shift in mediation from regulative mode to instructional mode focuses the children's attention on the actual words in the Code of Conduct.

This is the 'curriculum' to be learnt and understood. Its purpose is clear and precise: to build a common understanding of the meaning of words from the Code of Conduct by decoding them

and reframing them in the children's own language. The children are aware that they are meant to be appropriating and understanding the words. Phrases and words such as 'in this vein', 'philosopher', 'endeavour', are reframed so that everyone supposedly has a deeper understanding of the form and meaning they intend to impart.

Table 11: Example of coded transcript that reveals the Instructional Discourse[18]
(Refer to key in Table 6, p. 59)

Observation	**Evidence**	**Tracking of mediation**	**Conclusions**
17 August 2012: LESSON 1 (2 x 45 min =1 ½ hours)			
L: Does not answer. Another child answers and the teacher does not call on L again, or reprimand the other child for interrupting and answering.	Conduct…what does conduct mean?	Focus on the object of study by reiterating the word. Question **(B)**	ID
J: It means how we behave/act.	Very good. *Think of it*...**Code of Conduct…the way we behave…**	**(CR)** Interjection instruction statement **(S)**	RD Metacog instruction
C2: Well, umm, the behaviour of a person in a place or situation.	*(Pointing)* I like that….	Interjection **(B)**	RD positive affirmation, maintains BOUNDEDNESS
J: 'Cos the opposite is, you can be bullied or someone…if you angry or something. *(In the school there are three Codes of Behaviour: 1 = Playground behaviour; 2 = Quiet work with intent, but may involve talking; 3 = Complete silence and respectful, decorous behaviour.)*	*(Nodding)* *But let's also think…* **the way C2 explained it there, is that you are going to act differently in a different way in a different situation** *(children offering agreeing comments).* **We can have a fun assembly where you are allowed to sing and make a noise, and then we have a formal assembly where it is Code Three behaviour and you are expected to be in proper behaviour.** *No clapping and whistling…*okay… **so that is your conduct. The way you behave in the circumstance.** Okay…I like that…umm…**at the bottom there…let me wake you up.** What's the next word?	Instruction Statement x 2 Interjection Statement x 2 **(D)** Interjection Statement Question that implies command **(CR Token for type)** **(B)**	RD Metacognitive instruction involving thinking ID using token to clarify **(CR)** RD
S2 &A: Excellence.	**Excellence.** Haven't we had that?	Statement Question **(B)**	RD focuses attention on what is being said
Observation	**Evidence**	**Tracking of mediation**	**Conclusions**
J: The quality of being outstanding or being extremely good.	Okay, '**of being extremely good'. Your aim here, as a school, is to give that Crawford Excellence. You get that Crawford Excellence and you are**…mwah… the cherry on my cupcake'	Interjection 3 x statements Interjection Exclamation **(B)** **(S)**	RD that is the ID…the rules being discussed and used as examples are also reinforcing the

[18] For entire transcript of lesson refer to Appendix 9.5 Tracking teacher/tutor's Transmission and Mediation, p.76.

			RD and ethos of the school
C2: Mrs L, on my last report I got three 'Crawford excellents'. *(On the report those who get above 90% for a subject are given a star instead of the normal 1 – 4 level of achievement)*	How does that feel, to get that?	**(CR)** Question	Invokes reflection on achieving well.
C2: *(Other children looking at her and smiling)* Very good.	**It feels nice…**don't you feel proud of yourself? You feel so good? **You feel motivated.**	**(CR)** statement question x 2 statement	RD of institution Reinforced the RD
J: Now we doing _____ you feel like me….(laughing)	Ja (laughing) **but that's…okay, you know how you feel when you get that for Crawford Excellence.** (They agree.) **Imagine that we could get Crawford Excellence in our Code of Conduct…**	**(CR)** **(B)**	RD reinforcing institutional perspective
N: Proud J: Proud of yourself C1: A great achievement.	**Proud…**(pointing and affirming) **Proud of yourself. Proud of your school. Happy.** **And a great achievement…that would be amazing…if you guys can install (sic) pride in the Code of Conduct. They would do it because they want to, not because they have to.**	RD Focus on the object of study by reiterating the word **(B)** **(D)**	RD

In this lesson the tutor becomes the 'knower', and it is her say that clarifies the terms and phrases. Her voice is the last one heard as each phrase is discussed, and it is her reframing in each instance that eventually clarifies the agreed understanding. In this lesson the tutor talks far more than in other lessons, and it is most evident that she has a curricular agenda. She sometimes 'shuts down' what the children say, reframes a phrase in her own words and insists on her interpretation, checking that the children have understood.

Her framing becomes stronger and more evident, as does her classification of the content and its boundaries (Bernstein, 2000). Even though much of the content is related to the RD of the school, and thus works on two levels, the actual words and their meanings are the ID of this lesson. It is the teacher's intention that by the end of the lesson all children will be well versed in the terminology, have a clear understanding and be able to express the meanings in their own words. The teacher is in control from start to finish. At this point, the trajectory of the conversation is entirely reliant on her framing of the 'curriculum' of the Code of Conduct.

I have explored the teacher's mediation, which largely uses the RD and an invisible pedagogy, but where necessary employs the ID and a visible pedagogy. Now I want to understand the acquisition of the children as a means to track their developing concepts of rules in general and the Code of Conduct specifically.

5.5 Text Based Realities to track development of Reflexivity

Using Wertsch's theory of text based realities (Wertsch, 1991), I aim to track the development of self-regulation and reflexivity over time. This is one of the ways I developed to analyse metacognitive change throughout the module. Using the card game as an example, I have highlighted how each of the indicators suggested by Wertsch develops over time. To explore what the children have to learn, and what they learnt, I recruit the four indicators that Wertsch proposes.

Depersonalisation: It becomes evident early on that an individual child's personal moves will not provide enough information to solve the 'secret rules'. To become successful in decoding the game, one must be able to move away from focusing only on what happens when 'I' play, and reflect on what happens when others play too. This builds conscious awareness that a level of generalisation and abstraction is necessary. The teacher does not indicate the type and function of rules, the children have to construct these for themselves. Only by becoming aware of the commonalities and distinctions that occur between the 'plays', as opposed to seeing one's own 'plays' in isolation, is one able to build viable patterns.

Boundedness: Any game that is played has rules, but elements can be varied within the main structure of the game. This immediately introduces boundaries within which to function, and creates the text-based reality of 'the rules'. In this game, which supposedly has no rules and yet has several implicit rules (taking turns; having one person who is 'on'; sharing cards; playing cards in a clockwise direction etc.), logical connections have to be made simply by observing the patterns of cards created as each person takes their turn, and each 'yes' and 'no' is applied to them by the person who is 'on'. Understanding that the "objectively identifiable text-based reality" (Wertsch, 1991, p. 76) *is* the game, gives parameters or 'boundaries', within which to reflect. These 'boundaries' are available to everyone in the game and create a space for common reflection, where each child can learn from another's guesses and ideas, and build on them to arrive at a personal conclusion.

Conscious Reflection: Being asked to become aware of what one is thinking, is conscious reflection. In the game, all children are made aware that they are thinking *about* the rule under observation. They are asked to create distinctions each time a card is played. The person who is 'on' has to identify whether the 'play' fits the rule they invented. The other players have to gather information from each 'play' (the number and suit of each card) in order to be able to construct patterns that might apply to a rule. They have to refer to concrete sign tokens (i.e. each card played) and apply these to an abstract rule, which is an unidentified sign type. To solve the riddle, they also have to note distinctions that call for comparing and contrasting, and finding similarities and differences. This connecting of 'token-to-type' connections moves the children from the concrete to the abstract and back again, creating verticality. The super-ordering principle of the secret rule also allows the children to move from the general to the particular.

Systematicity: Each abovementioned indicator of reflection helps to build a systematic scheme of information: a web, that allows for connections to emerge. Each set of connections enables finer distinctions to be made, which eventually reveal the secret rule. Definitions that apply to

one card become relevant to others, and help to create a frame of reference – a system – for identifying the code. This has relevance in the context of the game and is also important throughout the Code of Conduct lesson, as it helps the children to see shades of meaning within rules, and eventually assists them to see both the constraints and the possibilities of rules.

I tracked these four markers to identify concepts that are developing semiotically, as the children show more sophisticated understanding. The more the text reflected their ability to depersonalise, remain bounded, consciously reflect and demonstrate systematicity, the more evidence there was of developing concepts, as will be seen when I explore individual children's concept development.

5.6 Analysing Learner Acquisition through Individual Development

In an attempt to understand the flipside of the education coin, that is the acquisition of the learner, I explored various ways of analysing the data for evidence of learning and concept development in individual children. I chose three children from the study, L, C2 and J, to create a diverse core group for observation. C2 is a learner who seems to flourish in the DIY programme and school generally, J is a learner who sometimes does well and sometimes struggles, yet seems to enjoy the freedoms of a DIY classroom, and L is compliant in all aspects of classroom behaviour (quiet, well behaved, appears engaged) but sometimes does not achieve at the level expected.

Using microgenetic explorations of key words and phrases from verbatim exchanges, I made an initial assessment of each child under analysis, referring to the stages of moral and concept development.

After looking at each child individually, I analysed the transcripts of the group as a whole, ending with the 'follow up' interview conducted a year after the children had finished the project. This provided insight as to the kind of learning that had been internalised. To moderate this evidence, I conducted an interview with children at a sister school and analysed the transcript using the same markers (Wertsch's indicators of reflexivity and metacognition).

5.6.1 Task demands - Wertsch & Thompson's Theories describing what/how children learn

As explained when I discussed the teacher's design of the module, her aim was to initiate children into the Code of Conduct by introducing them to the concept of rules and their purpose. These task demands had to be mediated by the teacher/tutor to create the ZPD that enabled the children to learn, thus developing the concepts in their own minds. To measure this development I recruited Wertsch's theory of text based realities (TBR), which explores symbolic forms, of which the card game and the Code of Conduct are examples.

Throughout the learning experience of the Code of Conduct, the teacher uses language to communicate, mediating the 'problem space…, which is created and maintained and operated on through semiotic (usually linguistic) means' (Wertsch, 1990, p. 74). She asks them to

reflect on what they have said (e.g. 'I like the way you are thinking. You're starting to look at patterns') or what they have heard others say ('How would you bend a rule?'), as well as asking them to reflect on the meaning of rules generally (e.g. 'So can we make them up as we go along?'), and rules encapsulated in the words and phrases of the Code of Conduct document ('Good…okay…the statement of intent is the reason we have the Code of Conduct in the school…why we have rules to follow and that is why it breaks down further'). She creates situations where they can begin to focus on the relationship between the concepts.

Wertsch suggests a way to see if the learning of a semiotic form has been developed. However, Wertsch's exploration of TBRs benefits from Thompson's (1990) theory of semiotic forms. Thompson's theory suggests that all symbolic forms have five aspects. I will use these five aspects to explore the extent to which learners develop an understanding of the Code of Conduct, and the way it functions as a symbolic form.

It should therefore should be possible to use these mediations, and the children's responses, to track their growing knowledge.

5.6.2 Tracking Individual Development

To explore what learning took place, and how effectively, I track the acquisition of three individual learners over time. I analyse the acts of acquisition (through changes in utterances over time) creating a layered analysis using Wertsch's Text based realities, and Thompson's semiotic forms. Recruiting Bloom's revised taxonomy , I then measure the levels of metacognitive practice. Finally, I use Kohlberg's Levels of Moral Reasoning. As the project called for a growth in the dispositions of ethical and moral reasoning, Kohlberg's theory is germane to ascertain whether there has been a change over time in the kinds of thinking, specifically metacognition and self reflexivity. In other words, do the children develop into better citizens, who understand, follow and model the rules?

5.6.2.1 Tracking 'L' and his acquisition during the Code of Conduct lesson[19]

L is very quiet as the cards are handed out in the first lesson. He is observant and seems to be watching others to understand what to do next. He follows the lead of playing a card, but expresses frustration at not putting down a correct card – 'Ah, no!' He does not ask for clarification or try to work out what the rule might be. In the next round he says, "I am scared!" indicating that he has still not worked out the rule that S1 has made up. He still does not ask for clarification, and seems not to have assimilated the clarifications of others. He is not looking for connections with other players' cards. After he has played the card, which is accepted, he expresses excitement that it was not rejected and immediately suggests a solution unrelated to his own correct 'play': 'The first four cards that you put down were different…'. He seems to be trying to decode the rule in isolation, more as an object of reference than an object of reflection. After a while he expresses excitement that he has 14 cards left. This has nothing to do with winning the game and is irrelevant. In the next round, when his card is rejected, he is frustrated yet still does not try to make connections between the cards. After a

[19] For entire tracking transcript of L's engagement in the lesson, refer to Appendix 9.6 L's Learning and Acquisition: p. 101.

few more rounds L excitedly announces, 'I won! My cards are finished already.' This seems to be evidence of a complex (Vygotsky, 1981) of card game rules. He has transferred random information and impressions from another card game to this one. His understanding from another game is that if you get rid of all your cards, you have won. When the game continues he quickly realises that he has not won, and tries to assist J by suggesting, 'You had to put a heart first…'. Again, this suggestion is not linked to any empirical evidence and is a guess. He also tries to work out the conventions of the game by asking, 'Must he pass to the left?' even though he has played every round in that direction. It appears that L is an outsider in terms of the commonly shared culture of card games assumed by the teacher: that all the children would understand the basic rules of card games.

From the first lesson it is evident that L has come in with a different situation definition (Vygotsky, 1981). Not only does he seem to have limited understanding of the concept of 'rules', but he also appears to be unversed in the intricacies of card games, *per se*. Although he takes part in the game with enthusiasm and was seen to be following the cues of others (observing how they played), it appears that his situation definition presupposes that the purpose of the game is to win by getting rid of all your cards. His understanding of games in general is that there should be a winner. This may have been exacerbated when the teacher asks, 'What is it (the rule)? Guess again ... you might win.' Although she refers to 'guessing the rule' being the means to win, rather than winning through playing all cards, it is implicit. Very soon after, L plays his last card and announces that he has won. When everyone else continues to play, he realises that he has not won. They do not tell him that he is wrong, but ignore him, neither condemning his move nor explaining why he has not won. He still does not ask for an explanation. He equates finishing his cards (presumably the rule from another game) with winning, and seems to have missed the real, although implicit, point of the game: guessing the 'secret rule' on which the cards are being evaluated as they are played. Neither has L been able to construct a system or pattern in the cards played, in order to hazard a guess at the rule. It is very likely that he never arrives at a shared situation definition in the game. He appears to have a syncretic (Vygotsky, 1981) understanding of the game and its rules, as he does not find something to focus on and develop, and opts for trying different solutions, none of which is linked systematically to the one before or after. In Wertsch's terms (1991) he is outside the "boundaries of the space" of this card game, and does not seem to understand the concept of 'card games' in general.

It appears that each time L plays a card he hopes it will be accepted, but when it is not, he does not interrogate why. He then shows irritation and confusion. From this we can draw the conclusion that not only does L <u>not</u> have a shared situation definition, he has not yet developed the reflexivity needed to change his own situation definition to shift his ZPD closer to the teacher and his group. His attention seems to be misplaced, as he is focused on winning the game (even though he does not know what is required to win it) rather than thinking about the game itself. It appears that he has developed pseudo concepts (Vygotsky, 1981), mimicking the actions of others, but making judgements based on empirical and spontaneous connections, e.g. 'I have 14 cards left', 'I won! My cards are finished already.' There is too great a gap between what he can do alone and what is being offered by the group. Therefore he does not establish a ZPD.

The same tactic seems to continue in the next lesson, where the children are tasked with developing understanding of the words in the Code of Conduct. They have to interrogate their understanding of certain words and phrases, such as 'in this vein', 'philosophy' and 'endeavour', so that they can put them into their own words, ready to discuss with the tutor in the following session. L does not significantly add to his own or the others' knowledge, and seems to get side tracked. For example, in response to the question: 'What is a rule?' he responds, 'Mrs L just said, "No bullying".'

He is grouping 'a rule' with 'rules', seemingly engaged with the semiotic activity of using what others know, rather than constructing knowledge through a process of experimenting and argumentation to solve problems. In this regard L appears no to have developed the conscious self-regulation needed to focus his own attention and thinking; on trying to discern what the point of the lesson is. Instead, he is intent on giving the teacher what he thinks she wants to hear. As a result, his engagement remains somewhat passive in nature.

In the discussion session with the tutor, L is very quiet and observant. He does what is expected of him – writing the discussion points in his book – but does not add to the discussion at all. Significantly, when he is asked directly to answer a question, he stutters a little and another child answers for him. The teacher fills in the blank, thus giving the illusion that L has participated, but allowing others to cover for any inadequacies of knowledge he may have. (Refer to extract of transcription below and Appendix 9.6, p. 101.)

Table 12: Extract from transcript to illustrate L's lack of participation:

CHILDREN	**TEACHER RESPONSE**
J: Govern.	**Govern…they enforce the rules of the country…so the Code of Conduct needs to govern and enforce…the…the…the rules in our school**…okay…um…*next word.* L, what's the next word?
L Does not answer, but looks in his book as though he is trying to find the answer. Another child answers, "Conduct" and the teacher does not call on L again, or reprimand him for interrupting and answering.	Conduct…what does conduct mean?
J: It means how we behave, or act.	Very good…*think of it*...**Code of Conduct…the way we behave…**

For the remainder of the lesson, which is very interactive for most of the other children in the group, L remains silent, but appears engaged and to show understanding.

When L was to be interviewed in his Grade 7 year as a follow up, he was unable to participate in the group interview as he was absent that day. Although the children knew the interview was to happen, it seems unlikely that he missed it on purpose as he consented without concern to being interviewed individually when he returned to school.

At the start of the follow-up interview, it appears that L has not significantly grown in understanding or concept development about rules or the Code of Conduct. He remembers why the lesson happened - 'Well, I remember that we had to think of a way to make it easier for the smaller children to understand the Code of Conduct, so that they could follow the rules.'- but does not appear to have appropriated the point for his own learning. He seems

unable to transfer his knowledge of rules to other areas of life where rules are used (the law, rules of the road, etc.), other than to use them as tokens to explain his point:
Even with having rules, you can still have fun. Like…for instance…for an example, if we were playing a board game without any rules and children might think that it is fun and then when you add rules to it they will think that it is boring, but it is not…'cos you can make it a way in order to have fun again.

Throughout the conversation he names tokens to explain the type that he is trying to describe (Wertsch, 1985). He is stuck in the concrete representations of the knowledge, naming things that they did, or explaining them through examples, 'Um…we had to take cards and then on each card we had to write down a rule from the Code of Conduct', 'That after she had showed us an example of the game, she said that every game has to have a rule' and 'So that people don't get angry and start fighting and…yes.'. His levels of abstraction are limited. He can name the concept of rules but resists moving away from examples into an abstract description. He does not consider any attributes of rules outside those that are obvious and visible (Vygotsky, 1981).

Using Thompson's (1990) theory of symbolic forms to describe L's engagement with the invisible curriculum reveals significant differences in terms of the intended curriculum and that experienced by other children. He appears to struggle with the symbolic form (e.g. the card game) because it is not explicit. I have attempted to illustrate how L's understanding of the symbolic form of the Code of Conduct and all that the DIY 'curriculum' entailed – rules, games, words and phrases, appropriating and internalising the Code of Conduct to use as a counsellor etc. - may have been impeded for one or more reasons.

It seems that L has not yet developed what Marzano et al. (1988) characterise as 'executive control', or the ability to evaluate his current state of knowledge. Although he demonstrates 'declarative knowledge' on a number of occasions, where he is able to talk about the facts of the situation, he is unable to use these to develop his own responses and to modify and moderate what he is doing to solve the problem. For example in response to the question: 'Do you think that having a better understanding of the Code of Conduct lesson that you did in Grade 6… did it help you in any way to become a Counsellor in Grade 7?' L answers, 'I haven't really thought about it, but I am sure it is a yes because, otherwise, I wouldn't be knowing what to do and what not to do. I would be confused with the rules of the school.'

Connected to this, it appears that his use of 'conditional knowledge' (being able to describe *why* a strategy works) is also limited. L seems to be the kind of learner who gets through school to some degree by being a chameleon, shaping his answers to what he thinks the teacher of that subject wants to hear. A subject such as DIY flummoxes him in some ways, as it is asking him to engage in a way that 'normal school' does not.

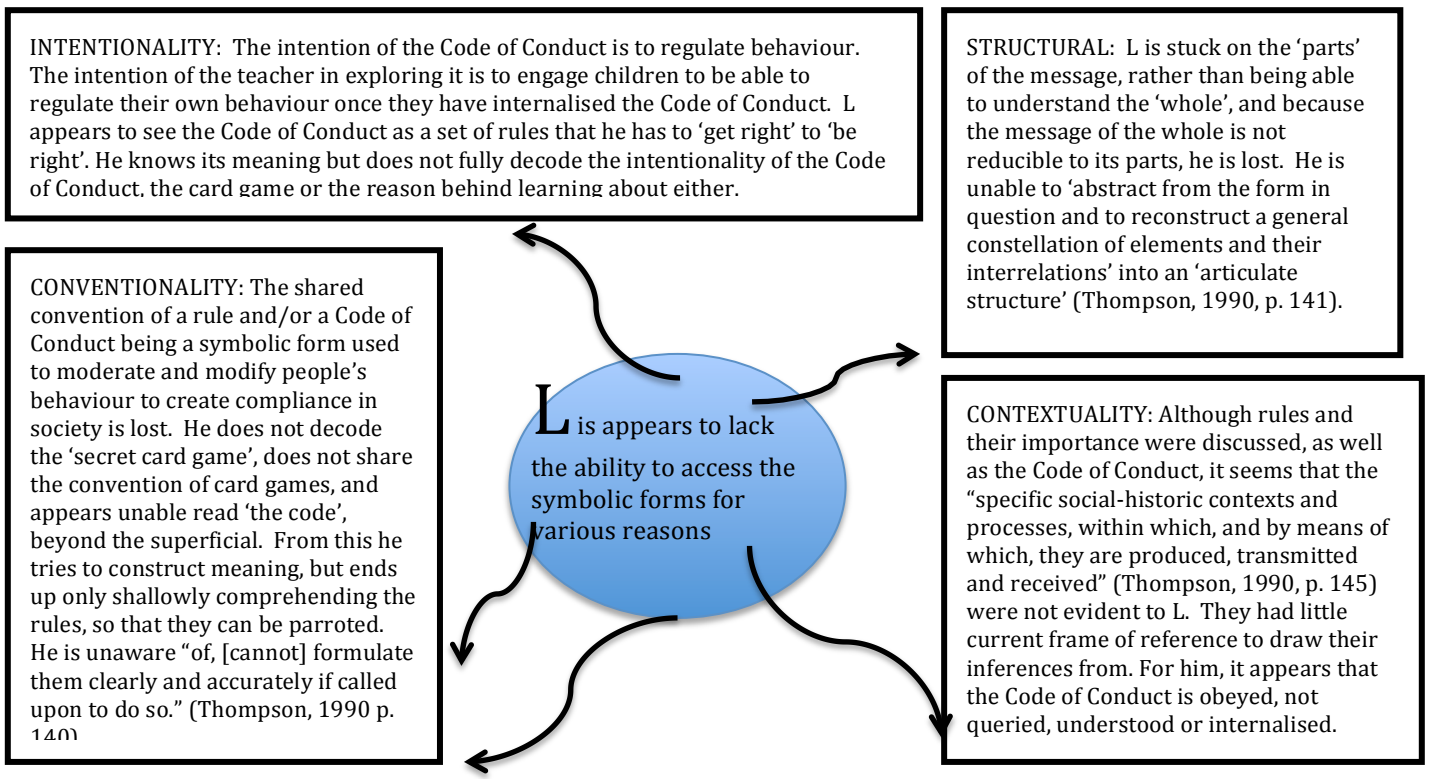
L's level of abstraction and ability to apply generalisation appears limited. He struggles to meet some of the markers that Wertsch (1991) suggests. He is unable to depersonalise his thinking, to move away from his own personal experiences or away from the current focus of the lesson. Although he is able to apply boundedness to some degree, at least linking his thinking to the object of focus (i.e. giving examples of rules, even though they do not explain what a rule is), his ability to consciously reflect appears limited. He uses sign tokens to identify examples of rules, e.g. "For an example…when you're driving…there are rules that you have

to…as a **guideline**…that you have to use as a guideline, like for an example, when you go to turn without your…without the…yes, indicator…so that the person will know that you are now turning or not turning…the person behind you." It seems as though he can only explain rules as a point of safety and does not expand thinking to encompass living in a society, where there is shared understanding and symbolic codes in the rules of the road, the law etc. So, even though he can transfer his knowledge of rules to another context (road rules) he is not able to engage with the Code of Conduct as a symbolic form that mediates and regulates society. He remains stuck in the specifics and constraints of laws, rather than recognising the possibilities.

L appears unable to move into the abstracted, decontextualised realm of rules and codes. He does not seem to have the ability in this context to mediate his own thinking and develop a system of interdependent ideas that constitute a systematic approach to the concepts of 'rules' and 'codes'. The form and content of the Code of Conduct is only explored using limited synonyms (i.e. 'guidelines' for 'rules') and has not achieved the 'systematic interconnectedness' (Wertsch, 1991, p. 80) necessary to develop metacognitive activity and reflexivity. L appears to give credence to Flavell's comment that 'children are quite limited in their knowledge and cognition about cognitive phenomena, or in their metacognition, and do relatively little monitoring of their own memory, comprehension and other cognitive enterprises' (Flavell, 1979, p. 906).

Figure 5: L's development according to Thompson's Symbolic Forms

NOTE: The arrows indicate direct connection (full access), partial connection with pointing towards a box but not connecting (partial access) and a lack of access not pointing towards the boxes (complete lack of access).



5.6.2.2 Tracking 'C2' and her acquisition during the Code of Conduct lesson

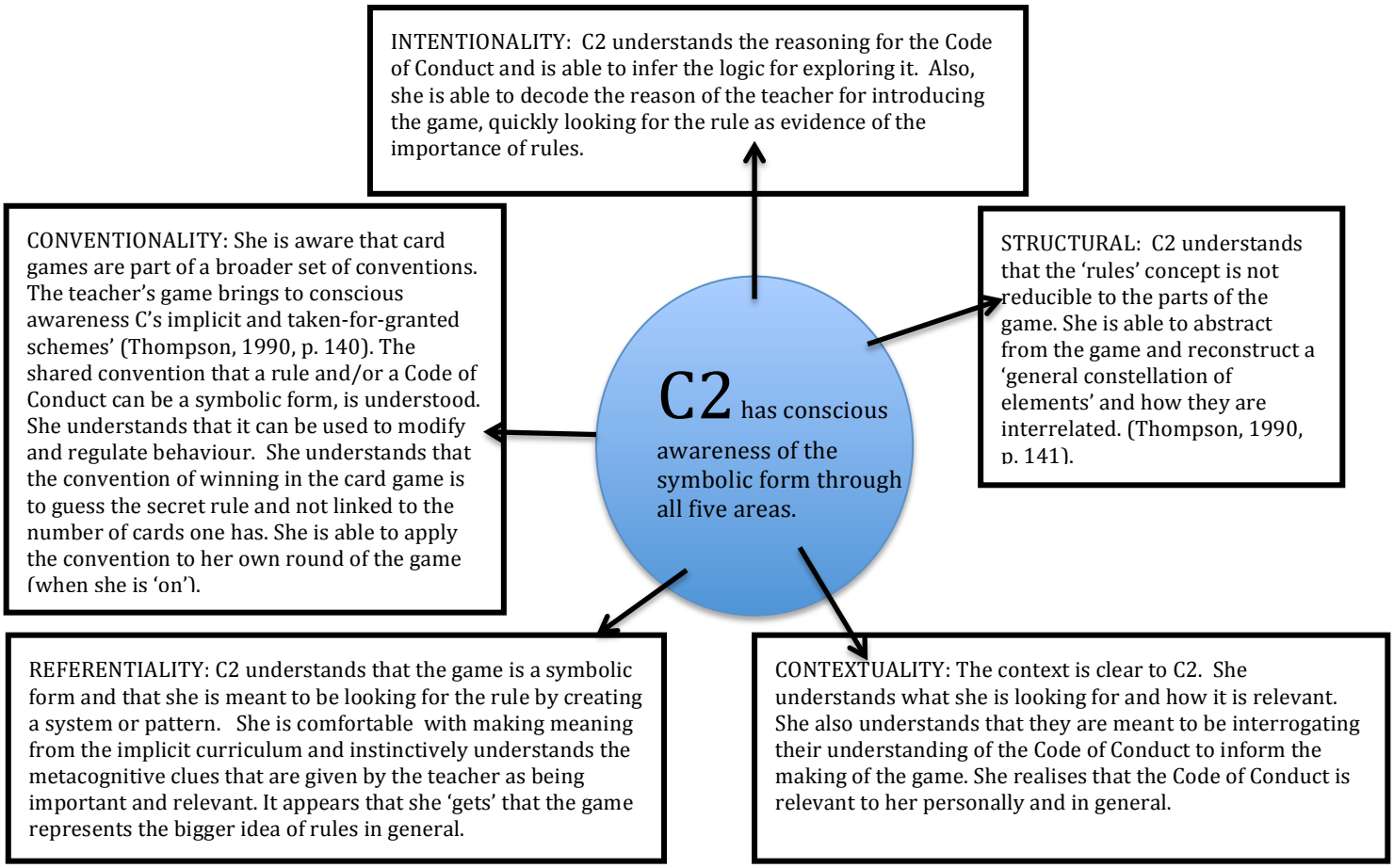
From the beginning of the card game process, it is evident that C2 is comfortable with the concept of the card game, as well as its purpose: to explore the need for rules. Her situation definition is in line with the teacher's and she plays easily, dealing the cards for the first round of the game. She is focused on trying to decode the rule that S1 has set. She understands the abstraction of 'rule' in trying to find 'the rule'. The first time she speaks in the game she asks, 'Could it be that every second card, you say, "No."?' Next she comments, 'I think the joker has something to do with it.'

It is evident that C2 is thinking about 'the rule', as well as 'rules' in general. She regulates her playing when she comments, 'I have to pick one up', comfortably continuing play. When she suggests, 'It has to do with being over eight!', even though this is incorrect it shows an attempt to identify a pattern. Not only is she aware of how the rule is being applied to her own 'plays', she is observing other people's cards too, and trying to systematically build a pattern. She has easily made the rule the object of reflection and is thinking about how the rule might govern the game, so that she can identify it. She does not express frustration at the game and appears to be intent on creating good interpersonal relationships, indicating that she has reached at least some of the milestones for conventional morality (Kohlberg, 1963).

In the second lesson, where the small groups had to decode the language of the Code of Conduct, C2 (together with B) comfortably takes control of the group. They both understand the intention and purpose of writing the phases in their own words, and constantly regulate other children's behaviour and thinking. C2 is organised and takes charge saying, 'Guys, I've got all the questions', 'Maybe we should all offer and see who is …' and 'I'll do it', in response to choosing a 'gatekeeper', whose task it is to keep the group on topic. In this capacity she regulates the group by saying, 'We're missing the point', and, when the team is supposed to brainstorm rules, 'We're getting side-tracked'. When the group only has a few options she reminds them that, 'There are only two or three.' She also instructs the group to 'get examples of where rules are used every day.' She demonstrates an understanding of the need to build interconnectedness and systematicity. (See Appendix 9.2, p. 54)

When asked to define 'rule' she easily offers, 'A rule is a **boundary**. It is a **guideline** to guide you in the right direction and to stop fighting and disagreement.' She uses conscious reflection by applying two synonyms, thus showing that she is engaging with the concept of 'rules' as an object of reflection. In addition, she is able to depersonalise and remain bounded (Wertsch, 1991), keeping people within the conversation as well as asking for others to look for examples that move them away from their own experience. Her ability to reflect and regulate her thinking implies that she has developed the skills necessary to be considered a reflexive learner. Using Thompson's symbolic form theory (1991), I have illustrated C2's understanding of the symbolic form of the Code of Conduct, which is in stark contrast to L's illustration.

Figure 6: C2's development according to Thompson's Symbolic Forms



In terms of Marzano et al.'s framework (1988), C2 is able to apply her knowledge to work procedurally and conditionally. She is able to complete the tasks with sureness, knowing how she should be achieving them. She understands the limitations within which they should work and applies these to stay on task. C2's knowledge also often has a declarative aspect to it. She is able to say what she thinks and states it with confidence. She knows what is expected and is focused on achieving it, thus demonstrating executive control.

From her shared situation definition and ZPD to her ability to decode the semiotic form, C2 is comfortably able to perform, both within the group and independently. Each step of the way, C2 seems to develop the necessary ability and concepts to move forward with the teacher as the incremental shifts in situation definition happen. She is equally comfortable working on her own or in a group, interacting, listening and leading in turn.

According to Zuckerman's analysis of metacognition it appears that C2 is well on the way to developing the abilities to:

> (a) consider the goals, motives, methods and means of one's own and other people's action and thoughts; (b) take other people's point of view; view things from perspectives other than one's own; and (c) to understand oneself; study one's own strong points and limitations in order to find the ways to excel or to accept one's shortcomings (Zuckerman, 2004, p. 10).

C2s interaction in the follow-up group interview is interesting too, as it seems to demonstrate an advanced level of metacognitive awareness. However, I will discuss this later (refer to Analysis of 'follow up' interview with DIY Group) as I will be using it to compare the DIY group, as an entity with the interview with the comparison group.

5.6.2.3 Tracking 'J' and his acquisition during the Code of Conduct lesson

The third child chosen for detailed analysis is J. In the first lesson of the card game he enters the game with an apparently shared situation definition. He understands the conventions and checks immediately to see that he has enough cards. He has understood that everyone needs the same number of cards to begin, applying a rule from another game successfully. Quite quickly he proffers the suggested rule, 'No odd numbers?', indicating that he is thinking about the rule that S1 has made up. He understands that he is trying to decode the clues that she is giving. Although his suggestion is incorrect, he has already begun to look for connections with S1's answers to each card played, thus demonstrating that he made rules an object of reflection. He is vocal with ideas to solve the problem, but expresses frustration at not being able to get it right, 'I don't know what this rule is either. This is frustrating.' Still, he is able to engage with the concept of rules within a game.

At one point in the game he takes too long to play a card, not knowing which one to choose. The teacher says that he has to pick one and he replies, 'I am choosing one', appearing to try to refer to the rule that he thinks S1 may have made up, rather than using the clues around the table to guide him. He puts down a correct card, but does not interrogate it further. Later on he shouts out, 'It's so unfair and frustrating!' which indicates that, at times, he is still at the 'individualism and exchange' level of Kohlberg's Moral Development theory (1963). He feels the game is 'unfair' and appears to be getting nothing out of it at this stage. However, there are indications that he is moving into Stage 3, where good interpersonal relationships are seen to be important. He encourages others and gives positive feedback (e.g. telling S1; 'You chose a good rule!', 'That's the way.', 'Divide them evenly.', 'Yoh, that was a good one!' and 'I am just joking.'). This seems to indicate that he is in transition between two phases.

In terms of metacognitive development, J seems to move up and down the metacognition ladder. Sometimes he is insightful and seems to grasp the systematicity of the concept of 'rules' and 'codes'. In the big group discussion that takes place after the card game, J's earnestness is evident in the discussion about lying. The group has opened discussion around the rule of not telling lies, but has refined the argument to explore the concept of 'white lies'. J comments that it may be cruel not to tell the truth in some situations, as this may open a person to ridicule (he uses the example of himself walking around with his fly zip undone). This indicates that he is aware of the distinction between things – 'lies' and 'white lies' – but refines it even further to create an argument against white lies.

However, at other times he reverts to the personal and seems stuck in tokenism (Wertsch, 1991), giving examples not always directly related to the conversation. While he generally remains well bounded, seeming to stay within the confines of the discussion, he seems to struggle to move into full abstraction and generalisation. For example, he offers the answer, 'So there's no fighting or cheating involved', in response to the question, 'What is a rule?'

Immediately thereafter, he follows it with an example of conscious reflection. One of the other children offers the definition of a rule as being 'It guides us' to which J replies, 'Just like the Code of Conduct'. While it is still a token of the type, it is also a more abstract version of a rule, as well as being a form of rules and, in this discussion, is synonymous with rules.

Confusingly, in the next exchange he immediately reverts back to tokenism:

J: Just like the Code of Conduct.
N: What do you call it? The Constitution.
S: The rules at work.
J: You can't murder something.

To illustrate what rules are, J offers an example of a rule, 'do not murder', even though it does not directly relate to the current discussion. His inconsistency in approach again points to him being between two stages of concept development, oscillating between the complex and the formation of potential concepts (Vygotsky, 1981). He slips from one feature to the next without any hierarchy, and then moves into a more generalised and abstract way of thinking that unifies ideas. This indicates that a ZPD is operating for him, in which he is moving between already established knowledge and more complex knowledge being mediated by the group.

At times he has the reflexive awareness that he is 'not getting it' (e.g. 'I can't even notice a pattern. It's just a jumble!'). He knows he does not know, but still seems to struggle to find strategies that will enable him to define his situation definition to close his ZPD.

Another example of J's inconsistency emerges in the following exchange:

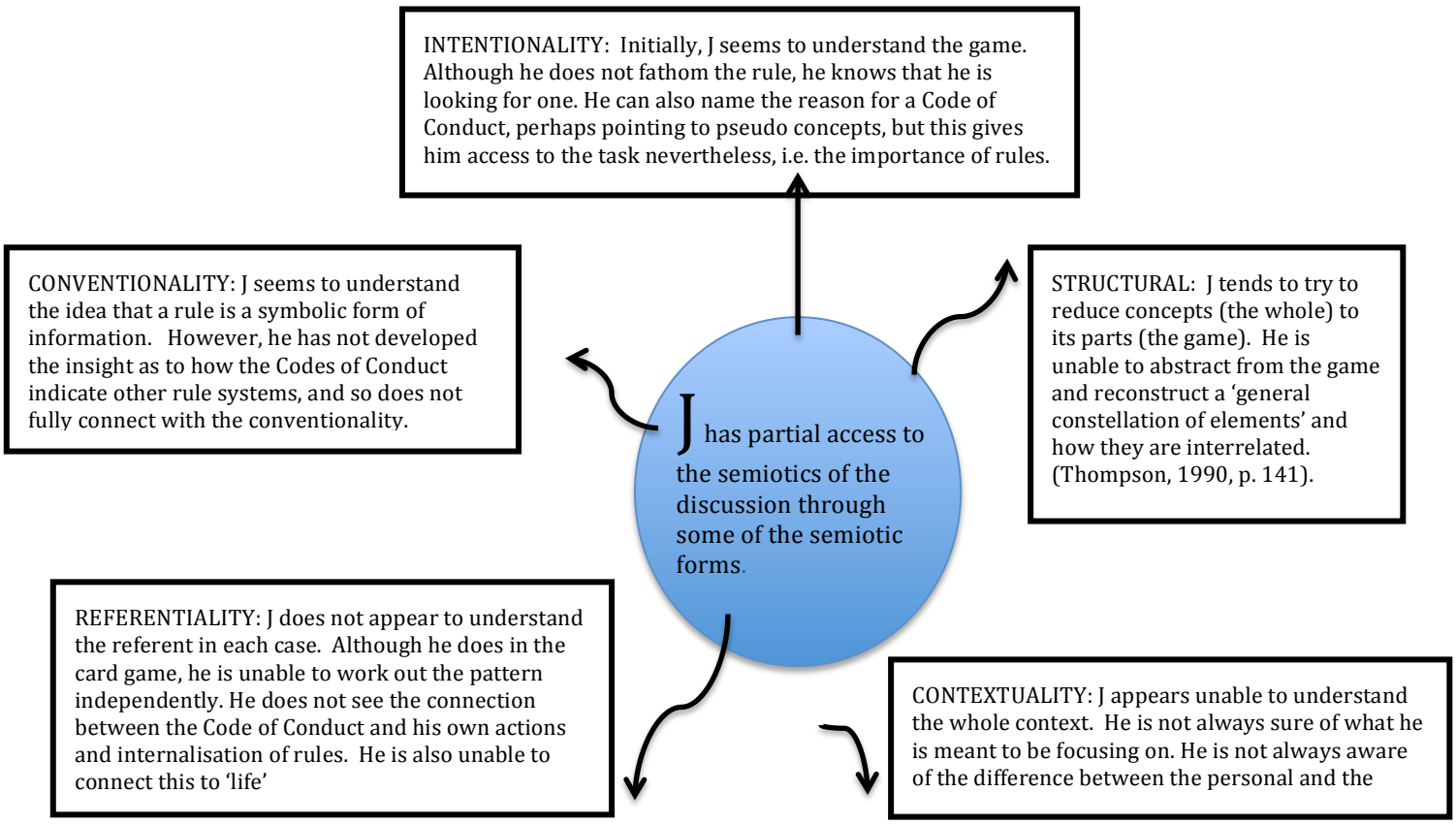
Table 13: Episode 3: Decoding the Code

Episode 2: Decoding the Code	**Regulatory Action**
N: Rules are needed to protect us.	N offers a definition of rules.
L: What did she say? .	Asks for clarification, showing engagement without moving conversation or understanding forward.
B: She's just trying to find a way of saying it.	Offers explanation without repeating what was said.
J: You're not supposed to cheat anyway.	Offers an example (sign token) of a rule. This does not seem logically linked to what has gone before, but is still BOUNDED in the conversation about rules.
N: No cheating at school!	Reworks J's suggestion into a rule.
B: But you can't cheat anyway.	Argues that it is not a valid rule, as cheating is not allowed. (Does not realise that this is proof of the rule existing.)
N: So what? It can still be a rule.	***Confirms the token as an example of the type***, thus ***boundedness***, ***conscious reflection and systematicity***.
S1: They make life fair at school, 'cos if they say that you don't cheat in exams, you shouldn't in ordinary tests too.	Comments on rules being linked to 'fairness' as a concept. Building ***systematicity.*** Moves into ***sign token*** rule as an example of rules in general, but ***fails to generalise or move into the abstract.***
J: To make yourself smart.	Seems to be personalised, unbounded and without systematicity or conscious reflection.

Teacher: Don't try to overthink it.	Regulates J, by ***focusing attention***
N: So… "don't cheat"	Regulates by reiterating that her rule is valid.
B: Why do you think rules are needed?	Asks a question that engages J and brings the conversation back into the boundaries.
J: I don't know.	Is unable to engage with an answer. Still appears to be lacking reflexivity and metacognitive awareness

Thompson's theory of semiotic mediation proves enlightening as a means to understand J's inconsistencies. He (J) seems to access the intentionality, but has limited or no access to the other four indicators.

Figure 7: J's development according to Thompson's Symbolic Forms



J's development of metacognition seems to be inconsistent. In each of the four types (executive, declarative, conditional and procedural knowledge) he demonstrates gaps. Although he is sometimes able to evaluate his current state of knowledge (executive), he is not always aware of the facts in a situation (declarative). In addition, he seems to have inconsistent conditional knowledge, not always being able to explain why a strategy works or not. His procedural knowledge, which links to the actions performed, is equally unreliable.

The inconsistency noted in J's development of concepts will be revisited in the group follow up interview, where he demonstrates some interesting progress.

5.6.3 Analysis of 'Follow-Up Interview' with DIY Group

Arguably the most interesting part of the data for this study is found in the follow up interview with the DIY group children in their Grade 7 year (Refer to Appendix 9.7, p. 108).[20] At the beginning of the interview the children remember the tasks that were part of the Code of Conduct lesson and remind themselves of the specifics. Looking at the form and meaning as well as the content, it quickly becomes apparent that they are using reasoning, rationality and moral judgement that is functionally different from the comparison group children.

Initially the children remind themselves of what the project was about, focusing on the reason for rules (e.g. C2: You have to obey them.). As will be seen, this mirrors what the comparison group said and even the references to school uniform rules appear similar, as a sign token and example of rules being applied. However, fairly early on C2 introduces the concept of understanding the rules with 'absolute understanding', pointing to an awareness of why the project was run, as well as an awareness of the content of what they learnt. C3 quickly agrees, saying, "And it made us all more aware of the rules." They are conscious that they were being asked to reflect on rules and the Code of Conduct. They habitually use words like 'understanding', 'knowing' and 'learning', pointing to an added awareness of their metacognitive state – a thinking about their thinking, and knowing about their knowing.

The transcript of the interview reveals a level of abstraction and generalisation that appears to meet Kohlberg's (1991) stages of moral reasoning at a higher level than would normally be expected from 12-13 year olds. Repeatedly, the references to systems and patterns (e.g. where parents pass on what they know to children and where children become independent thinkers; where consequences impact on future life) point to Level 2: Conventional Morality, Stage 4 "Maintaining Social Order". According to the theory, this emerges between the ages of 10 and 14. By the end of the interview the DIY children repeatedly make reference to thinking that could be characterised as Level 3: Postconventional Morality. They seem to understand the distinctions between society and the individual's rights, as well as the universal principles of fairness, responsibility, personal agency, and leadership. Considering that these skills are generally only identified towards adulthood (14 and older), and taking into consideration that they sometimes appear not to develop at all in adults who function adequately at Level 2, more investigation is needed.

Reviewing the transcript reveals interesting patterns of complex reasoning that incorporate all four of Wertsch's (1988) markers of metacognition and reflexivity. Not only are they aware of the constraints of rules in general, and the Code of Conduct in particular, they appear to be able to consider the possibilities of what rules offer. Their thinking incorporates refinements and distinctions very different from those in the comparison group. Consider the following extract:

[20] Note that the three children (C2; L and J), whose development is examined more closely, formed part of a group of 10 children (Sample 1A). When they created board games and engaged in small group discussion, their DIY tutorship group was broken into two groups of five (for which Sample 1B was constituted). When the follow up interview was conducted some of the other children participated as well. (Sample 1C)

Table 14: Follow-up Interview with DIY group

Follow Up interview	Exploration of Metacognition
C1: If you follow the rules you get now, when you're an adult and have children, you will also get those rules from your parents.	**If/then** **Boundedness (B)** **Conscious Reflection (CR Conscious** **Systematicity (S) interconnectedness** Shifting between the present and future, indicating an understanding of the 'here and now' and its impact on the 'there and 'then'. This points to a level of reasoning and deduction that the children did not display previously, as well as an understanding of the conditions of possibility that rules provide. The introduction of 'if/then' reasoning implies an ability to look at both sides of a situation, exploring strengths and weaknesses and to build a web of interconnected refinements. Shifts between types and token (some examples, but more at the level of the general and more depersonalised).
Researcher: That is interesting.	
C2: Ja. Also, some of the rules go against what your parents teach you…like not against, but they clash. 'Cos my parents always taught me to stand up for myself. So, if someone is going to hit me, I am going to hit them back. That's what my parents taught me, because self-defence is like a big thing…but in school, if you…if someone hits you and you hit them back, there is going to be punishment.	**Systematicity (S) refinement/distinctions between things/ recognition that the system is open to personal interpretation If/then** **Depersonalisation (D)** **Boundedness (B) – logical connections** An awareness of the pros and cons of rules and that they are sometimes ambiguous. 'If/then' refinements to argument. Understanding that things are not all or nothing; good or bad; black or white. A move away from categorical thinking. This implies a textured, differentiated way of thinking about rules. Understanding of how rules can constrain and enable.
N: Ja…we all growing up and we are not going to have the Code of Conduct thing with us again…we can sometimes make our own rules and follow other rules… that we will…you know in the future…and you will make your own rules in the future… and you will make your own rules for your children as well and…	Past, present, future thinking. **Possibility of future. And rules in general/abstract.** The idea of making your own rules suggests an awareness of the development of a personal moral sense.
Researcher: Very good point…that there comes a point when you need to do it too [make rules]. That's a good point, N.	
J: And also we are going to high school next year and you also have to make a choice and then are you going to go to the good side or you're going to go to the bad side? And…	Shifts between types and token (some examples but more at the level of the general and more depersonalized) **Understanding of own freedoms and responsibilities.** **Boundedness (B)**
C1: It's hard.	
J: And what choice are you going to make, or that? And…depends how far…	**Personal versus general**
Researcher: And what do you think helps to make them, J? How do you…	
J: Maybe it's personal or some personal reasons. And also, if you make a bad choice it is going to affect your future…like if you want to be a lawyer, you are not going to be a lawyer or it will affect your grades and then you are going to drop down and you're not going to make it to law school.	Reflections on the conditions of possibility **If/then** **Conscious Reflection (CR) sign token** **If/then** **Consequences**
N: It also depends who you are going to hang around with…so people…	Dependent on… **Systematicity (S) building connections**
B: Like peer pressure…	

As can be seen at a glance, the richness of evidence that points towards metacognitive awareness and reflexivity is remarkable. The DIY children progressively distantiate as the interview progresses, revealing more generalised and abstracted thinking, which points to metacognitive reasoning and reflexivity. They appear to have 'real concepts' (Vygotsky, 1987) that point to a re-synthesis of the signs of the Code of Conduct, which they demonstrate through a series of abstractions and generalisations.

The children freely reference the abstract concepts of 'responsibility', 'rights', 'freedom' and 'leadership' for example, and anchor them to the concrete. They are able to give examples that are generalised where relevant and personal where necessary, and they appear to be able to understand the demands of living in a society. They are also thinking about and reflecting on the concepts as opposed to the objects. This indicates that they have developed true concepts.

They have systematised their thinking to create hierarchies of meaning, with refinements and interconnected ideas. They understand that, within the system, there are ideas that depend on each other. It is evident that the individual concept of rules and 'code of conduct' can only exist within the interconnected web of ideas that creates a system. The children recognise the concept and can use it to illustrate their understanding.

5.6.4 Focus on J, C2 and L in their Grade 7 year

C2, J and L were at very different stages of metacognitive reflexivity at the end of the Grade 6 *DIY* project, as demonstrated in the analysis earlier. C2 had developed the requisite skills, J was considered to be unsystematic, but with moments of thoughtful reflexivity and L appeared to lack metacognitive skills.

When exploring J's engagement on a metacognitive level at the end of the project, it appeared that he struggled to be systematic in his approach. I described his efforts as 'moving up and the down' the metacognition ladder, but at the stage when the follow-up interview wass done, he appears to have a far more systematic way of thinking. He regularly uses 'if/then' thinking, demonstrating that he is habitually refining arguments and creating distinctions, which indicates systematicity. He also seems to engage conscious reflexivity by referencing sign tokens that are more generalised and depersonalised (e.g. being aware that choices made today affect your chances of being a lawyer tomorrow). He moves easily between the 'here and now' and the 'there and then' (Wertsch, 1991).

J appears to have developed a far more refined and generalised form of thinking than he was displaying Code of Conduct lessons.

At the beginning of the interview, C2 references sign tokens of the uniform to describe rules (type). However, she fairly quickly reveals that she is aware that learning about the Code of Conduct 'gets into the minds of children', changing the way they see things. She demonstrates 'if/then' thinking with an understanding of the possibilities of what rules offer in one's future life. She uses metaphorical language to reference depersonalised examples (comparing teaching children to be independent to 'giving a horse rein'.) She links concepts such as the Code of Conduct to others, such as 'discipline' and 'reputation'. She also acknowledges N's

comment that that there should not be too many or too few rules, as both would have consequences – rebellion or anarchy. She explains the ambiguity that occurs when different people enact rules differently, drawing a distinction between rules that her parent has taught her, and how they may clash with the school rules. All of these pointers indicate that C2 is well on the way to being at a Stage 5 level of Kohlberg's (1988) levels of moral development.

Because L was absent when the follow up interview with the DIY group was conducted, he was interviewed alone. He appears to lag behind the others in terms of metacognitivity and remains bound by unsystematic sign tokens. It is interesting to hypothesise about how much of the final part of the process of concept development happened for the other children during the final follow up interview. It appears that one of L's strategies for engaging in school is, 'give the teacher what she wants'. He seems to be a past master at regurgitating what he thinks is required, without thought or personal engagement. In one of his last utterances he appears to be trying to give the 'right answer' to the question:

> Researcher: Okay. And if you look back on that learning opportunity or chance about the Code of Conduct, could you evaluate the lesson for me? This was good. This was not great. This was worthwhile. This is what we learnt. Could you try and chat me through that whole process?
>
> L: I think it was good because most of us learnt what to do and what not to do in the school with the Code of Conduct. How to follow it and how not to follow it….like, for an example if you were to… you were not allowed to wear…girls for an example are not allowed to wear short, short skirts…we have to come in full school uniform every day…and… not …and not vandalise the school in any way…and not use any vulgar language.

His answer is unsystematic and seems to hop from one aspect of the school rules to another. One wonders how functionally different his thinking would have been in the group context. It is interesting to hypothesise about whether L would have benefitted from being involved in this discussion. Both J and C2 seem to develop their thinking through interacting in the group. There is a remarkable shift that happens quite quickly from the token-rich form of reflection mired in personal examples to depersonalised, bounded, conscious reflection and rich interconnected systematicity.

The regulation afforded by the teacher/tutor and the group collaborative scenario seems to mirror Vygotsky's suggestion that humans develop control over time, by learning to regulate their conduct and developing volitional actions, which are often mediated through the regulated language of others. It is evident that the students learnt the concept of 'rules' and the conscious self-regulation to control their own activity and to regulate that of others. The generation of new forms of knowing and being has been tracked by exploring the shifting ZPD between the transmission of the teacher and the acquisition of the children as they take control of their learning.

The affordance of the small-group/tutor arrangements for learning appears to support Davydov et al.'s claim that, "[w]hen cooperative learning is organised in small groups, the children learn independently to organise the debate – that is, to hold onto the sought after whole, part of which is grasped by each participant in the joint work, but which does not 'belong' to any of them personally" (Davydov, Slobodchikov & Tsukerman, 2003, p. 67). There is development of the skills that involve 'watching' oneself thinking, and surveying the kind of thinking that one is using, e.g. 'Do I need to plan?', 'Am I generating ideas?', 'Should I link ideas together by putting them in a logical, progressive order?'. This 'watching' of one's thinking, described as 'reflection' (El'konin, 1972; Davydov, 1999), has apparently been developed through the DIY process.

When trying to observe change in a group, especially when it is incremental, it is not always possible to notice the significance of observations without having a basis for comparison. For this purpose I approached our sister school to constitute a similar group (grade, academic ability, both genders, multi-racial, multi-ethnic). They form a 'matched population' to the DIY group in every way, except they have not been exposed to the DIY methodology.

5.6.5 Analysis of Interview with Comparison Group

I interviewed the children for about 40 minutes and, once transcribed, I analysed their utterances and coded them for the same markers used for the DIY group's follow-up interview: Depersonalisation, Boundedness, Critical Reflection (including tokens and types, and forms and meanings) and Systematicity. I also explored whether the kinds of sentence structure revealed additional clues as to the children's understanding and levels of metacognitive reasoning.

At the beginning of the interview session (Refer to Appendix 9.8, p. 127), the children listened carefully to my outline of the research and why I needed their help. From the outset K, Q and D were vocal about their understanding of rules and their significance in the Code of Conduct and freely shared their points of view. They characterise rules as being constraints to the freedom of the learner, with comments such as:

> K: When I think of it, I kind of come up with demerits and warnings.
>
> Q: I hear "Rules and Regulations"…things you can't do…certain things…like guidance.
>
> D: Like boundaries…
>
> M: Keeping children in check.

Initially it seems as if they think about the Code of Conduct very categorically, as something forced on them over which they have no control or say. The have been introduced to it every year from Grade 4 – 7 with a lesson at the beginning of the year, and it is in their diaries. Their experience of it is somewhat personalised, and they seem to feel limited in their ability to effect change within the system. They are aware of the Code of Conduct's constraints and purpose in controlling them.

In terms of Kohlberg's theory of Moral Reasoning, they appear to be at the Preconventional Morality level, oscillating between 'Stage 1: Obedience and Punishment Orientation' (where the child is focused on what is and is not allowed by those in authority. Morality is something that does not reside within the child, but is something that others tell you to adhere to) and 'Stage 2: Individualism and Exchange' (where avoiding punishment becomes the primary motive for behaving according to the rules. They do not see themselves as part of society, but as individuals in isolation).

Their primary orientation throughout the interview seems to point to the regulative, and they appear not to have developed the necessary understanding that would place them at 'Stage 3: Good Interpersonal relationships'. They have not yet developed the belief that people should behave 'nicely', erring on the side of 'goodness' or 'rightness', and in fact tend to believe that others are intent on breaking the rules, which they have no authority to uphold. They mention peers who would laugh at them and adults who do not take into consideration their point of view. In many ways they appear to feel as though they are victims of the rules, rather than agents of them, even though they have been given the same role of counsellor as the children in the DIY group. They do not appear to question authority (except to imply that it is draconian and unreasonable).

An example of this is when K describes a perceived bias in punishment towards the boys.

> K: I think it's quite biased in a sense, because if you try to defend the girls, because it is the right thing to do…but like…for example if something happened on the field, there is no actual physical proof that that happened, but maybe the girl is just being spiteful and tells the teacher that a boy did something but they really didn't, the boy does not have a say in it, so they'll just get in trouble anyways…
>
> M: And also…
>
> Researcher: Sorry, just hang on a bit, M. What do you mean, the boys do not have a say?
>
> K: Like even if you defend yourself, like whoever is like talking to you about it, thinks you're being defensive and then so really…
>
> Researcher: You're damned if you do and you're damned if you don't.
>
> K: All you can do is just sit and take the punishment.

It is evident from this exchange that K does not feel empowered to discuss punishment, or to express his point of view.

It also appears that the comparison group as a whole has not yet developed the understanding that things are relative to any situation. An example of this is the comment that they would tell a child who was worried about having broken the rules, not to worry.

Q: Well it depends on how bad it was.

Researcher: Okay, "I've got to go to Mr A's office 'cos I took someone's pencil case."

D: Most Grade 7s would probably be dismissive. Like it's such a small thing. Why are you worried about it?

They have no sense of maintaining social order, and the fact that the child had stolen something seems to be ignored, and is confused with the point that, in their eyes, it was not an important thing that was stolen (a pencil case).

Using Anderson et al.'s revised Bloom's Taxonomy, they utilise the "knowledge" and "comprehension" of the Code of Conduct (Levels 1 and 2) in everyday school life, and even move into the "application" stage (e.g. they describe how they have applied rules to teaching and disciplining younger children). However, they appear to struggle with the "analysis" level, where the objective is to break down, differentiate and discriminate between things in order to move into the realm of generalisations of knowledge. In contrast, the DIY children appear to have moved through this level into 'synthesis' and even 'evaluation', where they are able to "defend judgements based on internal evidence of external criteria" (Bloom et al., 1956) (e.g. they argue against too many rules, or too few; they justify decisions of parents and school, even though they may differ).

As a group, the comparison children seem to move in the realm of tokens to illustrate the specific and concrete examples of how they view the Code of Conduct. Much of their discussion ranges around the rules to do with school uniform and they frequently reference themselves, and their personal experiences, as examples of their thinking or explanation. They also discuss extensively the rule of not running in the corridor and refer to it repeatedly. They seem to be in the 'here and now'.

Although Q demonstrates an understanding that there is 'there and then' in her future (referring to the relevance of a uniform in the world of work), her comment in response to a query by the researcher was:

Researcher: So when you go out into the real world, no one is going to give you a Code of Conduct…

D: You'll have to make your own decisions.

Q: There still are codes of conduct in the real world…like in the work environment, like things you should and shouldn't do. Like some workplaces you have to wear a set uniform, set…like say a business top and jeans or whatever…and then like casual Fridays…like, yeah.

However, even with this example, she references it by returning to the sign token of uniform and implies that others decide what the rules are. This is very different to N in the DIY group, who says, 'You will make your own rules in the future.'

Linked to the analysis of Moral Reasoning using Kohlberg's levels, references to High School appear fairly one-dimensional. While, according to them, Preparatory school rules are constraining and controlling, their understanding of High School is that it is totally free and without any constraints. This all-or-nothing thinking indicates undeveloped systematicity and conscious reflection.

On the whole, the Comparison group seems to struggle with all four of Wertsch's suggested measures of metacognition and reflexivity. They constantly reference themselves, peers, school or teachers in their examples, keeping their explanations of rules and their significance very close to home and concrete. An interesting case in point is when the researcher tries to elicit thinking about how rules relate to individuals and groups by asking the question, 'And is it relevant to each person? Is it relevant to us as a group?':

Table 15: Comparison Group Interview

Episode 4	**Exploration of Metacognition**
K: Well it's relevant to the individual, because the way you taking the Code of Conduct…you might be very strict with enforcing the rule, but your group might not, like if you are hanging out with the wrong crowd…	Tries to introduce some ***systematicity*** to his thinking, refining it, yet remains in a ***personalised*** example. However, instead of generalising to society, he remains focused on his own experience of the groups at school
R: Okay so if I understand what you're saying then, it is relevant to both. The group and the individual. It kind of controls the individual as part of a group, but it sets the rules for the group so that individuals follow it. So it's kind of both, isn't it?	Reintroduces the idea of the group and the individual as co-existing and dependent on each other.
All: Ja, yes.	**Agreement indicates shared situation definition.**
Researcher: All right. So, let us go back to this idea of rules. I just want to explore it a little further…Y said that it is either something to guide…you did not use the word 'guide', you said that it is either something you should do or you shouldn't do, if I understood what you were saying.	Attempts to focus their attention on the ***concept of rules***, introducing ***synonym of 'guide'*** and moving back to the refining thought of what 'we should and shouldn't do'
Y: Ja, I get the idea that if your hair is in your face or longer than your shoulder you have to tie it up.	***Identifies example to illustrate type***, thus ***boundedness***, ***conscious reflection and systematicity***.
Researcher: And what do you think the reason for that is?	Tries to introduce an ***abstraction*** of the concept of tidiness, respect for self and uniform, personal pride.
Y: It's difficult working with your hair in your face.	Seems to be ***personalised, unbounded*** and without s***ystematicity*** or ***conscious reflection.*** He misses the cue and stays in the ***token***.

Researcher: So if you're working it's going to get in your face. But it's your hair…who cares?	Again, tries to open the discussion to 'why is this important?'
K: Also, if you can see your hair through your eyes, it damages your eyesight, it will make you near-sighted, so you need to tie it up. So those who enforce that are doing it so that you can protect your eyes. I think the reason was so that you can protect your eyes because …	Remains completely engaged with the ***token*** of 'hair rules', ***disregarding any generalisation or abstraction.***
Researcher: Have you <u>seen</u> the kids at the college?	Tries to debunk the argument humorously by implying that college children have their hair in their eyes and do not seem to suffer bad eyesight as a result.
K: Ja…	Does not draw any conclusions from the ironic tone used by researcher, agrees with the ***literal.***
R: Have you seen how many of them have hair hanging over their eyes?	Repeats the tactic.
K: Ja…	Again does not engage with the idea on a more ***general or abstract*** level.
M: Yes, but that's the thing with the College, you can have your hair down…you can have it up…you …	Supports the argument that K is making, zoning in on the perceived freedoms afforded in College, but does not see the flaw in the argument. Using ***Tokens but does not reveal the type. Has strayed from the boundedness of the conversation about rules.***
D: At the College, you've got a lot of freedom. At the College they try and tell you to make your own decisions…	Black and white thinking, no ***hierarchy***. The perceived total freedom of college is juxtaposed to the ***limitations*** on prep school. ***Constraints.***

At times, the comparison group tends to stray from the boundaries of the topic, getting caught up in specific rules and their personalised implications. They appear trapped in examples, coming to the discussion on rules, but giving different (not necessarily linked) examples of their own experiences to explain their thinking. Their examples do not move into the abstraction and generalisation of rules in general and they rarely use synonyms to explore the form and meaning. This weakness in conscious reflexivity and reasoning is interesting when contrasted with the DIY group's follow up interview.

It appears that the children in the comparison group do not see or acknowledge the benefits of rules except to reference that they 'keep us safe'. They are mostly orientated towards constraints of rules, rather than their possibilities. They have a limited view of what rules might provide.

Using Vygotsky's theory of concept development, the comparison group appears to be at the level of complexes in terms of the concept 'rules' and the concept 'Code of Conduct'. It appears that they are unable to transfer their learning from one situation to another and have developed random factual impressions (Vygotsky, 1981) that slip from one feature to the next in an unsystematic way, because they have not developed a hierarchy of interrelated ideas around the Code of Conduct. Their descriptions and explanations of rules reveal that they do not know what to look at or refer to.

As a final coded measurement of the Comparison group's thinking, Anderson et al.'s revised Bloom's Taxonomy (2000) shows thinking at the first two levels: 'remembering knowledge' and 'demonstrating comprehension'. They appear to understand the main rules of uniform and behaviour and refer to them repeatedly throughout the interview to demonstrate their points. It

is possible that, because these two areas of behaviour (dress and decorum) are the most often regulated things in school, that they are simply referring to what they perceive to be important, based on what has been foregrounded in their own interactions with staff and previous counsellors at the school.

It is significant too that the comparison group characterises their learning of the Code of Conduct as something that is taught through copying and observation. It appears that it is not an overt 'study', or object of reflection, as occurred for the DIY group in the Code of Conduct lessons, e.g.:

> R: Okay…So, we've agreed that the way we learnt to do things the "Crawford way" was being told by older kids not to run in the corridor, or being shouted at. I think that those were the words that you used, M… How else do we learn the Crawford way?
>
> Queen: From our teachers.
>
> May: Ja…like principals and deputy principals.
>
> K: And we saw others…
>
> Researcher: So we copied.
>
> All: Yeah.
>
> D: You didn't want to stick out so you just did what they did…
>
> Researcher: Oh, okay, "I'll just do what they do". Okay, and K, you were saying that we learn the law that M mentioned in the same way. When we do something, we don't want to stick out, so we modify our behaviour to suit it.
>
> K: *(Nods.)*
>
> Queen: Also, when we are young, I think we learnt to imitate other people's actions, like you learn to speak by hearing other people speak, how you learn to walk is by seeing other people walk and so, like that instinct doesn't go away, like, it carries on throughout your whole life.

Q's pertinent observation of how learning often happens supports Vygotsky's theory of concept development and the ZPD. When the random and unsystematic grouping of impressions is made through observation, and the situation definition of the child is different to the adult, it leads to an understanding that cannot be transferred to another situation. The person attempts to group things together without considering any attributes of the idea, apart from the obvious. When this development from syncretic conglomerations has moved through complexes into the realm of pseudo-concepts, the person can often name the concept (in this case 'rules' and 'Code of Conduct') but is unable to move into generalisation and abstraction, and remains locked into the concrete. This is what appears to have occurred with the

Comparison group's understanding of the Code of Conduct. They have made meaning without forming a systematic understanding of its implications.

The DIY group thus reveals a marked difference in thinking from the comparison group. Not only have they a sense of the idea 'rules', they have developed hierarchical, systematised thinking that reveals their interconnected web of concepts around rules.

They can transfer their understanding from one scenario to the next and have developed a clear vision of possibilities for the future, rather than merely the constraints of the rules. There is a sense that they have developed a sense of personal agency and social responsibility.

In accordance with Bernstein's theory (1990) of the three message systems, I now move onto an analysis of the evaluation criteria in DIY.

5.7 Analysing the Assessment Criteria in DIY

When discussing the design logic of the project I introduced the assessment protocol, but here I attempt to unpack the eight assessment documents (Refer to Appendix 6, p. 19) to explore how their dispositional slant reveals the invisible pedagogy and the RD in a way that augments the teacher's RD in the classroom. The assessments measure knowledge growth and even concept development around rules and the Code of Conduct, and focus on the development of 'good citizenship'.

Exploring the assessment of DIY required a way of presenting the information to reflect what was being assessed, who was assessing it and whether the assessment standards actually assessed what they purported to assess. I have coded for how much 'content' and which 'dispositions' are reflected in the assessments, and have tried to explore which criteria are being implicitly and explicitly assessed.

It should be noted that generally the assessment rubrics are generally distributed at the beginning of a project in DIY, and although not always referred to explicitly, are made available for the children to check, should they wish to.

The ratings in the assessment rubrics are the same for all eight assessments:

10-9 **No room for improvement**	**8-7** **With effort**	**6-4** **Mostly**	**3-0** **Not really**

Using the same codes that were employed to analyse the children's and teacher's transcripts, I have analysed the assessment standards in the eight Code of Conduct Assessment rubrics. To show the distribution of content versus disposition, I coloured the blocks. Light grey shows an assessment standard that reflects some sort of content-based expectation, and light blue indicates the evaluation of a disposition. The dispositions are often revealed in the verbs used. These have been italicised and made bold. Where the verbs reflect a level of thinking in

Anderson's Revised Bloom's Taxonomy, I have added the level, using the 'rainbow code' created in the tracking documents.

Boxes left uncoloured indicate an assessment standard that is not overtly content-based or dispositional, for example 'The Code of Conduct booklet can be easily reproduced and distributed to the whole school'. In this case, it is a measure of the team's ability to understand and follow an instruction, and to create something that has a real life application. Incorporated into this expectation are a number of invisible dispositional expectations (e.g. neatness, clarity, attention to detail) as well as artistic or design abilities (e.g. use of colour and visual appeal). The assessment standard does not mention these directly, pointing again to the invisible pedagogy favoured in DIY.

Table 16: Evaluation in the DIY Project – Looking at Assessment Rubrics

#(KMR = 'Kohlberg's Moral Reasoning')

LO1 **Identifies and Solves Problems**	**LO2** **Works with others and communicates effectively using a variety of skills**	**LO3** **Organises and manages self responsibly**	**LO4** **Collects, analyses, organises & critically evaluates information**	**OBSERVATION**
Assessment 1: Tutor assessment of learner in group discussion				
The learner was able to ***participate*** in the game and try to ***guess*** the rules **Level 3: Apply Knowledge**	The learner ***respected*** their team members and ***listened*** to their ideas	The learner ***had*** their scrap book and stationery in class in order ***to complete*** the task	The learner was able to ***think*** of their own rule **Level 5: Synthesise Solutions**	Even from this early stage in the project, there is an expectation of higher levels of reasoning **7 out of 8 assessment standards assess for dispositions,** such as organisation, preparation, forward planning, participation, respectful listening ***#KMR: Stage 2: Individualism and Exchange***
The learner ***understands*** what a rule is **Level 2: Demonstrate Comprehension**	The learner is able to ***participate*** in the game with minimal conflict	The learner ***completed*** the written task neatly **Level 3: Apply Knowledge**	The learner was able to ***contribute*** their ideas as to what rules are and why they are needed **Level 4: Analyse Generalisations** **Level 5: Synthesise Solutions**	

LO1 **Identifies and Solves Problems**	LO2 **Works with others and communicates effectively using a variety of skills**	LO3 **Organises and manages self responsibly**	LO4 **Collects, analyses, organises & critically evaluates information**	OBSERVATION
Assessment 2: Tutor Assessment – Group Game				
The learner ***contributed*** creative ideas to formulate a game in their group **Level 3: Apply Knowledge** **Level 4: Analyse Generalisations** **Level 5: Synthesise Solutions**	The learner ***participated*** in the group activity with enthusiasm	The learner ***had*** all the material they required ***to participate*** in the lesson	The learner was able to ***read and understand*** the rules of new games **Level 1: Remember Knowledge** **Level 2: Demonstrate Comprehension**	**5 out of the 8 assess for dispositions.** When content is assessed, it is done so at the lower levels of metacognitive reasoning (remembering; understanding), but when dispositions are assessed they tend to move into the higher levels of reasoning. ***#KMR: Stage 2: Individualism and Exchange:***
The learner ***contributed*** to finding the meaning of the words **Level 2: Demonstrate Comprehension**	The learner was able to ***explain*** their ideas and listen to others **Level 2: Demonstrate Comprehension**	The learner ***participated*** in setting up the game to be played and ***worked*** as part of a team	The learner ***displays*** an understanding of the meaning of new words **Level 2: Demonstrate Comprehension**	
Assessment 3: Tutor Assessment - Code of Conduct Booklet				
The children were able to ***perform a SWOT Analysis*** of their different ideas on how to present the revised Code of Conduct **Level 2: Demonstrate Comprehension**	The Code of Conduct booklet can be easily reproduced and distributed to the whole school *	The children ***utilized*** class time well and ***completed*** the task on time	The children ***understood*** what was required of them **Level 2: Demonstrate Comprehension**	**3 out of the 8 assess for dispositions; 3 assess for content and 2 are indeterminate.** * The children were asked to produce a book with parameters (limited colours, space, clarity, etc.) that would make it easily reproducible. ** Problem solving based on content, but dispositional in that it requires an attitude of positivity *** This assessment standard assesses for neatness and organisation of information ***#KMR: Stage 4: Maintaining the Social Order***
The children were able to ***anticipate*** possible problems and ***provide solutions*** for their ideas ** **Level 3: Apply knowledge** **Level 5: Synthesise Solutions**	The children have ***produced*** a Code of Conduct booklet that is attractive and easy to read and understand *** **Level 4: Analyse Generalisations** **Level 5: Synthesise Solutions**	The children were able ***to complete*** the task with minimal input from the tutor	The booklet is a reflection that the children ***understand*** the content of the Code of Conduct **Level 1: Remember Knowledge** **Level 2: Demonstrate Comprehension**	

LO1 **Identifies and Solves Problems**	LO2 **Works with others and communicates effectively using a variety of skills**	LO3 **Organises and manages self responsibly**	LO4 **Collects, analyses, organises & critically evaluates information**	OBSERVATION
Assessment 4: Tutor Assessment – Management Assessment				
The children were able ***to answer*** questions about the content and format of their booklet **Level 1: Remember Knowledge**	The Code of Conduct booklet can be easily reproduced and distributed to the whole school	The children ***booked an appointment*** for the interview in advance	The children ***understand*** the content of their booklet **Level 1: Remember Knowledge** **Level 2: Demonstrate Comprehension** **Level 3: Apply knowledge**	**2 out of the 8 assess for dispositions; 4 assess for content and 2 are indeterminate.** The assessment of organisation is consistent throughout the process Some assessment standards have been repeated. It is not clear if this was done on purpose or if it is an error.
The children are able ***to explain*** one possible problem with the booklet and offer a solution **Level 3: Apply knowledge**	The children have ***produced*** a Code of Conduct booklet that is attractive and easy to read and understand **Level 4: Analyse Generalisations** **Level 5: Synthesise Solutions**	The children ***were prepared*** for the interview	The booklet is a reflection that the children ***understand*** the content of the Code of Conduct **Level 1: Remember Knowledge** **Level 2: Demonstrate Comprehension**	
Assessment 5: Self Assessment - Learner				
I was able to ***follow all instructions*** and complete the project to the best of my ability	I was able ***to work independently*** with little assistance from my tutor	I ***always had all the material*** I needed in class to complete my project	I ***knew*** exactly what was expected of me and asked questions if I did not understand something	**7 out of the 8 assess for dispositions; 1 assesses for content** Assessing your own work requires you to think reflexively and to activate a level of metacognitive thought; it requires appraisal and assessment **Level 6: Evaluate Judgements** ***#KMR: Stage 3: Good Interpersonal relationships***
I was able ***to find*** my own ***solutions*** to any problems I had	I was able ***to work with my group*** when necessary and share my ideas and opinions, as well as listen to my team members	I ***completed*** all my tasks according to the deadlines	I understand the Code of Conduct and know it well **Level 1: Remember Knowledge** **Level 2: Demonstrate Comprehension**	
Assessment 6: Group Self Assessment				
Our group ***worked well together*** and we reached agreement easily	Our group ***made sure*** that everyone made a contribution to the discussion	Our group ***displays*** good time management and we ***completed*** the task on time	Our group ***recorded*** our conclusion*	**8 out of the 8 assess for dispositions** * The group was expected to keep a record of what they decided as a group for their game (this assesses for organisation) Again, the very act of assessing one's contribution to a whole, and then the group's contribution as a whole, requires metacognitive activation **Level 6: Evaluate Judgements**
Our group ***knew*** what we had to discuss and we stuck to the topic	Our group ***listened*** to everyone's ideas	Our group ***had*** a leader, scribe, gatekeeper and scribe	Our group all ***had*** their scrapbooks in class and ***made their own notes***	

LO1 **Identifies and Solves Problems**	LO2 **Works with others and communicates effectively using a variety of skills**	LO3 **Organises and manages self responsibly**	LO4 **Collects, analyses, organises & critically evaluates information**	OBSERVATION
Assessment 7: Group Peer Assessment				
My friend ***came up with their own ideas***	My friend ***displays*** a positive attitude when communicating with other members of the team	My friend ***has*** their scrapbook in class	My friend ***was able*** to discuss all the ideas that were presented **Level 2: Demonstrate Comprehension** **Level 4: Analyse Generalisations**	**7 out of the 8 assess for dispositions; 1 assesses for content** Having to explain one's thinking behind why a certain attainment was given, requires evaluative thinking; **Level 6: Evaluate Judgements** ***#KMR Stage 3: Good Interpersonal relationships***
My friend ***contributes*** to sorting out conflict in the group	My friend ***shares*** their ideas with confidence	My friend ***has*** all their stationery in class	My friend ***was able*** to agree and disagree with ideas in a calm manner with reasons for their opinion	
Assessment 8: Group Tutor Assessment				
The group ***discussed*** various game options before settling on their best choice **Level 5: Synthesise Solutions** **Level 6: Evaluate Judgements**	The group ***worked well together*** with minimal conflict	The group ***showed respect*** for one another and listened to everyone's ideas	The group have ***designed*** a simple game easy to understand and play **Level 5: Synthesise Solutions**	**6 out of the 8 assess for dispositions; 2 assess for content.** The children have effectively reproduced their knowledge of the Code of Conduct. This places their learning in the field of reproduction (Bernstein, 2000), although they do not have to learn it verbatim. To design a successful game the children must have constructed, designed developed, and devised, formulated and generated. ***#KMR Stage 4: Maintaining the Social Order*** ***#KMR Stage 5: Social Contract and Individual Rights:***
The group were able to identify problems and find possible solutions **Level 5: Synthesise Solutions** **Level 6: Evaluate Judgements**	The group ***shared*** roles and responsibilities	The task ***was completed*** on time	The group have ***planned*** a game that explains the meanings of new words **Level 5: Synthesise Solutions** **Level 6: Evaluate Judgements**	

There is a marked preponderance of dispositional assessment, as opposed to content: Forty-four assessment standards are assigned to dispositional development, as opposed to sixteen for content. The conditions of possibility are created and activated, as well as reflected in the assessment.

The fact that the criteria for assessment rely on the dispositional qualities and skills embedded in the Critical Outcomes in OBE, influences the focus for attainment. As the Critical Outcomes are dispositional in intention, the focus of the DIY projects and how they are evaluated tends to be dispositional too.

Overlaying Kohlberg's Levels of Moral Reasoning (#KMR on the table) gives perspective of the incitement to adhere to the 'social order'. Although the Code of Conduct project was about social order, the fact that the assessments are based on broad social dispositions seems

to suggest that this may influence the children to think in terms of themselves as members of a group. Added to this, the aspect of having to assess one's own contributions and those of others implies a level of reasoning that might not be developed if the tasks were not suggested.

Significantly, that the assessment documents reveal the invisible pedagogy of DIY. They often assess dispositions and sometimes appear to assess one thing (e.g. the board game), while actually assessing another (e.g. the ability to work in collaborative groups).

By the end of the research, clear differences in levels of reasoning observed in the DIY group and comparison group indicated that transmission and mediation embedded in the Code of Conduct project reflected in 'how' and 'what' the DIY children learnt. The comparison group benefitted from the standard class discussion and the exploration of the Code of Conduct in the school diary, but the DIY group had a fundamentally different form of transmission and mediation through the module designed (in the classroom pedagogy, the small group mediation and the assessment protocol), which appears to have assisted them to develop the concepts at a functionally deeper level of understanding.

A number of limitations that emerged from the data are addressed in the next chapter.

Chapter 6: Limitations of the Study

With hindsight, I see a number of limitations in this study. As they appear in aspects of the DIY process from classroom set-up to teacher training and limited data it is difficult to link them, but in this chapter I shall highlight areas for consideration.

First, it would have been ideal if I had done 'before', 'during' and 'post' DIY/Code-of-Conduct learning experience interviews with both the DIY children and the comparison group. This would have provided tangible evidence of changes in metacognition in both groups, indicating what was directly attributable to the DIY process generally (or lack-thereof), and the Code of Conduct lesson in particular. Whilst it is noted that DIY appears to be the main difference in the learning experiences of the children from the two schools involved, there may be other factors that have not been identified or addressed in this study.

Also unclear from the data is to what extent the learning and development of metacognitive and reflexivity skills can be attributed to the Code of Conduct lesson specifically, and how much may have been gained over the almost four years (Grades 4 – 7) that the DIY children had been exposed to DIY by the time they were interviewed. Further research, especially if conducted over a four-year longitudinal study, may reveal these gains more incrementally and with greater clarity.

My data suggests that children exposed to DIY programmes have more highly nuanced cognitive skills than those who are not, as well as appearing to attain a higher level of generalisation and abstraction; the ability to imagine a past, present and future, and to understand that living in a society calls for constant reflection in terms of 'self' (the individual) and 'other' (the group).

One cannot state categorically that this is the case, as it is possible that having been challenged to consider a sequence in order to extract meaning from the card game, (i.e. to construct a rule), the children have practiced the ability to apply hypothetical thinking in other areas, (e.g. 'If those cards have been played, then it is likely that this is the secret clue'). This is suggested in their ability to apply 'if/then' hypothetical thinking in their analysis of the lesson during the follow-up interview. This ability is particularly evident when compared with the comparison group. Theoretically then, it is possible to draw a link between the hypothetical thinking 'training' afforded in the game, with the the collaborative mediation that occurred in small groups, the competence-based pedagogy, the real life application of learning and the children's ability to subsequently apply it.

In appropriating the meaning of the Code of Conduct specifically, and rules in general, it would seem that the invisible curriculum, the implicit pedagogy, the collaborative regulation of peers and the small group affordance may all have played roles in developing markedly different thinking in children of similar ages.

The study of DIY has revealed some interesting insights into a curriculum innovation that may offer suggestions for educational practice. It could be claimed that the research has developed the metacognitive skills of a small number of children because of differences - compared with

others who have not gone through the process - in their levels of attainment according to scales posited by a number of theorists. However, as no other schools follow the same procedures, it is not possible to generalise.

A longitudinal study over four years (e.g. following a group of children from Grade 4 – 7 in two different schools) might offer a more definitive insight into the gains suggested in this small research.

The limited size of this DIY group makes it difficult to make categorical claims about the efficacy of the programme. A longitudinal study would offer insights into individual development and, even though I initially thought that a bigger group may offer insights, I now believe that the small group will be as effective, not only because it allows for deeper analysis, but also because the nature of this kind of research calls for detailed analysis of individual development. There are indications that the affordances that DIY offers, allow children to develop their 'thinking about thinking' skills. This in turn, seems to encourage them to transfer their thinking to other situations and circumstances, as well as to internalise the dispositions that have been encouraged. The study was aimed at describing what and how learning happens in the DIY process. Though this account can only be a partial selection, it has yielded some valuable insights.

When compared with the study of Davydov (2003) and his cohorts mentioned earlier in this paper, it appears that the DIY children exhibit some of the traits of independent reflexivity. They appear to have been influenced significantly by their peers' mediation of their thinking, as opposed to only the teacher's. In Davydov et al.'s research it was concluded that the teacher posing the questions was still 'the agent or initiator' of the reflexivity, but it appears that in DIY, the children are performing that task for each other as well. It therefore seems logical that if they are mediating for others, they are probably doing it for themselves too. The "gap between reflexive ability and the ability to teach oneself how to learn" (Davydov et al., 2003, p. 69) seems to have narrowed somewhat in the DIY process. Again, further research is needed to develop clarity as to what extent they are able to do this for themselves.

Another limitation is that the data itself was limited. Not every lesson was recorded and transcribed. In some of the lessons the recording could not be transcribed because of the ambient noise in a classroom in which several groups were working. Initially this seemed to pose a problem, but what in fact revealed the learning was data recorded in the interviews several months after the conclusion of the project.

Discrepancies between how the DIY group and the comparison group were exposed to the Code of Conduct could prove a further limitation. The 2013 interviews with the DIY cohort and the comparison cohort in a sister school were analysed and compared in the same way to reveal notable differences. The comparison group, which had not worked through the Code of Conduct project showed far less systematicity, less boundedness, less conscious reflection and less metacognition that the DIY cohort which did.

Although the comparison group had been exposed to the Code of Conduct through the standard class discussion led by a teacher, typically at the beginning of each year, and they

had had to sign the document, indicating that they understood it, they appear to be engaging with its content for the first time during the interview. For a really valid comparison, one group should go through the DIY project and one should be taught for the same number of terms using the pedagogical approach normal to that school. It should also be pointed out that although the comparison group children experience the Code of Conduct differently at their school, it is the nature and form of their thinking rather than the content of what they say about it that is significantly different.

Related to this was the timing of the interviews. To interview the children a year after they had completed the project, find a noticeable improvement in their metacognitive abilities and claim that 'this watching of one's thinking, this reflection, has apparently been developed through the DIY process,' could be argued as a simplistic interpretation. In the space of a year one would expect considerable development and learning from other sources. What is significant here, is that even when both sets of learners have been tasked with being leaders in their schools, upholding the school rules and assisting to 'police' younger children, those who have been through the Code of Conduct project were able to engage with the process in a significantly deeper and richer way.

An explanation is necessary regarding my inclusion of posters created by the 2013 DIY group. The task of creating a booklet to simplify the Code of Conduct for younger children (later found to work better as a group-input poster) was not completed by the 2012 DIY group owing to lack of time. When the project was re-taught the following year, the 2013 group completed the poster. Their input is included both to contextualise the final product of the project and to illustrate (literally) the depth of knowledge achieved through the DIY project.

In attempting to reveal and demonstrate the intangible skills of creativity and innovative thinking, the DIY process could be accused of being insubstantial. In theory the general public supports a shift in methods of education, but finds the concept of measuring the presence of creativity and innovative thinking a challenge. More accurate measurement of metacognitivity and other intangible skills would therefore greatly benefit from the development of purpose-designed computerised tracking tools. These would add credence to current research and, as increasing data was gathered and analysed, support further studies.

Another limitation of this study is that it has not fully explored how DIY is not successful with some children. The limitations of invisible pedagogy as discussed by Bernstein (2000) and Naidoo (2011) need further attention if a fully comprehensive study is to be conducted.

At this point L has to be left struggling to appropriate knowledge of the Code of Conduct lesson. He is trying to work out the social rules but has not yet managed to access the referentiality (Thompson, 1990). If DIY is to be developed further, this needs to be investigated. It is interesting to hypothesise that, had L been present at the group follow-up interview, he might have managed to shift his situation definition in the ZPD during the discussion generated by the interview.

J began the follow-up interview with a limited understanding, but through mediation offered by the researcher and capable peers during the discussion it appears that he managed to move

to a higher level of abstraction than L did in his solitary interview. Analysing why is beyond the scope of this study, which is a further limitation.

The interpretation of data is frequently open to criticism for, depending on the lens applied, it can shift the findings. I value the power that interpretation offers, as selections and viewpoints give meaning to data. However, with the limited knowledge of a first-time researcher, I am concerned that I may have missed some of the subtleties embedded in the more dense theories I have attempted to apply. Through ongoing research I hope to develop the gaze needed to fully utilise these nuances.

It is noted that the volume of data collected, as well as the application of various tools to analyse it, tended to generate too much information for the scope of this research report. Arguably, I have not gone into enough depth in some areas, leaving room for more detailed analysis at a later stage. In terms of theories to recruit and data to explore, I have tried to focus on the most relevant choices to limit the scope of my research in a way that still reveals its significance. I am well aware that there are areas that need further investigation and would value the opportunity to do so in further research.

The findings of the project, together with its limitations, will be used to inform teacher training in the DIY methodology both in the current school and, if the research is accepted as valid, in other schools in the group. It will also be used to inform curriculum development of new projects.

Chapter 7: Conclusion

My conclusions for this study are prefaced with the proviso that the findings cannot be generalised and they are definitive only in relation to this small group and the limited data.

Earlier in this study I quoted Flavell, who says, 'I find it hard to believe that children who do more cognitive monitoring would not learn better both in and out of school than children who do less. I also think that increasing the quantity and quality of children's metacognitive knowledge and monitoring skills through systematic training may be feasible as well as desirable' (Flavell, 1985, p. 910).

DIY is a programme that encourages 'cognitive monitoring' through a substantive curriculum intended to socialise into dispositions, not content. It appears that it achieves its intended goal and that the children exposed to it have reached a substantially higher level of cognitive and metacognitive reasoning, using Vygotsky, Kohlberg, and Anderson et al.'s (2000) model of Bloom's Taxonomy as measures. According to Wertsch's indicators, it also appears that the children have moved into the realm of metacognition and reflexivity, and of conscious self-regulation, at a level well above that generally seen in children their age, and seem to use depersonalisation, respect boundedness, employ conscious regulation and readily explore ways to systematise their thinking (Wertsch, 1991).

Although I did not use Piaget's theory of development as a main focus for this study, Kegan's (1982) description of its highest level, 'Era 4: Formal operational thought' seems an apt description of what DIY children achieved in the Code of Conduct lesson:

> The formal thinker can ponder about situations contrary to fact; accept assumptions for the sake of argument; make hypotheses that can be expressed in terms of propositions and tested; leave the tangible, finite, and familiar for the infinitely large or the infinitely small; invent imaginary systems; become conscious of her own thinking; and reflect on her thinking in order to provide logical justifications (Kegan, 1982, p 38).

One cannot make categorical or even causal claims, but the study does seem to raise relevant questions about how metacognitive development occurs, as well as how a DIY-type learning environment may teach dispositions that are sought in the modern world of business and learning. Each project's intended curriculum, which includes a social interaction dimension (developing collaboration, conscious self-regulation, reflexivity and metacognition), a cognitive dimension (developing knowledge and skills germane to the task) and an implied affective dimension (developing emotional control, perseverance, inquisitiveness, independence etc.) appears to develop a multi-layered learning environment that holds potential for further exploration.

This focus on authentic application of tasks that are relevant in a real world situation requires competent independent thinkers who are set to become critical and creative citizens; based on the thinking they appear to display at the end of the follow-up interview, it seems to encourage a qualitative difference in the children's learning. The sociological imperative of DIY, which

aims to develop concerned, reflexive citizens who are learning to participate in a social community, seems to be at least partially achieved.

Much of the intended curriculum of DIY focuses on developing dispositions of thinking as opposed to 'testable knowledge'. In many ways the 'what' of what is being learnt is merely a vehicle for the invisible curriculum of 'creating good citizens'; it revolves around "learning by doing" (Lave, 2011, p. 4). The children appear to be able to use the various kinds of knowledge – executive control, declarative knowledge, conditional knowledge and procedural knowledge (Marzano et al., 1988) – and to apply them successfully to various situations.

While Karpov asserts that the "traditional system of school instruction often promotes empirical thinking [which] often leads to misconceptions" (Karpov, 2003, p. 70) and Zuckerman's criticisms of the general education system – making the teacher the controller of curriculum, with unassailable knowledge, bearing 'ultimate truth', as well as encouraging 'black and white' thinking (Zuckerman, 2004, p. 11) – are damning indictments that raise important questions about instructional discourse being the dominant mode of transmission in many schools.

In terms of teacher training, exploring ways to harness the best of conventional teaching and augmenting them with DIY, holds generative possibilities.

7.1 Suggestions for further development of DIY

There are a number of suggestions for developing and building on DIY in the future:

- Being interested in children like L, who do not develop skills at the same pace as others, I would value the opportunity to continue developing the potential inherent in the DIY programme. One would be to develop ways of building scaffolds into DIY, so that no child is left in a situation definition that excludes them from the intended learning process. These scaffolds could include more systematic documentation and collaborative reflection on thinking processes and learning experiences.

- Building reflection on action and ideas by using conscious objects of awareness that are not school subjects, holds great potential for teaching both gifted and struggling children.

- An unexpected spin-off of this research, focus on the ZPD, should be explored further.

- I would like to track a group of children for a longitudinal study over their four-year tenure in DIY (from Grade 4 to 7) to systematically focus on concept development and metacognitive skill acquisition.

- Developing learning programmes that actively incorporate my understanding of pedagogy is an immediate priority in DIY, together with training teachers to facilitate the process.

- Instead of appearing as a full subject in the curriculum, DIY methodologies could be modified to offer the skills it purports to teach without completely redesigning the timetable. This may be feasible for implementation in other schools, both in and outside the CrawfordSchools™ group.

- It appears that some of the affordances (Greeno, 1994) offered to children in the DIY lessons assist with developing their metacognitive awareness and skills. This, together with a more active incorporation of Communities of Enquiry and Philosophy for Children (P4C) (Matthew Lipman et al., 1984; Lyle, 2008; Haynes & Murris, 2011; Stanley, 2012), offers effective pedagogies.

- Developing detailed learning projects that explore broad topics in unusual depth would add a further dimension to the kind of learning that already happens in DIY.

- Regarding the study of the use of invisible pedagogy and a largely Regulative Discourse in the classroom (i.e. Competence modes), I am aware that much of the research already done in this field has explored the use of RD in classrooms where children are from disadvantaged backgrounds, many of whom are learning in their second or third language. In these circumstances it has often been found lacking, and the visible pedagogy of the Instructional Discourse has been favoured (i.e. Performance modes). However, there does not seem to be much research on middle class and advantaged children and the use of RD and invisible pedagogy, such as is used in DIY, and how it could be used to support the development of metacognition and self-reflexivity. This is an area of research I would like to explore in more depth.

While development of the individual child is always at the forefront of the DIY process, the deepened pedagogical knowledge of teacher-tutors comes as an unexpected spin off. All the DIY tutors teach other subjects (ranging from Drama, Art and Life Skills, to English/Afrikaans/Zulu, Maths and Technology). Each of their insights and passions has broadened the learning experiences of the children, and has also given the teachers insight. It thus appears that the collaborative small group that benefits the children has similar benefits for the teachers, who have substantively developed their own teaching, based on what they have learnt through the collaborative teaching process encouraged in DIY.

Applied to the learning of teachers too, being afforded the agency of "reflection [that] is not individualized; reflection exist[ing] in an interpsychic form" (Davydov et al., 2003, p. 67) has likewise taken on new meaning. I would like to build on this with them, by sharing a new awareness of pedagogy and the practice of conscious concept development, moral reasoning, varied learning styles, and so on. Ongoing teacher training, from learning to think philosophically to conducting enquiries (our own enquiries as well as those involving children, parents and other staff) would also be areas of focus. Regular collaborative reflection and planning supported by rigorous documentation of children's interactive processes enables the

'emergent curriculum' of the Reggio Emilia municipal system to function. I would like to learn more about this process, to see how it can be applied to DIY.

During the course of this study, I came across a provocative question posed by Fox & Riconscente: "Would interventions addressing how children know and view others and objects have effects also on their capabilities in terms of metacognition and self-regulation?" (Fox & Riconscente, 2008, p. 382).

In terms of being able to draw definitive conclusions from this study, the limitations addressed in the previous chapter necessitate further study, but it appears that based on the preliminary findings of this research the answer to Fox and Riconscente's question, when applied to DIY, is, 'Yes.'

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