

**How can peer assessment be used in ways which
enhance the quality of younger children's learning in
primary schools?**

Thesis submitted for the degree of

Doctor of Education

at the University of Leicester

by

Stuart Ian Boon

School of Education

University of Leicester

2016

Abstract

Stuart Ian Boon

How can peer assessment be used in ways which enhance the quality of younger children's learning in primary schools?

Peer assessment actively engages peers in the formative assessment and evaluation of work produced by a peer. This thesis explores how social processes, such as classroom talk, influence the quality of children's learning in more interactive contexts of PA. This focus is needed since children often find PA challenging as they may not have the interpersonal skills to collaborate effectively leading them to use talk ineffectively as a tool for learning. This research was interventionist and children in the year three and four classes I taught received *Thinking Together* lessons as a strategy to enhance the quality of their talk in contexts of peer assessment. Methods used to examine the impact of the talk intervention, and to gain greater insights into the role that the social context plays in peer assessment, included transcribed digital audio recordings, open ended observations, semi-structured interviews, mind maps and children's work. Qualitative data were analysed using thematic coding analysis whilst data in transcripts were quantitatively analysed to calculate the frequency of words and phrases associated with *exploratory talk* before and after the intervention. Findings suggest that children's characteristics influence the way they communicate in contexts of PA and some of the most challenging learners seemed to benefit most from the talk intervention in terms of its influence on their ability to collaborate, hypothesise and reason throughout the peer assessment tasks. The findings also draw attention to previously under-researched PA social processes such as discussion, negotiation and peer questioning that lead to outcomes for learners such as self assessment. The main conclusions drawn are that more interactive kinds of peer assessment might be viewed as a differentiated and discursive practice where teachers consider the various needs of learners, based on their individual characteristics, and provide appropriate support so they are able to collaborate and use language for mediating effective PA practice.

Key words: peer assessment; peer feedback; formative assessment; social context; classroom talk

Acknowledgements

First, I would like to thank my supervisor who has provided both support and challenge and helped to develop and advance my thinking around peer assessment. I would also like to thank the University of Leicester's School of Education who awarded me a studentship for the EdD in 2012 and had faith in me to complete a piece of research at doctoral level. I would also like to thank all the children who took part in my study because without their contribution the findings generated would not have been possible. Finally, I would like to thank my parents, family, friends and colleagues who have taken the time to understand the research I am doing and who have shown an interest in this.

Table of Contents

Abstract

Acknowledgements

Table of Contents

List of tables

List of figures

Abbreviations

Chapter 1: Background, focus and value of research	1
Chapter 2: Review of literature and conceptual framework	6
Chapter 3: Methodology	38
Chapter 4: Findings	70
Chapter 5: Discussion and conclusions	135
References	167
Appendices	177
Appendix A: Example of an interview with a pupil	177
Appendix B: Example of a full whole class discussion around peer assessment	179
Appendix C: Field notes	183
Appendix D: Parental consent letter	191
Appendix E: Letter to children	193

List of tables

Table 2.1: Studies which explore how feedback influences learners' goals	10
Table 2.2: Studies concentrating on improving the quality of peer feedback	12
Table 2.3: Studies focusing on the use of peer feedback or peer assessment's outcomes	17
Table 2.4: Social processes in peer assessment research	22
Table 2.5: Studies evidencing the impact of interventions on pupils' group work and discussion	26
Table 3.1: Research questions, data collection methods and details of participants and informants	49
Table 3.2: Key words and phrases	61
Table 3.3: Wider range of key words and phrases suggesting use of exploratory talk	62
Table 4.1: Frequency of words and phrases associated with exploratory talk used in the PA task context before and after the talk intervention	96
Table 4.2: Words and phrases used by Steven and Helen	103
Table 4.3: Words and phrases used by Michael and Phillip	108
Table 4.4: Words and phrases used by James and Leanne	117

List of figures

Figure 4.1: Steven and Helen's work around the number 25	72
Figure 4.2: Michael and Phillip's work focusing on the number 25	77
Figure 4.3: James' and Leanne's work around the number 25	78
Figure 4.4: Lucy and Sophie's work focusing on the number 25	80
Figure 4.5 – Ground rules	84
Figure 4.6 – Year 3 pupils' attitudes towards group work following <i>Thinking Together</i>	85
Figure 4.7 – Year 4 pupils' attitudes towards group work following <i>Thinking Together</i>	85
Figure 4.8 – Examples of mind maps produced by children in year 4	86
Figure 4.9: Steven and Helen's discussion around the number 100	93
Figure 4.10: Bella and Daisy's use of words and phrases associated with <i>exploratory talk</i> in a PA task context before and after the <i>Thinking Together</i> intervention	96
Figure 4.11 – James and Daniel's peer assessed work with the peer assessment checklist they were using to evaluate the work	98-99
Figure 4.12 - Example of Mike's work from the transcript	100
Figure 4.13 – Jane and Tim's work	102
Figure 4.14: Helen and Steven's use of words and phrases associated with <i>exploratory talk</i> in a PA task context before and after the <i>Thinking Together</i> intervention	104
Figure 4.15: Michael and Phillip's discussion before focusing on the number 25 and after the talk intervention focusing on the number 100	109
Figure 4.16: Michael and Phillip's work focusing on the number 100	110
Figure 4.17: Bella and Lucy's work focusing on the number 150	112
Figure 4.18 – The frequency of words and phrases associated with <i>exploratory talk</i> used in PA task context <i>after</i> the <i>Thinking Together</i> intervention	113
Figure 4.19: Leanne and James' work around the number 100	116
Figure 4.20: James and Leanne's use of <i>exploratory talk</i> prior to and after the <i>Thinking Together</i> intervention	118

Figure 4.21 – Example of two mind maps produced by year 4 children before taking part in *Thinking Together* which focused on their likes and dislikes about peer assessment124

Figure 5.1: Towards a model of peer assessment as differentiated and discursive practice149

Abbreviations

AfL – Assessment for Learning

AR – Action Research

CPD – Core Professional Development

ESL – English as a Second Language

IDZ – Intermental Development Zone

PA – Peer Assessment

SEND – Special Educational Needs and Disabilities

SPRinG – Social Pedagogic Research into Group-work

ZPD – Zone of Proximal Development

Chapter 1: Background, focus and value of research

Background and rationale

Educational assessment has in the past emphasised focus on formal examinations and psychometric approaches to evaluate a student's ability. Over a period of at least twenty five years, however, there has been much clearer recognition of the importance of formative assessment which concentrates on how pupils can learn more effectively through high quality diagnostic feedback (Gipps, 1994, 2011; Black and Wiliam, 1998; Black et. al., 2003; Sebba et. al., 2008). In the classroom, formative assessment might involve high quality teacher feedback, pupils responding to this to move their learning forwards, questioning strategies which promote deeper thinking and ways to actively involve students in their learning through self and peer assessment (Sadler, 1989; Black and Wiliam, 1998; Black et. al., 2003).

Peer assessment is one aspect of formative assessment which actively engages students in learning by peers providing task-involving feedback to one another (Butler, 1987; Falchikov, 1995, 2005; Falchikov and Goldfinch, 2000; Topping, 2009, 2010). This, in turn, can facilitate self-assessment and individual learning as students become more familiar with the success criteria for the task in question (Catterall, 1995; Black et. al., 2003). Researchers have argued that peer assessment has significant benefits for student learning as it helps them to develop social skills, become more involved and engaged in learning and enhance their understanding of success criteria (Black et. al., 2003; Bloxham and West, 2004; Harris, 2007).

On the other hand, peer assessment might inhibit the quality of students' learning if they are inadequately prepared for it (Pryor and Lubisi, 2002; Frankland, 2007; Crossouard, 2012; Harris and Brown, 2013). For instance, poor social relationships between pupils, ineffective ego-involving peer feedback and the pressure of being judged and evaluated by a peer have been found to limit the effectiveness of peer assessment in schools (Pryor and Lubisi, 2002; Frankland, 2007; Crossouard, 2012;

Harris and Brown, 2013). Ofsted (2012) also found that peer assessment might disrupt the flow of learning when it is used by pupils too early on into a lesson when they have only written a few lines.

Much peer assessment research has also concentrated on outcomes of PA thus tending to neglect the contribution that social processes, such as talk and dialogue, may play in enhancing the quality of learning opportunities. This is surprising as PA is an activity which requires a social environment where pupils feel secure, are able to collaborate effectively and critically provide feedback to one another on their work and ideas (Van Gennip et. al., 2009, 2010). Moreover, both my experience as a primary school practitioner, and the wider literature, suggest that children find it particularly challenging to collaborate and use talk effectively as a tool for learning when engaging in a social activity like peer assessment (e.g. Mercer et. al., 2004; Mercer and Sams, 2006; Baines et. al., 2007, 2009; Galton and Hargreaves, 2009).

Therefore, a central aspect of this study involved me identifying ways in which children, in the two classes I taught over separate years in different primary schools, could be guided to use talk effectively as a tool for learning in peer assessment task contexts. I decided to use a talk intervention, known as *Thinking Together*, so pupils in my classes became familiar with a set of ground rules for effective communication (Dawes et. al., 2000). Although all pupils took part in this intervention, I focused on a smaller number of cases for more detailed data collection to gain insights into how this intervention was relevant for developing children's use of effective talk in contexts of PA and to explore how it might change the ways in which they use PA to improve their own and one another's learning.

In my year four class, three pairs of children (N=6), each representing a different ability strand within the class, were focused on for more detailed data collection. However, in the second year of research, and with my year three class, I was particularly interested to explore how five different pairs of children (N=10), from the wider class, used ground rules in order to generate talk which enabled them to

positively communicate with one another and give effective peer feedback in open ended mathematical PA task contexts.

In this study, a key focus on younger learners' peer assessments in number work is also necessary as much peer assessment research has concentrated on the subject area of writing instead of mathematics (e.g. Olson, 1990; Topping, 2001; Boon, 2015, 2016). As a teacher-researcher, I am therefore interested to explore, as part of this study, how peer assessment, and aspects of its social context, can be used in ways which enhance the quality of younger children's learning in order to gain a better understanding of how social processes are linked to PA outcomes. In turn, I am interested in identifying theories and concepts which have the potential to explain how children learn from this activity particularly as it is an under-theorised area of research (Topping, 1998).

Focus of research

The main aim of this study is therefore to identify the processes and aspects of peer assessment which are most closely and perhaps causally related to pupils' learning. In order to achieve this aim, my research has a number of objectives:

- To critically evaluate existing peer assessment literature and formulate a conceptual framework which has the potential to explain, how peer assessment influences different aspects of children's learning;
- To design a small scale interpretive and action research study which will involve practitioner intervention in terms of modifying aspects of the social context of peer assessment, such as children's use of effective talk through the *Thinking Together* talk intervention, so pupils' learning and outcomes from this activity are enhanced;
- In light of the findings generated, to propose a model of peer assessment as a differentiated and discursive practice where teachers consider the individual needs of learners so that they are able to use language as a tool for providing effective peer feedback in PA task contexts; and

- To formulate recommendations for teachers and schools around how they might use peer assessment in ways which enhance the quality of younger children's learning.

I now turn my attention to outlining the overall structure of the study.

Overview of chapters

This thesis is organised into four further main chapters as follows:

Chapter two

In this chapter, I first define formative assessment and peer assessment before critically evaluating the most recent literature and identifying where further opportunities for research exist around the substantive topic of peer assessment, how PA processes contribute to learning outcomes for pupils and how this kind of assessment might be used in ways which support younger pupils' learning. In this chapter, I also formulate a conceptual framework and identify several research questions, which emerge from the review of literature, and which are critical in extending current understanding of PA influences on pupils' learning.

Chapter three

In chapter three, I argue why I positioned my research within the interpretive and social constructivist research paradigms, summarise and explain my research strategy, provide details of participants and informants and justify which research methods were most suitable for answering the research questions which emerged from my literature review. I also discuss how data were analysed, how key ethical issues were addressed and the interpretive criteria against which I believe my study is most appropriately judged.

Chapter four

In chapter four, I present the outcomes of my data analysis as research findings and relate them to each research question developed in light of my review of literature discussed in chapter two.

Chapter five

In the final chapter, I discuss my findings from chapter four in relation to wider peer assessment research, identify which theories and concepts may underpin aspects of pupils' learning in contexts of peer assessment and suggest the implications of my findings for classroom practice and further research in this area. I propose a model of peer assessment as a differentiated and discursive practice which considers how pupils' characteristics, which in this study include prior attainment, behaviour, shyness and articulateness, influence the degree to which they are able to use language for mediating effective PA practice. Here I argue that although some children are able to use talk as an effective tool for learning, others might need to be guided to do this so they acquire the necessary interpersonal skills in order to engage in high quality verbal feedback with one another.

Having briefly identified the content of each chapter, chapter two now provides a critical overview of peer assessment literature and several research questions are identified which I address in my study around peer assessment.

Chapter 2: Literature review and conceptual framework

In the introductory chapter, I established that the focus of my study is to explore aspects and processes of peer assessment which are linked to pupils' learning in order to gain a greater understanding, as a practitioner and researcher, about how PA can be used in ways which enhance the quality of younger children's learning. In this chapter, I critically evaluate studies which are relevant to my research focus, determine where gaps in PA research exist and identify the specific research questions my research addresses.

I first argue that currently peer assessment studies, and those related to formative assessment, are underpinned explicitly or implicitly by theories of motivation surrounding learners' goals (Dweck, 1986; Butler, 1987). These studies focus on PA processes such as developing students' confidence in giving task-involving peer feedback which helps to develop a mastery-oriented approach to learning amongst pupils (Dweck, 1986; Butler, 1987, 1988; Kamins and Dweck, 1999). Recent literature has also concentrated on processes which involve pupils making good use of peer feedback so they can make progress and on PA outcomes such as improvements in the quality of written drafts or skills in self-assessment (Olson, 1990; Catterall, 1995). There are, however, only a few studies which explore how the social context of peer assessment, and the social processes associated with this, are related to students' learning during peer assessment (e.g. Tsui and Ng, 2000; Van Gennip et. al., 2009, 2010).

After reviewing these studies, I argue that they tend to be undertheorised and tend to overlook the importance of guiding younger pupils to develop key interpersonal skills. Such skills enable pupils to collaborate with one another and use talk as an effective tool for learning in PA task contexts. Then, drawing into sharper focus the social context of peer assessment in the primary school classroom setting, I suggest that children might gain more from PA by participating in *Thinking Together* – an

approach which develops pupils' use of *exploratory talk* where they learn to hypothesise, reason and collaborate effectively. I argue that this kind of talk and peer assessment are conceptually linked and thus the former has the potential to improve the quality of children's learning through use of the latter. After this, I explore concepts and theories which may underpin and explain how learning occurs through particular socio-cultural facets of PA processes, drawing in particular on the theories of Vygotsky (1978), Salomon and Perkins (1998) and Mercer (2000). In the final part of the chapter, and in light of my review of relevant empirical and theoretical literature, I formulate several research questions which I address in my study. I want to begin my review by critically considering ways in which both formative assessment and peer assessment have been defined to clarify what these concepts involve.

How has formative assessment and peer assessment been defined?

As previously mentioned, peer assessment forms part of a broader range of formative assessment techniques including questioning strategies which challenge learners, effective feedback and formative use of summative assessments, such as tests and examinations, to support and in some cases accelerate pupils' learning (Black and Wiliam, 1998; Black et. al., 2003; Wiliam, 2011). There has, however, been some debate about formative assessment's exact meaning (Dunn and Mulvenon, 2009). Sadler (1989) argues that it involves teachers carefully evaluating the responses students provide and reacting in suitable ways which facilitate learning. Formative assessment also involves goal setting by educators and pupils who collectively identify ways in which these can be successfully achieved (Black and Wiliam, 1998; Black et. al., 2003; Gipps, 1994, 2011; Wiliam, 2011).

Nevertheless Black (2007) has raised concerns that teachers sometimes consider their practice as being formative when actually it involves summative assessment. For example, some teachers will test children without using these results in a formative way by merely identifying gaps that need to be addressed by learners (Drummond, 2003; Stiggins, 2005; Black, 2007). Therefore, a central aspect of successful formative assessment is that it culminates in students mastering new knowledge, understanding

or skills in a particular area (Tunstall and Gipps, 1996; Drummond, 2003; Gipps, 1994, 2011).

In primary and secondary schools, formative assessment has been described as *Assessment for Learning* (Gipps, 1994, 2011). This is in contrast to *Assessment of Learning* which focuses on measuring a student's ability through traditional summative assessments such as tests and examinations (Gipps, 1994, 2011). Although AfL and formative assessment have been used almost interchangeably by practitioners and researchers, Swaffield (2011) has recently suggested that there are important differences. She argues that AfL focuses on short term goals whereas formative assessment may happen over a longer duration; AfL is a process where students are actively involved yet learners might be more passive throughout formative assessment; and formative assessment may only involve students mastering learning objectives in a particular subject area whereas AfL also can be used to promote 'learning how to learn' (p.443). Whilst acknowledging Swaffield's (2011) assertion about these differences, it seems that AfL and formative assessment still share the key aim of helping students to learn by receiving effective feedback which drives learning forwards (Black and Wiliam, 1998; Black et. al, 2003; Wiliam, 2011). In other words, both involve the realisation of assessment practices as embedded features of learning. Peer assessment provides one way of ensuring learners are actively involved in this process.

Summative definitions of peer assessment have involved students giving one another grades or marks for their work (Topping, 1998; Strijbos and Sluijsmans, 2010). These definitions tend to focus on how peer assessment may be used in higher education where the outcome counts towards a degree level qualification (Topping, 2010). Nevertheless, Topping (2005) claims that scoring another peer's work might make students feel uncomfortable as it 'places them too much in a teacher-like role' (p.640). Furthermore, such an approach is likely to limit the effectiveness of learning during PA as a grade or mark alone may fail to diagnose strengths and developmental areas in the assessed piece of work (Butler, 1987; Black et. al., 2003; Davies, 2006). In addition to this, comment only peer assessments are more likely to inspire students to

learn as grades or scores might distract them from the content and qualitative dimensions of the feedback given (Butler, 1987; Black and Wiliam, 1998; Kamins and Dweck, 1999).

In support of this notion, most authors have concentrated on using peer assessment formatively so students learn something from it (Falchikov, 1995; Topping and Ehly, 1998; Falchikov, 2005; Wen et. al., 2006; Falchikov and Goldfinch, 2000; Topping, 2009). For example, Kollar and Fischer (2010) suggest that PA involves three elements where learners engage with a task, are assessed on the outcome of this by a peer and then use this feedback to improve the quality of their work (Kollar and Fischer, 2010). Nevertheless, Kollar and Fischer (2010: 347) propose that peers could also assess the learning ‘processes’ that lead to outcomes during PA. Falchikov and Goldfinch (2000) also suggest that, during this process, students use success criteria to evaluate the quality of one another’s work. In similar vein, Wen et. al. (2006) suggest that peer assessment involves students focusing on how well their peer is learning. In PA, a peer will assess and be assessed so it may not be possible for role of assessor and assessee to be clearly defined (Xiongyi and Steckelberg, 2010). Additionally Topping (2009) suggests that PA is done in symmetrical pairs where students are operating at a similar cognitive level. By contrast, other researchers take the view that studies should now explore peer assessment in asymmetrical pairs, which has implications for some of the theories which underpin it as I discuss further on (Van Gennip et. al., 2009). If up to this point I have considered definitions of peer assessment, it is now time to outline some theories I have found useful in understanding how a number of formative peer assessment practices reported in the literature might influence pupils’ learning.

Motivational theories and formative peer assessment

In the PA and formative assessment field, literature has focused on the need for students to be given high quality task-involving feedback (Black and Wiliam, 1998; Black et. al., 2003). This is either implicitly or explicitly underpinned by research which explores how ‘different kinds of feedback’ influence the ‘motivational

orientations' of learners (Butler, 1987: 480). This section therefore briefly reviews these studies which help to provide a context for the focus, in many extant PA studies, on ensuring students provide relevant, task-involving peer feedback so their partner's learning is optimised. Table 2.1 provides an overview of these studies in terms of their foci, methods and key findings.

Table 2.1: *Studies which explore how feedback influences learners' goals*

Author	Year	Student number	Students' ages	Institution	Where	Research approach & data collection	Focus of study
Butler	1987	200 (94 girls; 106 boys)	11 (fifth and sixth grade)	Elementary	Israel	Pre-test-post-test four treatment comparison (comments; grades; praise; no feedback) Questionnaire assessing pupils' interest in tasks	Impact of different kinds of feedback on the extent to which learners are intrinsically motivated
Butler	1988	132 (64 girls; 68 boys)	11 (fifth and sixth grade)	Elementary	Israel	Pre-test-post-test three treatment comparison (comments; grades; comments + grades)	Impact of different kinds of feedback on students' motivation and interest in task
Kamins and Dweck	1999	Study 1: 67 (34 boys; 33 girls)	5-6	Elementary	-	Post-test three treatment comparison of criticism received: person, outcome or process + interviews + post-treatment self-assessments	Impact of ego involving (person-centred) and task involving (process-centred) feedback on learners' success and resilience when faced with further tasks
		Study 2: 64 (32 boys; 32 girls)	5 (kindergarten)	Elementary	-	Post-test three treatment comparison of praise received: person, outcome or process + interviews + post-treatment self-assessments	

The kinds of feedback given to students may affect whether they believe that effort or ability influences their academic outcomes (Dweck, 1986). For example, Butler (1987, 1988) distinguishes between ego and task-involving feedback which might be given to

students. The former involves assessors praising a student or assigning scores or grades to a piece of work whilst the latter involves commenting on how successfully the task in question has been met (Butler, 1987, 1988).

Importantly Butler's (1987) study found that students receiving only task-involving comments about their work were more intrinsically motivated and 'expressed most interest' (p.481). These students also viewed that the effort they put in to achieving a successful outcome was more important than their ability and they significantly outperformed peers whose work was graded. By contrast, work that was graded or praised reinforced 'ego-involving' beliefs amongst learners that outcomes are influenced by ability rather than effort. This was particularly detrimental for 'low achievers' who did not view the 'task as relevant to competence development' (Butler, 1987: 481). In addition to this, Butler (1987) found that the 'motivational orientation' of students receiving grades/praise and written feedback was similar to that of students whose work was just graded. As mentioned earlier, this was because such students discarded the written feedback simply focusing on the grade and how this was a reflection of their ability in relation to others (Butler, 1987, 1988).

The type of feedback students receive may therefore influence the extent to which they adopt certain kinds of goals during peer assessment (e.g. Dweck, 1986; Kamins and Dweck, 1999; Grant and Dweck, 2003). Dweck (1986) has identified performance and learning goals that students might adopt. Performance goals are when students focus on outcomes such as examination results and aim to perform positively in relation to other peers. Moreover, such learners might avoid demanding tasks as these may negatively affect their ego resulting in them being compared unfavourably with other students (Grant and Dweck, 2003). These goals are underpinned by the idea that ability is predetermined (Dweck, 1986). Ego-involving feedback, which centres on the person, is likely to encourage students, during peer assessment, to adopt such goals (Dweck, 1986; Kamins and Dweck, 1999).

On the contrary, learning goals emphasise that effort can influence intelligence and improvement at something is possible (Dweck, 1986; Kamins and Dweck, 1999; Grant

and Dweck, 2003). According to Dweck (1986), learners adopting such goals are ‘Mastery-Oriented’ and resilient when faced with setbacks and challenges. A culture in classrooms, where students adopt mastery-oriented goals, is likely to be promoted by the use of task-involving peer feedback which concentrates on the task in question and the extent to which it has been mastered successfully rather than the person (Butler, 1987, 1988).

Extant literature: quality, use and outcomes from peer assessment

A focus on improving the quality of peer feedback

In accordance with the previous ideas, much existing literature concentrates on improving the quality of students’ learning during PA by ensuring that task-involving feedback is given between peers (Harris and Brown, 2013; Boon, 2015). This type of feedback relates to the success criteria of the task in question so learners are inspired to use it to enhance the quality of their work (Topping and Ehly, 1998; Smith et. al., 2002; Black et. al., 2003; Miller, 2003). Table 2.2 demonstrates how training, success criteria, prompts, practice, and modelling of the PA process have been used to enhance the quality of peer feedback in a range of settings from primary schools to higher education institutions.

Table 2.2: *Studies concentrating on improving the quality of peer feedback*

Author	Year	Student number	Students’ ages	Institution	Where	Research approach & data collection	Focus of study
Berg	1999	46 (24 male, 22 females)	17-56	University (ESL students)	US (East Coast)	Control (untrained) and experimental (trained) group. Pre and post-test comparison of writing quality.	Training students to respond to peer’s work so feedback improves its quality
Yarrow and Topping	2001	28 (16 girls, 12 boys)	10-11 (Year 6)	Primary school	UK	Action Research project involving two conditions: experimental (peer tutoring) & control (no peer	Effects of peer interaction on writing

Author	Year	Student number	Students' ages	Institution	Where	Research approach & data collection	Focus of study
						tutoring). Pre and post-test comparison of pupils' writing quality in both conditions.	
Orsmond et. al.	2002	22	First year undergrad	University (Staffordshire)	UK	Student work (poster) + questionnaire + quantitative analysis of peer and tutor marks	Students applying marking criteria to examples of work
Sluijsmans et. al.	2002	93 (19 male, 74 female)	Student teachers (20-21)	University	Netherlands	Pre-test-post-test design + questionnaire	Impact of training on PA skill + student perceptions
Smith et. al.	2002	103	Second year university students	University (Liverpool John Moores)	UK	Action Research qualitative + quantitative analysis of questionnaires + peer marks for posters	Quality of peer feedback enhanced due to training intervention
Min	2005	18	University students	University	Taiwan (south)	Quantitative + qualitative analysis of peer feedback (pre and post-intervention)	Impact of training on quality of peer review
Yu et. al.	2005	52	Sixth grade students	Primary school	Taiwan	Quantitative analysis of questionnaires + open ended questions	Peer assessment and 'question posing'
Min	2006	18 (16 females, 2 males)	19	University	Taiwan (south)	Quantitative + qualitative analysis of changes to the quality of writing (pre and post-intervention)	Impact of peer review training on standard of reviewee's writing
Gielen et. al.	2010a	85 (63% male, 37% female)	Seventh grade (12-13)	Secondary school	Belgium	Quasi-experimental pre-test-post-test control group design + questionnaire (around student views on PA)	Peer versus teacher feedback; use of question prompts for delivering peer feedback
Gielen et. al.	2010 b	43 (28 males, 15 females)	Seventh grade (12-13)	Secondary school	Belgium	Quasi-experimental pre-test-post-test	Enhancing quality of peer

Author	Year	Student number	Students' ages	Institution	Where	Research approach & data collection	Focus of study
						control group design	assessment/ feedback
Van Steendam et. al.	2010	247 (42% female, 58% male)	Average age was 18.5	University	Belgium	2x2 factorial design (pre and post-test)	Modelling and practice (imitation) important for developing PA skills
Boon	2015	6	10-11 (Year 6)	Primary school	UK (West Mids)	Action Research case study + (pupil work, informal interviews, mind maps & open ended observation)	Training children to develop PA skills

The use of success criteria is important as it demonstrates that the assessor is clear about what needs to be done to be successful and this understanding might help them to self evaluate their work later on (Topping and Ehly, 1998; Sluijsmans et. al., 2002; Black et. al., 2003). Success criteria is also important as peers will have a clear idea about how to improve the quality of their work in light of feedback particularly if examples are used to support the comments made by a peer (Sluijsmans et. al., 2002; Yu et. al., 2005; Min, 2005, 2006; Gielen et. al., 2010a, b). Before peer assessment, children should first therefore evaluate an anonymous piece of work, outlining strengths and weaknesses and practice giving feedback on how well the task has been accomplished (Berg, 1999; Orsmond et. al., 2002; Sluijsmans et. al., 2002; Smith et. al., 2002; Black et. al., 2003; Van Steendam et. al., 2010).

Despite this, it might be a challenge for students to recall key elements of the success criteria, so they may need prompts such as checklists when assessing writing (Min, 2006; Topping, 2009; Gielen et. al., 2010b). For example, Yarrow and Topping (2001) focused on peer assessment with twenty-eight primary school pupils. These learners were reminded about what should be included in their peer's work through key questions. Min (2006) also used checklists to remind eighteen students, learning English as a Second Language, about the features their peers should have included in

work. The author found that comments were more relevant to the task and focused less on secretarial features in writing. Finally, a study focusing on Dutch secondary school pupils found that checklists helped them to recall key aspects of success criteria when giving feedback (Gielen et. al., 2010a, b).

Teachers and instructors might also use prompts to model peer assessment for children and give them practice at developing assessment skills (Hansen and Liu, 2005; Min, 2005, 2006; Topping, 2009; Van Steendam et. al., 2010). Instructor's modelling in one study focused on identifying mistakes, giving reasons and formulating next steps for a fictional peer (Min, 2005). This modelling helped students to become familiar generating feedback which was more relevant to the overall quality of the text written (Min, 2005). Notwithstanding this study took place in a ESL classroom so it is unclear whether readers can make naturalistic generalisations to other contexts such as primary schools (Stake, 1978). In addition to teachers' modelling, students need time to practice peer assessment frequently (Van Steendam et. al, 2010). This regular practice might help children to develop skills so that they can reliably and accurately peer assess (Topping, 2009; Van Steendam, 2010). Until recently most PA studies, similar to the ones previously reviewed, took place in the context of ESL classrooms, secondary schools or higher education (e.g. Min, 2005, 2006; Gielen et. al., 2010a, b; Topping, 2010).

Nevertheless, these findings helped to inform and shape an action research enquiry I undertook which focused on the development of peer assessment skills of writing in a year six (10 and 11 year olds) primary school classroom (Boon, 2015). In this study, I encouraged the children to use checklists to help them recall success criteria, modelled how to give reasons about the effectiveness of a piece of work and provided them with time to practice developing assessment skills similarly to strategies previously mentioned (Boon, 2015). I used a range of methods of data collection, including mind maps, children's work and informal interviews in order to compare and contrast the perspectives of different pupils in the class (Cooper and McIntyre, 1996). The outcome of this piece of practitioner research was that children's feedback related more directly to the task in question (Min, 2005, 2006; Gielen et. al., 2010a, b; Boon,

2015). Pupils also appeared to be engaging more with success criteria and giving effective reasons for their comments (Min, 2005; Gielen et. al., 2010b; Boon, 2015). As this research focused on year six pupils, it would be interesting to examine the extent to which findings from this context can be transferred to those with younger learners. It is possible that some of the strategies used might need refining with younger children who are at a different stage of development from those in year six.

Claxton (1995: 342) also argues that ‘judgements of quality will never reduce to checklists of criteria’. Such approaches might emanate from education systems in the world where both teachers and learners are restricted by nationally driven, top-down curriculum objectives and performance standards against which pupils are measured (Darling-Hammond, 2010). The checklists might therefore ensure students are becoming successful at meeting such objectives which, according to governments, signal standards are rising (Darling-Hammond, 2010). Claxton (1995) acknowledges this approach might promote ‘attainment’ but suggests this is a narrow view of the qualities we are trying to develop in learners. He contests that learners need to be more actively involved in generating success criteria for themselves as this cannot always be decided in advance. This might be the case, for instance, when children are producing a piece of artwork where a prescriptive approach might inhibit the quality of work and stifle creativity (Claxton, 1995).

Moreover, he suggests that assessment might be more ‘intuitive’ (p.340) where learners independently consider what makes a piece of work successful. He suggests that approaches, involving learners in assessment, should also promote ‘learning acumen’ (Claxton, 1995: 340) and help them to develop a range of learning skills too. ‘Learning acumen’ might focus on learners collaborating, being resilient and persevering when presented with challenging tasks (Claxton, 1995). It might also require learners to be resourceful which involves them asking effective questions, making links between different ideas and concepts and using resources around them including peers who may be able to provide guidance and support. Finally ‘learning acumen’ also involves learners discussing the learning they have been engaging in and being reflective by planning and evaluating pieces of work and considering their

strengths, weaknesses and next steps (Claxton, 1995). Thus it is possible that approaches mentioned in previous peer assessment studies (e.g. Yarrow and Topping, 2001; Min, 2005, 2006; Gielen et. al., 2010b; Boon, 2015), which are designed to ensure peer assessments are more accurate and reliable, might enhance ‘student achievement’ but fail to promote ‘students’ *abilities as learners*’ (Claxton, 1995: 339-340) in terms of their ability to collaborate and be resilient, resourceful and reflective when faced with challenging tasks. This may have implications for how effective peer assessment practices are developed in the future. In this doctoral study, I wanted therefore to explore the success of peer assessment without using checklists and, as I examine in greater depth further on, focus more on the role that social processes such as classroom talk and dialogue play in scaffolding the quality of children’s learning instead in more open ended peer assessment tasks.

The importance of using feedback and peer assessment’s outcomes

Further studies have focused on the outcomes of peer assessment and how students can make good use of peer feedback in order to secure these. Table 2.3 provides an overview of these studies.

Table 2.3: *Studies focusing on the use of peer feedback or peer assessment’s outcomes*

Author	Year	Student number	Students’ ages	Institution	Where	Research approach & data collection	Focus of study
Olson	1990	93 (49 girls, 44 boys)	Sixth grade	Elementary	US	Quasi-experimental design + quantitative analysis of pupil work in both conditions	Impact of peer feedback on quality of students’ writing
Catterall	1995	120	Marketing students	University	UK (Ulster)	Peer marked assignments + tests + questionnaire	Impact of PA on students’ learning and skills in self-evaluation
Tanner and Jones	2002	48	11-12	Secondary	UK	Pre-test-post-test control group design	Influence of megacognitive skills (e.g.

Author	Year	Student number	Students' ages	Institution	Where	Research approach & data collection	Focus of study
						(quasi-experimental) + interviews	peer assessment) on pupils' mathematical learning
Van den Berg et. al.	2006	168	History students	University	Utrecht	PA condition (137 students) and control condition (37 students)	Using PA in higher education in ways which optimise students' progress and learning
Boon	2016	6	10-11	Primary	UK (West Mids)	Action Research case study design + pupils' work + informal interviews + observation + mind map	Ensuring peer feedback is used by pupils as a tool for learning

Several authors claim that feedback must be used by peers in order for them to make learning gains (e.g. Boud, 2000; Gielen et. al., 2010b; Wiliam, 2011). Van den Berg et. al (2006) found that higher education students, in History, gain more from PA when they have 'sufficient time' to enhance the quality of their writing following 'peer feedback' (p.355). In a similar vein, Olson's study (1990) provides evidence to suggest that, when peer feedback is used by younger children in elementary schools, it can positively influence the quality of their non-fiction writing.

In this study, all children had lessons in autobiographical writing which took place in one of four groups. In the first group, children were only taught how to edit and revise their autobiography by a teacher. In the second group, children only received feedback from their peer but no teacher instruction on how to edit and revise work. In the third group, children received guidance on how to revise their writing and were also given the opportunity to engage in peer feedback. The fourth group acted as a control and were neither taught how to edit and revise work nor given peer feedback. Findings suggest that children who experienced peer feedback and guidance from their teacher on revision strategies produced writing that was of a superior quality to other groups in

terms of its secretarial features. Children only receiving peer feedback produced 'drafts that ranked second in quality' (Olson, 1990: 27) in terms of similar features but improved the most when considering the work's 'rhetorical quality' (p.27) which considered, for example, audience and purpose in more detail. The findings suggest that, if peer feedback is acted upon, it can help younger children to make more progress than those who do not have the opportunity to engage in peer feedback with other learners. However, a limitation of Olson's (1990) study is that it does not exemplify the specific processes, such as talk and discourse, which lead to children making good use of this feedback so their writing outcomes improved.

Nevertheless, I carried out a piece of action research which explored some of the ways in which children, in my year six class, could make more effective use of peer feedback so it had a greater impact on the quality of their learning (Boon, 2016). In this study, I focused on a small group of year six children who were, at the time, producing an informative letter which provided a fictional time traveller with key information on life in 2011. The research design was interventionist and drew upon strategies that had promoted greater use of peer feedback in settings with older students. These strategies focused on training children to develop relevant task-involving feedback, giving them time to discuss this with each other and ensuring they considered how peer comments had been used to improve the writing's quality (Lewin, 1946; Black et al. 2003; Boud 2000; Whitehead and McNiff, 2006; Gielen et al. 2010a, 2010b; Hansen and Liu 2005; Kamins and Dweck 1999; Kollar and Fischer 2010; Olson 1990; Tsui and Ng 2000; Van den Berg, Admiraal, and Pilot 2006). These strategies ensured children made greater use of their peers' comments when making improvements to the quality of written drafts (Boon, 2016). Nevertheless, in this study, I explored peer assessment with year six pupils so it is uncertain whether these strategies would have the same influence on younger children's learning. There is also limited theoretical debate about how some of the processes in the social context of the classroom, such as peer talk and discussion, lead to pupils attending to feedback more than they had done prior to the intervention (Vygotsky, 1978; Salomon and Perkins, 1998; Boon, 2016).

In addition to this, the studies previously mentioned pay insufficient attention to other factors which could influence the degree to which pupils respond to peer feedback (Dann, 2014). Current strategies tend to be ‘mechanistic’ focusing on students using feedback so they can make progress and ‘close gaps’ (Dann, 2014). However, such approaches ignore the possibility that feedback might be used by students with differing levels of expertise (Dann, 2014). Moreover, scant attention has been paid to the voice of pupils in the literature which explore the reasons why feedback might not always be an effective tool for learning (Dann, 2014). An extract from Dann (2014: 152) supports this notion: ‘much... research on feedback... misses the pupils’ perspective’. A greater focus on pupil voice might deepen our current understanding of how different learner ‘mindsets’ and beliefs influence how feedback is received, interpreted and acted upon by different groups of students (Dann, 2014: 154). These groups might, for instance, focus on students’ motivational orientations, levels of articulateness, personality types, social backgrounds as well as their academic ability (Brown and McIntyre, 1993; Cooper and McIntyre, 1996). A more detailed understanding of the reasons why feedback has varying success on the impact of different groups of pupils’ learning might advance our understanding of how the social context, and processes and factors associated with it, influence peer assessment’s outcomes (Brown and McIntyre, 1993; Dann, 2014).

Other writers in the field of formative assessment have also reported on the outcomes of peer assessment without considering in depth the processes or theories that might explain these. This is particularly the case with self-assessment. At present, it is understood that peer assessment can help pupils with self-assessment by providing learners with skills to evaluate the quality of their individual work (Sadler, 1989; Catterall, 1995; Black and Wiliam, 1998; Tsui and Ng, 2000; Black et. al., 2003). An example of this is a study in higher education where over three quarters of marketing students felt that their skills in self-assessment had improved because of their participation in peer-assessment (Catterall, 1995). A drawback of this study, though, is that it inadequately explains the processes leading to such outcomes. Nevertheless, other authors have suggested that peer assessment enables students to become familiar

with success criteria for a specific task and they are therefore more reflective when considering what needs to be included in their work to ensure a successful outcome (Sadler, 1989; Tanner and Jones, 2002; Black et. al., 2003; Lee, 2006).

For instance Tanner and Jones (2002: 157) found that peer assessment in mathematics ensured students became more reflective and through this they ‘learned to evaluate and regulate their own thinking’. Lee (2006) has also suggested that discussions amongst pupils during peer assessment might result in them having a better understanding of how to be successful at meeting individual goals too (Lee, 2006). Furthermore, Tsui and Ng (2000) found that students became more conscious of the weaknesses in their individual pieces of work as a result of ‘reading peers’ writings’ (p.166). Nevertheless, similarly to previous studies mentioned (Olson, 1990; Boon, 2016) such suggestions and insights tend to be undertheorised and derive from contexts with older students. Such studies have also tended to neglect, or insufficiently address, the social processes that might be involved in peer assessment which may also influence the quality of younger pupils’ learning outcomes.

Social processes in peer assessment research

The previous sections reviewed research which has mainly focused on peer assessment processes such as giving and using peer feedback effectively and on the outcomes of PA particularly in writing. In such studies, students assessed using written rather than verbal feedback. However, recently Kollar and Fischer (2010) have argued that further research should explore ‘more interactive’ and interpersonal kinds of PA. Despite this, to date there have only been a few studies which investigate how social factors or processes, including verbal feedback, influence the quality of peer assessment. Table 2.4 provides an overview of these in terms of their foci, sample, methods and findings.

Table 2.4: *Social processes in peer assessment research*

Author	Year	Students' ages	Student number	Institution	Where	Research approach & data collection	Focus of study
Tanner and Jones	1994	Secondary	-	Secondary	Wales	Action Research + video/audio recordings + interviews + field notes	Peer assessment's impact on mathematical modelling
Tsui and Ng	2000	27	Grades 12 and 13	Secondary	Hong Kong	Questionnaire + student work + semi-structured interviews	Impact of teacher and peer feedback on the quality of students' writing
Van Gennip et. al.	2009	-	-	Secondary schools/ Higher education	-	Systematic review of studies (1990-2007)	Interpersonal factors and peer assessment
Van Gennip et. al.	2010	16-19	62 (all male)	Secondary (vocational education)	Netherlands	Pre-test-post-test control group design + questionnaire (pre and post-intervention)	Influence of interpersonal factors on PA

Tanner and Jones' (1994) study, focusing on Welsh secondary school students, found that students' peer assessments of one another's ongoing thought processes helped them to become more familiar with the process of 'mathematical modelling'. This is where: students are presented with a problem that exists in real life; they convert this into a mathematical problem using a mathematical model; find a solution to the original problem; and consider the strengths and limitations of this and the model used in the context of the original problem (Tanner and Jones, 1994).

In this study, children focused on verbally evaluating the developing thoughts and ideas of their peers in relation to the problem solving context. For instance: ideas were critiqued by others before decisions were made; peers were encouraged to question one another if something was unclear and provide developmental points; and there was

an expectation that feedback would be supported with mathematical reasons (Tanner and Jones, 1994). Thus, peer assessment enabled students ‘to test their... subjective constructions through discussion and comparison with others’ (Tanner and Jones, 1994: 424). Such an approach might therefore help learners to become more reflective and resilient which are arguably important learning skills for them to develop too (Claxton, 1995).

In accordance with the findings of Tanner and Jones (1994), it may be more beneficial for younger pupils too to provide peer feedback on the thought processes of their partner during problem solving activities which require them to hypothesise, reason and speculate (Kollar and Fischer, 2010). In turn, this might mean that peer assessment takes place more on the ‘process’ of learning than its outcomes as has been the case with the research reviewed earlier on (Kollar and Fischer, 2010). It also means that the kinds of checklists mentioned by previous research in writing (e.g. Yarrow and Topping, 2001; Min, 2005; Gielen et. al., 2010a, b) become irrelevant as students formulate success criteria as the task progresses due to discussion and negotiation (Claxton, 1995).

I felt this might prove an important focus for my doctoral study as previous PA research has tended to neglect mathematics altogether with regard to younger learners. Yet, from my experience, peer assessment in primary school mathematics can often focus on a set of answers given by a pupil and the accuracy of these. I have found that a limitation of such an approach is that it can reduce peer assessment to a form of summative assessment where pupils simply mark the outcomes of a peer’s activity without engaging with or negotiating success criteria (Black et. al., 2003; Black, 2007). Consequently the learning associated with such activities tends to be limited. Therefore, in this study, I pay much greater attention, than previous research has, to the role that verbal peer feedback plays in more open ended mathematical tasks.

Further research around social processes has examined the impact of peer assessment on interpersonal factors and student learning. For example, Van Gennip et. al. (2009: 43) outlined several ‘interpersonal variables’ which might influence students’ learning

in contexts of PA. They mention ‘psychological safety’ and ‘trust’ which involves peers feeling comfortable in a PA task context so they are able to provide honest and reliable feedback to one another and be confident that their partner will do the same (p.43). They also include ‘interdependence’ where peers rely on one another to provide feedback and accomplish a task. Finally, they highlight the importance that peers have a ‘shared understanding’ about what it is they are trying to achieve (p.43). Van Gennip et. al. (2010) explored how these factors are affected by peer assessment. In this study, students who had taken part in PA had more confidence in their assessor, felt more secure when receiving feedback and were more united with their peer. The authors conclude that ‘students in a peer assessment setting ... feel safer and perceive more unanimity in goals’ (Van Gennip et. al., 2010: 288). I was interested to explore, as part of my doctoral study, how comfortable younger children felt about participating in peer assessment particularly as other research has shown that students can sometimes feel uncomfortable with the PA process and actually prefer receiving feedback from a teacher (Pryor and Lubisi, 2002; Frankland, 2007; Crossouard, 2012; Harris and Brown, 2013).

Whilst previous studies have focused on some social processes, they arguably pay insufficient attention to other important features of the social context of peer assessment including aspects of communication such as speaking and listening, collaboration, talk and dialogue (Mercer, 2000; Hari and Kujala, 2009). Moreover, they do not address how the *quality* of communication and talk, in contexts of peer assessment, might also impinge upon pupils’ learning (Kollar and Fischer, 2010). These studies also neglect the possibility that students’ interpersonal skills might affect the extent to which they are able to engage in peer assessment. These areas are arguably important aspects of the social context of peer assessment as I explore next.

Guiding children to develop interpersonal skills in contexts of PA

A number of studies have found that, unless younger children are guided to develop key interpersonal skills, their success at working together in small groups is limited (Baines et. al., 2007, 2009; Galton and Hargreaves, 2009; Baines et. al., 2014). In

particular, Baines et. al. (2014: 1) have argued that: ‘... within the majority of primary classrooms, children sit in groups, but rarely work together as groups... [and]... when peer interaction takes place, it is often of low quality’. Therefore, if children are not guided to develop key communication skills, peer assessment’s impact on the quality of their learning might be limited as they will be unable to use talk effectively as a tool for learning (Mercer, 2000; Mercer et. al., 2004; Baines et. al., 2007, 2009; Galton and Hargreaves, 2009; Baines et. al., 2014).

In contexts of peer assessment, this might lead them to use a kind of talk, labelled by Mercer (1995, 2000), as *disputational*. This involves children stating their opinion with little evidence of reasoning or justification. They may also be unable to recognise alternative perspectives and the result can be disagreements and quarrels between them. There may also be ‘individualised decision-making’ (Mercer, 1995: 104). Mercer (1995, 2000) suggests that such dialogue is unlikely to be helpful as a learning tool for children since learners may fail to draw on ‘... language for collaborative activity’ (Mercer and Sams, 2006: 518). I wanted to find out, as part of my doctoral study, which specific groups of children used this kind of dialogue in contexts of PA and how this might be influenced by their underlying characteristics such as prior attainment or levels of articulateness (Cooper and McIntyre, 1996).

A second kind of talk Mercer (1995, 2000) describes is *cumulative* where children are more encouraging towards one another, agree with the ideas of other members of a group but build on suggestions uncritically and without question. Similarly to *disputational* talk, in my study, I wanted to find out which groups of children might use this kind of talk when engaging in PA and how this might be influenced by pupil characteristics (Cooper and McIntyre, 1996). I was also interested to find out whether there were any pupils who benefitted from using *cumulative talk* perhaps as a way of encouraging one another and feeling safe and valued in the PA task context (e.g. Van Gennip et. al., 2009, 2010) even though there may be less reasoning evident than in the third kind of dialogue mentioned by Mercer which is *exploratory talk* (1995, 2000).

Exploratory talk involves learners hypothesising, reasoning and speculating. Pupils' ideas are subject to critical scrutiny and there is an emphasis on learners reaching consensus through having a rich and fruitful discussion (Mercer, 1995, 2000). Children are also expected to justify their opinions using evidence (Dawes et. al., 2000). Interestingly this kind of talk shares similarities with some of the skills required by effective peer assessors particularly the emphasis on hypothesising (I think this...) and reasoning (because...). Indeed in peer assessment, as previous studies have found, students need to critique one another's ideas, ask questions, justify feedback and reflect upon successes (Tanner and Jones, 1994; Min, 2005, 2006; Gielen et. al., 2010a, b; Boon, 2015).

However, as previously mentioned, unless guided, children may be unaware how to use talk effectively in contexts of PA (Galton and Hargreaves, 2009; Baines et. al., 2007, 2009, 2014). In this study, I therefore wanted to examine ways in which different groups of pupils could be guided to use talk and dialogue more effectively as a tool for learning so it had a greater impact on the quality of children's learning during peer assessment. One such way children have been guided to use talk effectively is through the *Thinking Together* intervention and table 2.5, below, provides an overview of studies which report the impact of this intervention in various contexts.

Table 2.5: *Studies evidencing the impact of interventions on pupils' group work and discussion*

Author	Year	Student number	Students' ages	Institution	Where	Research approach & data collection	Focus of study
Mercer et. al.	1999	60	9-10	Middle schools	UK (Milton Keynes)	Pre-test-post-test control group design (scores on Raven's Progressive Matrices test compared) + observation + video & audio recordings	Impact of <i>Thinking Together</i> on children's use of effective talk and their individual reasoning

Author	Year	Student number	Students' ages	Institution	Where	Research approach & data collection	Focus of study
Mercer et. al.	2004	406	9-10	Primary schools	UK (Milton Keynes)	Pre-test-post-test control group design – scores compared on Raven's Progressive Matrices test + science SATs + observation of talk in groups + interview data	Impact of <i>Thinking Together</i> on children's use of effective talk, individual reasoning and attainment in science
Rojas-Drummond and Zapata	2004	88	Grades 5 and 6 (10-12)	Primary schools	Mexico city (south)	Pre-test-post-test control group design – scores compared on modified Raven's Progressive Matrices test + video recordings	Impact of <i>Thinking Together</i> on quality of argumentation + problem solving skills
Littleton et. al.	2005	-	-	Primary school (KS1)	UK	Semi-structured interview + transcripts of children's talk from case study + quantitative analysis	Impact of <i>Thinking Together</i> on children's use of effective talk and their individual reasoning in KS1
Wegerif et. al.	2005	180 (UK) + 84 (Mexico)	9-12	Primary schools	UK & Mexico	Pre-test-post-test control group design – scores compared on Raven's Progressive Matrices test + video/audio recordings	Impact of <i>Thinking Together</i> on children's use of effective talk and their individual reasoning in
Mercer and Sams	2006	406 + 14 teaching staff	9-10 year olds	Primary school	UK (Milton Keynes)	Pre-test-post-test control group design (comparing maths scores) + video recordings + transcripts of talk	Impact of <i>Thinking Together</i> on children's use of effective talk and their mathematical reasoning

The *Thinking Together* talk intervention consists of a number of key lessons which familiarise students with a set of ground rules for effective talk (Dawes et. al., 2000). These rules usually focus on children listening to one another, respecting ideas, giving reasons for opinions, questioning one another when ideas are unclear and ensuring everyone is involved in the discussion (Mercer et. al., 1999; Dawes et. al., 2000; Rojas-Drummond and Mercer, 2003; Mercer et. al., 2004; Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005; Mercer and Sams, 2006). Before any group

decisions are made, it is also important that children have reached consensus through exploring and scrutinising ideas (Dawes et. al., 2000). For example, one lesson is set in a dogs' home. The children have details about six dogs and they have to match them to five owners using the information about each to justify their choices. One dog is left at the dogs' home and pupils then have to decide which kind of owner(s) would be suitable and why (Dawes et. al., 2000). These kinds of lessons are therefore crucial in developing pupils' reasoning skills.

The *Thinking Together* programme has been trialled in schools in the United Kingdom, Mexico and other international contexts (Wegerif et. al., 2005). Most of the studies have focused on seven to eleven year olds but there is now an equivalent approach aimed at younger children in KS1 (Dawes and Sams, 2004a). In each of the studies, exploring the effectiveness of *Thinking Together*, children in schools from similar socio-economic backgrounds were placed in experimental and control groups so reliable comparisons could be made (e.g. Rojas-Drummond and Mercer, 2003; Mercer et. al., 2004; Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005; Mercer and Sams, 2006). Within each control and experimental class, the talk of one group of children was focused on before and after the intervention. The group consisted of three children working at different academic levels. These groups were recorded by video and audio technology and pupils were also interviewed about their experiences. Moreover, children's scores on the Raven's Progressive Matrices Tests were also taken prior to and after the programme. Although only one group was focused on in each class, this enabled the researchers to analyse the talk in greater depth which would have been impossible with a larger sample.

Nevertheless, a limitation of one study (Mercer et. al., 2004) was that there was a high rate of transiency in the schools being studied in Milton Keynes. This meant that by the end of the programme 87 children had left the schools so it was impossible to assess the effects of *Thinking Together* on all students. Additionally, in the study by Rojas-Drummond and Zapata (2004), children used *Thinking Together* to solve logical problems yet it is questionable whether such findings have relevance for other kinds of problem solving activities. It is also unclear exactly which groups of learners

benefitted most from the programme and how student characteristics and different groups of students influence its success (Brown and McIntyre, 1993; Baines et. al., 2014). For example, it has recently been suggested that children with *Special Educational Needs* find it particularly challenging to become involved in group work yet there is still a need for them to overcome this barrier and develop vital communication skills in such contexts (Baines et. al., 2014). Arguably limited attention has been paid to such issues or groups of children in the existing literature (Mercer et. al., 2004; Rojas-Drummond et. al., 2004; Littleton et. al., 2005; Mercer and Sams, 2006).

In spite of the previous limitations, all these studies found that, following the talk intervention, there was a statistically significant increase in children's use of features of exploratory talk in the experimental groups (Mercer et. al., 1999; Dawes et. al., 2000; Mercer et. al., 2004; Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005; Mercer and Sams, 2006). In addition, the authors found that children receiving *Thinking Together* improved far more than those in control groups on the Raven's Progress Matrices test of individual reasoning afterwards compared to pre-intervention scores (Vygotsky, 1962, 1978; Mercer, 2000). The authors' findings are therefore underpinned by Vygotsky's (1962, 1978) notion that learners can develop intramentally or individually by using language intermentally within the social context.

Despite this, *Thinking Together* has hitherto only been used for improving children's awareness of how to tackle scientific, mathematical or logic problems (Mercer, 2000; Mercer et. al., 2004; Mercer and Sams, 2006). However, Black et. al. (2006) and Black (2007) have suggested that if children can use talk effectively as a tool for learning they are likely to make better progress in AfL activities such as peer assessment. In particular, Black et. al. (2006) suggest that the *Thinking Together* 'lessons could... be seen as a powerful way of strengthening the development of peer assessment practices in enhancing pupils' capacity to learn' (p.128).

Therefore, in order to address this gap with regard to younger learners, I explore, as part of this doctoral study, the differential effects of the *Thinking Together* intervention on different groups of learners in terms of developing key PA skills such as conjecturing, critiquing and arguing. In mathematics, this might, for instance, involve children adhering to the ground rules for *exploratory talk* whilst giving verbal feedback on the ongoing thought processes of their peers during problem solving activities (e.g. Tanner and Jones, 1994, 2002). In English, children might use dialogue effectively to ask questions about the kinds of written feedback they have provided to one another particularly when its content needs clarifying (Boon, 2016).

I also set out to explore how factors such as pupils' prior attainment, socioeconomic background, motivation levels, mindsets and levels of articulateness influence the kinds of talk used following this intervention and how, in turn, this affects the success of peer assessment for different groups of pupils (Brown and McIntyre, 1993; Cooper and McIntyre, 1996). Having argued that it was important for my research to pay greater attention to the social context of peer assessment, and the social processes leading to outcomes during this activity, I now turn my attention to the conceptual puzzle this unravels and some of the theories and concepts underpinning my argument.

Conceptual puzzle: which theories and concepts help to understand how and why learning occurs during PA when its social context is considered in more depth?

As peer assessment can happen in various ways, different theoretical frameworks have been used to underpin research in this area (Topping, 1998). Given the greater focus on the social context of peer assessment in this study, I pay greater attention to theories which consider learning as a social interpersonal process. Piaget's theories might help to clarify how children learn during a social activity such as peer assessment. Traditionally, from a Piagetian perspective, the child has been construed as a 'solitary scientist' (DeVries, 1997: 4) whose development is independent of social processes in which he or she is engaged (Tudge and Rogoff, 1989). Even so, many authors now argue that it is a distortion to claim that Piaget overlooked 'the social nature of human development' (Matusov and Hayes, 2000: 215). In fact some of his

seminal work might be relevant for research on peer assessment (DeVries, 1997; DeVries, 2000). For instance, in his role as a ‘child psychologist’, Piaget emphasised the key ‘role... social factors’ play ‘in the construction of knowledge’ (DeVries, 2000: 190). Piaget also suggested that: social exchanges and relationships help humans to develop individually; the social context is important in bringing about cognitive changes in humans; and the social context helps humans to develop the ability to reason individually (DeVries, 1997; 2000; Matusov and Hayes, 2000). Piaget’s theory may therefore be relevant for peer assessment when children use talk and discussion during this activity to help them reason about the quality of a piece of work or the thought processes involved.

Piaget’s theories proved influential in my theorisation of this doctoral research, particularly his notion of ‘sociocognitive conflict’ (Jordan et. al., 2008; Skoumios, 2009). He suggested that children learn things by social interactions with peers which can lead them to adopt alternative perspectives and challenge previously held beliefs about the world (Skoumios, 2009). When this happens, children experience ‘cognitive restructuring’ (Wu and Kao, 2008: 45). This concept may apply to peer assessment since peers are exposed to different ways of viewing their work as a result of peer feedback and discussion about the quality of a piece of work. This, in turn, might enable them to accept ‘that there are more approaches apart from their view’ (Skoumios, 2009: 383). This conflict might then convince the child to make important changes to improve the quality of their work (Topping, 1998).

Although Piaget’s ideas may be valid, Vygotsky also offers relevant theoretical insights that have influenced my thinking about how the social context influences the quality of younger children’s learning during peer assessment. Whilst Piaget explored the relationship between the sociocultural context and learning, Vygotsky argued that this context had a more embedded and mediating effect on human development (Vygotsky, 1962, 1978; DeVries, 2000; Matusov and Hayes, 2000; James, 2006). For Vygotsky, cultural, physical and symbolic tools help to mediate learning and development (Kozulin and Presseisen, 1995; Ghassemzadeh, 2005). A significant cultural tool for Vygotsky is language which helps children to first function on an

intermental level, where they share ideas with one another in a social context through interaction, talk and dialogue (Adams, 2006; Jordan et. al., 2008; Mercer and Howe, 2012). In turn, this intermental activity helps children to develop intramentally or individually. Therefore, the social and cultural context is vital for learning to occur both on a social and individual plane (Vygotsky, 1962, 1978; James, 2006). In my study, I was interested to explore how intermental activity in the social context of the classroom, such as peer assessment and talk, affects children's intramental development, such as their ability to self-assess or improve the quality of a piece of work (Vygotsky, 1962, 1978). Consequently, this theoretical perspective might enhance our understanding of some of the processes which lead to learning outcomes in peer assessment (Olson, 1990; Boon, 2016).

Vygotsky (1962, 1978) also argued that interactions between more and less cognitively developed peers could result in gains for the latter through what he referred to as the *Zone of Proximal Development* (ZPD). The less knowledgeable peer operates at a more cognitively challenging level through being supported and guided by someone more knowledgeable. This theory may underpin aspects of peer assessment where verbal or written feedback is given which enables peers to work beyond their current academic level (Torrance, 1993; Gipps, 1999). This may be because such feedback is task-involving and offers suggestions for improvement. A limitation of this theory, however, is that it does not account for learning that occurs between peers functioning at similar academic levels (Schmitz and Winskel, 2008). It therefore does not sit comfortably with much current practice in classrooms where peer assessment often happens in symmetrical pairs (Topping, 2009).

Mercer (2000) developed a concept and framework of analysis which I thought might prove helpful in explaining how learning occurs during peer assessment when it is arranged in these pairs. A main concept in his framework is what he refers to as the *Intermental Development Zone* (IDZ). The IDZ refines some of the ideas previously mentioned in the ZPD (Fernández-Cardenas et. al., 2001). Unlike the ZPD, the IDZ carries no need for a more knowledgeable peer to scaffold the learning and development of someone less skilled, able or knowledgeable (Vygotsky, 1978;

Mercer, 2000; Fernández-Cardenas et. al., 2001). Instead, the quality of peers' interactions provide scaffolding and enable participants to step forward together, tentatively and provisionally as they learn new things together (Fernández-Cardenas et. al., 2001). This is because the IDZ involves the use of *exploratory talk* where learners question one another, critique ideas, give effective reasons and agree following productive discussions (Mercer, 2000). This kind of dialogue enables learners to operate at a higher cognitive level than they would be able to alone (Mercer, 2000; Shmitz and Winskel, 2008). If this dialogue fails though, then the IDZ risks 'collapse' (Shmitz and Winskel, 2008). This concept could therefore help to unravel some of the learning processes that occur during 'interactive variants of peer assessment' between learners functioning at a range of levels of academic achievement (Kollar and Fischer, 2010: 347).

Salomon and Perkins (1998) have also outlined several social modes of learning which might help to advance our current understanding of how peer assessment influences the quality of younger children's learning. The first mode is '*Active social mediation of individual learning*' (Salomon and Perkins, 1998: 3). Similarly to Vygotsky's (1978) ZPD, this mode involves more knowledgeable individuals within the social context supporting the learning of someone less competent. For example, a teacher may help a learner to make progress in the classroom through guidance and support. This helps the individual to acquire new knowledge or skills as a result of their interactions with someone more capable and sits comfortably with the 'acquisition metaphor' of learning where a clear outcome is evident such as 'possessing' new knowledge (Sfard, 1998). This could be relevant to peer assessment arranged in asymmetrical pairs but a disadvantage of this mode is that it neglects the learning of the social individual providing support (Salomon and Perkins, 1998). For this reason, a second mode concentrates on the learning of all participants in the social context. This is known as '*Social mediation as participatory knowledge construction*' (Salomon and Perkins, 1998: 4).

This mode focuses on how all participants in the social context 'construct' meaning through high quality social interaction which enables them to learn collectively

through ‘the socially shared vehicles of thought’ (Salomon and Perkins, 1998: 4). This mode of social learning thus concentrates on the learning of all social participants unlike the first mode. It is also similar to Mercer’s (2000) IDZ as dialogue and talk act as a vital scaffold in the learning of individuals and there is no requirement that they will operate at different cognitive levels in order for learning to occur. This seems particularly relevant for explaining how learning occurs during peer assessment organised in same ability pairs where interaction, rather than a more knowledgeable other, helps to scaffold the quality of peers’ learning (Vygotsky, 1978; Dawes et. al., 2000; Mercer, 2000).

Modes three and four focus on ‘learning to be a social learner’ and ‘learning social content’ respectively (Salomon and Perkins, 1998: 5-6). Elements of these modes might act as essential conditions for peer assessment given some of the previous ideas explored about the importance of guiding younger pupils to work collaboratively (Mercer, 2000; Mercer et. al., 2004; Baines et. al., 2009; Galton and Hargreaves, 2009; Baines et. al., 2014). The third mode involves children learning how to be resourceful and seeking help in the social environment. It also involves learners becoming interdependent and realising the symbiotic nature of learning in the social context. In peer assessment, this symbiotism might involve learners benefitting one another by giving and receiving feedback and thus the role of ‘assessor’ and ‘assessee’ become more blurred and interchangeable than the previous literature has suggested (Kollar and Fischer, 2010). The fourth mode focuses on learners developing interpersonal skills so they can communicate effectively, resolve disagreements and reach consensus whilst working together. This mode has clear links with some of the ground rules promoted by the *Thinking Together* intervention and thus might act as an important condition for peer assessment to take place successfully due to its collaborative nature when greater social interaction is permitted (Kollar and Fischer, 2010). These two modes may therefore be important for peer assessment particularly when it is explored more from a ‘social perspective’ (Van Gennip et. al., 2009, 2010).

Conclusions, gaps in research and further enquiries

This review has found that much current literature in the research field of peer assessment has focused on teachers guiding students to give task-involving peer feedback, ensuring this is used to move learning forwards and on the outcomes of peer assessment, such as self-assessment, mainly in curriculum areas such as writing (Olson, 1990; Min, 2005, 2006; Gielen et. al., 2010a, b; Boon, 2015). To date there are only a few peer assessment studies in secondary school mathematics which examine the importance of developing students' skills when verbally assessing the ongoing thought processes of their peers in mathematical modelling (Tanner and Jones, 1994, 2002). Thus, with regard to the primary school context, there is currently limited understanding of how social processes influence outcomes in peer assessment research (Kollar and Fischer, 2010; Topping, 2010). These social processes might include different kinds of classroom talk, dialogue, interactions and various forms of communication (Mercer, 2000; Hari and Kujala, 2009). My research therefore pays much greater attention, than previous literature, to the social context of peer assessment and how this influences the quality of younger children's learning during this activity (Kollar and Fischer, 2010; Van Gennip et. al., 2009, 2010). My research therefore aims to address an important research imbalance in the literature regarding the role that the *quality* of social interaction plays in influencing peer assessment's learning outcomes (Black, 2007; Kollar and Fischer, 2010).

However, I have also argued that younger peers may not always bring with them the necessary social and interpersonal skills to interact effectively during this activity (e.g. Kollar and Fischer, 2010). Indeed a growing body of knowledge suggests that, unless children are adequately guided, they may find it particularly challenging when asked to work together during activities such as peer assessment (Mercer, 2000; Mercer et. al., 2004; Baines et. al., 2009; Galton and Hargreaves, 2009; Baines et. al., 2014). My experience, and the wider literature, demonstrates that this can lead them to use classroom talk as an ineffective tool for learning (Mercer et. al., 1999; Dawes et. al., 2000; Mercer, 2000; Mercer et. al., 2004; Rojas-Drummond et. al., 2004; Littleton et. al., 2005; Mercer and Sams, 2006; Baines et. al., 2009; Baines et. al., 2014). Arguably

it is therefore important that children are appropriately guided to use talk in ways which support learning during peer assessment (Dawes et. al., 2000; Baines et. al., 2009).

This review has highlighted that the *Thinking Together* intervention may provide a strategy to ensure children are able to do this. As mentioned earlier, this intervention focuses on ground rules for effective talk such as asking questions, challenging one another and giving reasons (Mercer et. al., 1999; Dawes et. al., 2000; Mercer et. al., 2004; Rojas-Drummond et. al., 2004; Littleton et. al., 2005; Mercer and Sams, 2006). These ground rules are also relevant for peer assessment which is characterised by learners hypothesising and reasoning about the quality of a piece of work (Tanner and Jones, 1994; Min, 2005, 2006; Gielen et. al., 2010a, b; Boon, 2016). Consequently, as part of this doctoral study, I wanted to examine how developing children's interpersonal skills, through the *Thinking Together* talk intervention, influences their ability to peer assess and learn something meaningful from this kind of formative assessment (Black, 2007). A more detailed exploration of such links might help us to clarify in more depth how the social context influences learning during peer assessment with younger pupils (Black, 2007; Van Gennip et. al., 2009, 2010; Kollar and Fischer, 2010; Topping, 2010).

This focus has also helped me to formulate appropriate conceptual frameworks for my study and there are several ways in which research on peer assessment, from a social perspective, might be theorised. I have drawn into sharp focus Piaget and Vygotsky's ideas about how the social context helps humans to reason and develop on an individual level as a result of social interactions. I have also argued that Mercer's (2000) IDZ has explanatory power when considering how learning emerges during peer assessment arranged more symmetrically. The IDZ concentrates on the role of talk and dialogue in scaffolding the learning of participants in the social context (Mercer, 2000; Shmitz and Winskel, 2008). Finally several of Salomon and Perkins' (1998) social modes of learning also have conceptual links with peer assessment when its social context is examined in more depth.

Overall, my review has highlighted the need for further research which enhances our current understanding about how social processes, such as classroom talk, influence the quality of younger children's learning during peer assessment. These research questions have therefore been identified as critical in extending current knowledge and understanding of peer assessment in the primary school setting:

RQ1. What kinds of talk emerge during peer assessment when social interaction is allowed, and how useful are these for enhancing pupils' learning?

RQ2. To what extent do different groups of children consider the *Thinking Together* intervention helpful in developing their use of effective talk in contexts of peer assessment?

RQ3. How does the *Thinking Together* intervention change how different groups of learners use PA to improve their own and one another's learning?

RQ4. What factors do pupils consider important influences on the effectiveness of PA processes, and in light of this feedback how can PA be improved further?

RQ5. How does PA, as a learning process, influence pupils' learning outcomes including their ability to self-assess?

Having identified several research questions which shaped the focus and planning of my doctoral study, in the next chapter I present the research design including discussion of the research paradigm and strategy, methods of sampling, data collection and analysis and the criteria against which I judge claims to knowledge developed through my study.

Chapter 2: Methodology

Introduction

In the previous chapter, I identified that peer assessment research has tended to neglect the role that social processes, particularly talk and dialogue, play in enhancing the quality of younger pupils' learning in contexts of peer assessment. I then proposed that the study of these processes is important as many younger children might find it challenging to peer assess without being guided to use talk and dialogue effectively. This led to the adoption of several conceptual frameworks for analysing peer assessment from a social perspective (Vygotsky, 1962, 1978; DeVries, 1997, 2000; Salomon and Perkins, 1998; Mercer, 2000; Shmitz and Winskel, 2008). I concluded the chapter by identifying several research questions which are critical to developing our current understanding of how peer assessment, and some of the social processes involved, can be used in ways which optimise the quality of younger children's learning:

RQ1. What kinds of talk emerge during peer assessment when social interaction is allowed and how useful are these for enhancing pupils' learning?

RQ2. To what extent do different groups of children consider the *Thinking Together* intervention is helpful in developing their use of effective talk in contexts of peer assessment?

RQ3. How does the *Thinking Together* intervention change how different groups of learners use PA to improve their own and one another's learning?

RQ4. What factors do pupils consider important influences on the effectiveness of PA processes and in light of this feedback how can PA be improved further?

RQ5. How does PA, as a learning process, influence pupils' learning outcomes including their ability to self-assess?

This chapter concentrates on issues of research design in relation to these research questions. First, I outline my ontological and epistemological assumptions and indicate

how these shaped the interpretivist and social constructivist research paradigm within which my research is positioned (Allison and Pomeroy, 2000; Johnson and Onwuegbuzie, 2004; Scott and Morrison, 2006; Scott, 2007; Scotland, 2012). I then describe what an action research case study involves and argue why this was a suitable research strategy for my study (Lewin, 1946; Hopkins, 2008). Next, I provide details and justifications for the non-probability purposive sampling strategy used and the participants/informants selected (Cohen et. al., 2008; Robson, 2011; Silverman, 2015). After this, I introduce a table which shows how each research question, shaped in light of my review of literature in chapter two, correspond with the methods of data collection used in my research.

I then go onto justify why each of these methods were a suitable choice in relation to the research questions being asked. Throughout this section, I also discuss how my pilot study influenced and shaped some of my decisions concerning data collection instruments and data analysis procedures for my main study. I also outline how data were analysed using both qualitative and quantitative approaches. Following this, I describe the qualitative and interpretive criteria against which I would like my study to be judged (Patton, 2002; Dowling, 2006; Feldman, 2007; Heikkinen et. al., 2012). In this section, I also tackle issues of generalisability given the interpretative case study strategy adopted (Stake, 1978; Yin, 2013). Finally, I discuss how ethical issues and procedures were adhered to in my study including confidentiality, anonymity and consent (Zeni, 1998; Malin, 2003; Flewitt, 2005; Einarsdóttir, 2007). I also address issues of power imbalances in the context of teacher action research and how these were minimised in order to elicit ‘pupil voice’ (McIntyre et. al., 2005; Pedder and McIntyre, 2006).

Ontological and epistemological assumptions underpinning the research paradigm adopted

In this section, I outline how ontological and epistemological precepts reflect paradigmatic assumptions that have framed this study before arguing that my research best aligns with social constructivist and interpretivist frameworks of understanding.

Ontology is concerned with how individuals ‘see and experience the world’ (Allison and Pomeroy, 2000: 92). According to Scott and Usher (2002: 11) ontology asks questions about ‘what exists, what is the nature of the world’ and ‘what is reality’. There are different views on reality and the extent to which it is shaped and constructed by the human mind (Allison and Pomeroy, 2000). For instance, Allison and Pomeroy (2000) present two different ontological positions reflecting beliefs that the world exists independently of human minds or that the world is shaped through human construction (Allison and Pomeroy, 2000: 92). In similar vein, Cohen et. al., (2008: 7) question whether ‘social reality’ is ‘external to individuals... or... the product of individual consciousness’.

In turn, ontological assumptions shape the epistemological underpinnings of research. For instance, positivist researchers might subscribe to the view that reality has a more objective presence. They believe that ‘a discoverable reality exists independently of the researcher’ (Scotland, 2012: 10). Therefore, epistemologically, they may try to gather evidence which is ‘hard, objective and tangible’ (Cohen et. al., 2008: 7). Moreover, researchers who operate within the positivist paradigm might try to reduce the impact they have on findings and remain detached from the study in question. Research of this kind aims to produce findings which can be statistically generalised from a sample to a population from which the sample was drawn (Burgess et. al., 2006; Scott, 2007). This kind of research may also use probability sampling to identify suitable participants, values the use of control and experimental conditions to identify cause and effect and mainly produces quantitative findings.

This approach to educational research, however, has been criticised. For example, in naturalistic settings such as classrooms it might be impossible to control or isolate certain variables given that these are complex social settings (Smeyers, 2001; Hopkins, 2008; Scotland, 2012). Although positivists may claim to be impartial, they still need to make subjective decisions throughout the research process such as selecting methods and deciding on research questions. Furthermore, data need to be analysed and this requires human interpretation particularly when discussing the meaning of findings (Smeyers, 2001; Hopkins, 2008; Scotland, 2012).

In contrast to positivism, research which is interpretive and socially constructivist values the idea that certain research questions are best answered using the perspectives of human beings and their social experiences (Smeyers, 2001; Scott, 2007). These frameworks emerge from the ontological notion that people's views of reality may differ and 'multiple-constructed realities abound' (Johnson and Onwuegbuzie, 2004: 14). Thus reality is something more personal and subjective where 'social... processes and phenomena are... seen as open and indeterminate' (Scott and Usher, 2002: 14). Research questions are therefore likely to be more open ended and researchers value knowledge which is 'personal, subjective and unique' (Cohen et. al., 2008: 7).

The kind of knowledge generated might be context-specific and wider generalisation, at least in the statistical sense, is irrelevant (Robson, 2011). Instead, as I explore in more depth further on, individuals reading such research might make naturalistic generalisations where they judge the extent to which findings from one social context have relevance for another (Stake, 1978). Socially constructivist research also values knowledge which is generated from interactions in the social context (Vygotsky, 1962, 1978; Mercer, 1995; 2000; Robson, 2011). Nevertheless research located within the interpretive and social constructivist paradigms has been challenged since the data from such studies might only be relevant for the context from which it was derived (Scotland, 2012). Moreover, the findings generated might be interpreted differently depending on the perspective of the researcher conducting the study (Scotland, 2012).

In educational research, paradigmatic debates between, for instance, positivism and interpretivism have sometimes meant that researchers ideologically wed themselves to one position over another which can, in turn, influence the kinds of data collection and analysis procedures adopted in a study (Mercer, 2010; Humphrey, 2013). For example, Humphrey (2013: 13) has shown how this divide can result in an 'unhelpful dichotomy between qualitative and quantitative methods'. Yet a researcher might decide to collect quantitative data as part of an interpretive study (Humphrey, 2013). This quantitative data might be used to compliment qualitative data revealing participants' perspectives on or values in relation to a social issue. Thus the collection

of quantitative data sits comfortably with the researcher's interpretive assumptions (Humphrey, 2013). It is therefore perhaps more useful to consider research questions and then decide which paradigm or paradigms they sit within.

Arguably my research best reflects a set of social constructivist and interpretivist ontological and epistemological assumptions given my interest in exploring the mediating role that talk plays during peer assessment from a social perspective (Burgess et. al., 2006; Mercer, 2000; Mercer, 2010; Robson, 2011). This is because I explored, as part of my doctoral study, significant aspects of the social practices and perspectives of agents from their points of view and through the lens of their interpretations and sense-making. I combined this with the use of the frameworks of Vygotsky (1978), Salomon and Perkins (1998) and Mercer (2000) discussed in Chapter 2. Through my approach, I did not assume that the peer assessment processes and outcomes I was studying carried a universal objectivity beyond the articulated perspectives and contexts of practice investigated for this study (Cohen et. al., 2008; Robson, 2011). I encouraged pupils to generate the kinds of subjective and personal knowledge which helped them to express their perspectives and experiences in relation to peer assessment in the primary school context. However, I also collected quantitative data to reveal the frequency of different words and phrases associated with the kinds of talk used by different pairs of children during peer assessment, consistent with my interpretivist and social constructivist assumptions (Mercer, 2000; Alexander, 2008). I now turn my attention to exploring the research strategy which best suited my research questions.

Research strategy: action research interventionist case study design

Because my study explored the social interactions and interpretations of younger learners in specific classroom contexts, I decided to adopt a case study approach (Yin, 2009, 2013). This approach enabled me to explore 'a specific... phenomenon... set within its real-world context' (Yin, 2013: 321). According to Yin (2009, 2013) and Robson (2011), case studies can focus on a corporate organisation, whole school, class, child, pair or group of children. In my study, the cases being explored were

different pairs of children in the classes I taught over two years in separate primary schools.

Data from my first class, which I included in my pilot study, focused on three pairs of children in a year four (eight and nine year old) class I taught at a large primary school in Coventry in the West Midlands. Around 34% of children in the school and class were identified as disadvantaged and eligible for the government's pupil premium grant. In the wider class, there were thirty children who came from a range of socio-economic, ethnic and religious backgrounds. Around a third of them had some kind of special educational need or disability. By the end of the academic year, around eighty per cent of the children were working at the expected level for their national curriculum programme of study. From this class, I focused on three different cases for more detailed data collection. These cases included pairs of children from the class with lower, mid and higher prior attainment in national curriculum tests who were likely to be representative of different ability strands within the class.

The cases focused on for my main study, however, come from a year three (seven and eight year old) class I taught at a large Church of England primary school in Devon. The school has around 20% of pupils who are disadvantaged and eligible for the pupil premium and in 2015, 87% of pupils in year six gained the expected level '4b' in reading, writing and mathematics. 28% of my year four class were eligible for the pupil premium and around two thirds were boys some of whom presented significant behavioural challenges. I decided to focus on five cases within this class for more detailed data collection. As I explore further on, when providing details of my sampling strategy, I specifically decided to focus on cases which included children with a range of characteristics in order to explore the differential impact of peer assessment on diverse groups of pupils. For instance, some children in the pairs studied had the potential to present significant challenging behaviour whilst others were articulate, engaged and motivated learners.

The detailed study of different pairs of younger children in PA task contexts in English and mathematics may help to address a gap in the literature concerning the

relationship between peer assessment, pupils' underlying characteristics and the quality of their learning in the primary school context (Topping, 2010; Van Zundert et. al., 2010).

This piece of research explored, in contexts of peer assessment, ways in which children's use of talk can be developed more effectively as a tool for learning. The definition of peer assessment adopted in this study includes peer feedback on learning 'processes' and outcomes (Kollar and Fischer, 2010: 347). Different tasks were used in both classes; for example, year four children had to assess one another's writing whereas year three children had to provide verbal feedback on an open ended mathematics task focusing on number work.

Classroom interventions

For year three children the main focus was therefore on the quality of formative verbal feedback provided throughout the task (Tanner and Jones, 1994; Kollar and Fischer, 2010). I began by giving pairs of children a task where they had an answer (25) and had to think about what the questions could have been. Throughout the task, children had to comment on the possibilities their peer had suggested thus engaging in oral peer assessment (Tanner and Jones, 1994; Dawes et. al., 2000; Kollar and Fischer, 2010). Their talk was recorded and transcribed and I also kept evidence of the written work children had produced which is represented in figures 4.1 to 4.19 on pages 72 to 116 in the next chapter.

I then drew upon the *Thinking Together* talk lessons to guide children how to use talk as a tool for learning in small groups (Dawes et. al., 2000; Mercer, 2000). As mentioned in the previous chapter, these lessons encourage children to use a set of ground rules for talk such as asking questions, giving reasons and subjecting one another's ideas to critical scrutiny (Mercer et. al., 1999; Dawes et. al., 2000; Mercer et. al., 2004; Rojas-Drummond and Mercer, 2004; Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005; Mercer and Sams, 2006; Mercer et. al., 2009). In turn, children might be able to hypothesise and reason more effectively (Mercer, 2000; Dawes and

Sams, 2004b). I then gave the children in my study a similar open ended number task, this time focusing on the number 100, where they had to use their ground rules to comment on one another's suggestions. I also explored how children felt the *Thinking Together* intervention had influenced the quality of peer feedback and peer assessment. My research was therefore interventionist and grounded in the philosophy of practitioner action research.

Kurt Lewin (1946) created the notion of action research because he was frustrated with traditional approaches to research which had no impact on workplace practices. For example, he argued that 'Research that produces nothing but books will not suffice' (Lewin, 1946: 35). Until that point, research studies concentrated on academic concerns instead of social ones (Dickens and Watkins, 1999; Hopkins, 2008). Lewin (1946) wanted to create workplaces which were more 'democratic' (Adelman, 1993). He felt that decisions imposed on workers from those more powerful above had far less impact on practice than people working collectively to solve problems in their workplace contexts (Adelman, 1993). Therefore a central aspect of early definitions of AR was people working collaboratively to identify and solve problems (Adelman, 1993). Now action research can focus on either people working collectively or alone to develop their practices (Adelman, 1993). Lewin (1946) anticipated that action research would emancipate people and enable them to explore their workplace practices democratically (Adelman, 1993). Action research therefore creates a kind of knowledge which may be practical and personal and thus it is a research strategy which falls in line with my interpretive assumptions discussed earlier on (Whitehead and McNiff, 2006; Cohen et. al., 2008; Cain and Domaille, 2008; Hopkins, 2008).

The principles of action research have also been applied to teaching given that much traditional educational research has had limited relevance for classroom practitioners (Hopkins, 2008). For example, Lawrence Stenhouse (1975) pioneered the idea that teachers could engage in research whilst teaching to help enhance their professional practice. This was known as the 'teacher research movement' (Hopkins, 2008: 38). Its goal was to make teachers more autonomous when making professional decisions and judgements (Hopkins, 2008). In practice, this kind of research might start by teachers

exploring an area of their professional practice they would like to develop or improve. They then carry out reconnaissance and identify ways in which this aspect of practice might be enhanced further. This might lead to teachers and/or students trialling strategies in the classroom context which have the potential to enhance the quality of their professional practice.

Throughout the process, teachers need to constantly reflect on the success of such strategies and modify approaches if necessary (Dickens and Watkins, 1999; Goodnough, 2010). There may not be a clear conclusion for teacher action research studies. Instead it can occur in cycles where teachers reflect on successes and how approaches need to be altered to ensure practices are changed for the better (Lewin, 1946; Hopkins, 2008). Importantly this approach ensures that findings are personal, practical and relevant for practitioners (Bryant and Bates, 2010). This research strategy seems suitable for my study since I have a personal and professional interest in exploring and improving the ways in which children I teach use talk to enhance the quality of their learning in contexts of peer assessment (Mercer, 2000; Kollar and Fischer, 2010).

Nevertheless the action research strategy has been criticised because it: creates knowledge which can be personal and professional which may not always be relevant for a wider academic, professional or practitioner audience; studies often include small samples meaning that findings only have relevance for one context; and professionals may resist change as part of the AR process (Winter, 1982; Dickens and Watkins, 1999; Feldman, 2007; Hopkins, 2008). Despite these criticisms, Barlett and Burton (2006) claim that findings have wider relevance if professionals reading such studies work in similar settings. For instance, action researchers might aspire to provide a rich portrayal of their cases using ‘thick description’ (Ponterotto, 2006) so readers can make naturalistic generalisations instead (Stake, 1978). Yet it is also possible that practitioners working in quite different contexts, such as early years settings, secondary schools or even higher education, might be interested in some of the principles applied in this piece of research.

Indeed, in previous interventionist research I have conducted (e.g. Boon, 2015, 2016) many of the peer assessment strategies I used with primary school children came from higher education contexts and secondary schools. Although there were contextual differences, I was still able to connect with the principles and practices of such research and use this to shape and inform my interventions. Therefore it seems likely that teachers working in contrasting settings may be able connect with and find value in the principles and practices of this doctoral study even though they may be working in contrasting settings. Having considered the action research interventionist strategy I adopted in my study, it is now time to explore issues of sampling, data collection and analysis.

Methodologies: Sampling, data collection techniques and analysis

Sampling strategy: setting and participants

In this study, I used a non-probability purposive sampling strategy to select the cases I wanted to study in the different classes I taught. According to Silverman (2015) this kind of ‘sampling allows us to choose a case because it illustrates some... process in which we are interested’ (p.60). Children in the cases studied were engaged in some of the peer assessment social processes I was interested in exploring further in order to develop and enhance my professional understanding of this area. The study of pupils on a different site would therefore have been inappropriate in terms of answering the research questions identified at the beginning of this chapter (Silverman, 2015). Furthermore, the issues and processes I wanted to explore were personal and professional and existed within the different classes I taught (Cohen et. al., 2008; Robson, 2011; Silverman, 2015).

As mentioned previously, in my year four class, and during the first year of research, I selected three pairs of pupils, consisting of boys and girls from the wider class, who were working below, around and above age related expectations in mathematics and English. I chose these cases as, at this stage of my research, I wanted to gain insights into peer assessment practices and processes with children from different ability

strands within the class I taught. In addition, only the last four research questions apply to these children as I only recorded their talk after the *Thinking Together* intervention. However, for my year three children, I was also interested to explore how they interacted in the PA task context prior to any intervention or guidance so the first research question applies to them too.

Furthermore, in the second year of research, with my year three class, I wanted to explore how pupil characteristics influenced the kinds of talk they used in contexts of peer assessment and explore the differential impact of the *Thinking Together* intervention on different groups of pupils. Although I was still interested in pupils with higher, mid and lower prior attainment as before, I also wanted to explore, at this stage of my research, pupils within the class who: were articulate and/or highly motivated; may have had a special educational need related to behaviour and/or learning; and those pupils who were much quieter and reticent (Cooper and McIntyre, 1996).

I therefore decided to purposely select children from the wider year three class, for more detailed data collection, who had one or more of these traits. These children then worked in one of five pairs throughout their peer assessment tasks focused on number work. These pairs included:

- An articulate, higher attaining girl, eligible for the pupil premium and a girl, with lower prior attainment, who found mathematics a particularly challenging subject;
- A boy and girl who were both intrinsically motivated, engaged, higher attaining, articulate and working beyond age related expectations for their programmes of study;
- A boy (with social, emotional and behavioural difficulties) and a girl (with dyslexia), both eligible for the pupil premium, who have lower prior attainment and the potential to present challenging behaviour in the classroom;
- A *quieter* pair of boys with higher prior attainment who are articulate; and

- A pair of shy/reticent girls who have mid to higher prior attainment in mathematics.

The samples from each class were deliberately small and diverse so that I was able to investigate and explore issues relevant to peer assessment in greater depth (Marshall, 1996; Suzuki et. al., 2007). If I were to select a larger sample than this, it might have risked the loss of significant contextual detail and so jeopardised the creation of a complex, rich and detailed account of children's learning experiences during peer assessment who were part of the classes I had taught (Stake, 1978; Cohen et. al., 2008; Robson, 2011; Silverman, 2015). Nevertheless, due to the small sample sizes and case study design, results cannot be generalised beyond the context from which they are derived.

Procedures for and methods of data collection

Given my research questions, I needed to identify which kinds of data would best help me to answer these and consequently what kinds of data collection techniques to use. Table 3.1 below outlines the research questions and related data collection methods that were used in my study:

Table 3.1: Research questions, data collection methods and details of participants/informants

Research Question	Data collection methods to be used	Participants/informants
RQ1. What kinds of talk emerge during peer assessment when social interaction is allowed and how useful are these for enhancing pupils' learning?	Mind maps Transcribed audio recordings Observations recorded as field notes Pupils' work	Five pairs of year three children with different characteristics (see below)
RQ2. To what extent do different groups of children	Transcribed audio recordings of classroom	Year 4: three pairs of children

Research Question	Data collection methods to be used	Participants/informants
consider the <i>Thinking Together</i> intervention is helpful in developing their use of effective talk in contexts of peer assessment?	discussions around PA Semi-structured interview to give children more direction when answering questions Observations recorded as field notes Pupils' work	(with higher, middle and lower prior attainment for their programmes of study) Year 3: Five pairs of children with different characteristics <ul style="list-style-type: none"> An articulate, higher attaining girl, eligible for the pupil premium and a girl, with lower prior attainment, who found mathematics a challenging subject A pair consisting of a higher attaining and articulate boy and girl working beyond age related expectations for their national curriculum programme of study; A boy (with social, emotional and behavioural difficulties) and a girl (with dyslexia), both eligible for the pupil premium, who have prior lower attainment and the potential to present challenging behaviour in the classroom; A <i>quieter</i> pair of boys with higher prior attainment who are articulate; and A pair of shy/reticent girls who have mid to higher prior attainment in mathematics.
RQ3. How does the <i>Thinking Together</i> intervention change how different groups of learners use PA to improve their own and one another's learning?	Transcribed audio recordings of classroom PA Pupil work Observations recorded as field notes Mind maps to record children's thoughts Semi-structured interview to give children direction when answering questions Pupils' work	
RQ4. What factors do pupils consider important influences on the effectiveness of PA processes and in light of this feedback how can PA be improved further?	Mind maps and transcribed audio recordings of whole class discussions Observations recorded as field notes	
RQ5. How does PA, as a learning process, influence pupils' learning outcomes including their ability to self-assess?	Pupils' work with evidence of self assessments and peer assessments Transcribed audio recordings of whole class discussions Observations recorded as field notes	

In this section, I explore in more detail how each method of data collection relates to the research question being asked in my study.

Recording peer assessment talk: whole class discussions and pupil talk

For all five research questions, focusing on the social context of peer assessment, I used digital voice recorders to capture talk in the classroom setting. In total, 3 hours, 24 minutes and 42 seconds of discourse was generated by pupils. This talk focused on whole class discussions and paired work. Although I did not set out to record whole class discussions in my pilot study, focusing on year four children, I found that they provided a rich source of data for answering key research questions. For example, these discussions allowed me to ask a range of children questions and gave them time to think about peer assessment issues in depth. Children were also familiar with this kind of communication which might have meant the data was more authentic. They could articulate why each ground rule was important for peer assessment and give examples of how it had been used.

Audio recordings of whole class discussions and paired talk were transcribed to enable key elements of my teaching practice to be evidenced (Hopkins, 2008). Furthermore, as only one or two children were speaking at a time, background noise was not an issue and the recordings were mostly audible. This method of data collection was also beneficial since the digital voice recorders were easy to move from one location to another. They also accurately recorded most talk in close proximity and provided ample data for analysis later on (Hopkins, 2008).

Notwithstanding, the novelty of the digital voice recorders meant that some pairs were distracted by their presence in the classroom. Because of this distraction, some children actually hid the voice recorders in order to forget they were present. One pair of children, in year three, also accidentally deleted recordings meaning that data was lost which would have been helpful in answering my first research question. In addition to this, the digital voice recorders picked up too much background noise meaning that recordings were sometimes inaudible. Because of this, I decided to record the talk of children, in the sample, in areas that were quieter such as empty classrooms or the school's library. This meant that background noise was no longer an issue and the majority of talk was audible.

A further issue with the audio recordings is that they fail to provide visual data and only record what can be heard. Because of this limitation, other methods of data collection were drawn upon, such as observations, mind maps and pupil work, which I critique further on. The talk recorded took a long time to transcribe verbatim (Swann, 2001; Hopkins, 2008) and it was important to ensure that contextual aspects of talk were included before and after the transcript in my findings chapter (Swann, 2001). It was therefore important, in my research, to keep sufficient details of the context of different sequences of talk recorded and note down any evidence of unspoken behaviour (Swann, 2001). Observations of such behaviour were recorded as field notes (Appendix C) as I explore further on.

A further limitation I needed to be mindful of when recording sequences of whole class talk surrounded the inclusion of different groups of pupils. According to Black (2004) a limitation of some of the research into talk (e.g. Edwards and Mercer, 1987; Mercer, 2000) is that it treats 'pupils as a homogenous group' (Black, 2004: 36). Black (2004), however, argues that certain groups of pupils are more likely to participate in whole class discussion than others. Other children are inadvertently excluded from such discussions and may not feel confident enough to contribute. This may be due to a range of factors, such as social background, personality or prior attainment (Black, 2004).

I therefore wanted to minimise this limitation in my research by ensuring that a range of pupils, with diverse characteristics (Brown and McIntyre, 1993; Cooper and McIntyre, 1996), participated in the discussions on peer assessment. In order to achieve this aim, I operated a 'no hands up' policy throughout the research. This is a formative assessment technique which has encouraged all students to participate instead of those who may be confident or high achieving (Black et. al., 2003). This ensured, as far as possible, that the whole class discussions I recorded were inclusive and representative of the views of a range of children in my class (Brown and McIntyre, 1993). Furthermore, as mentioned earlier on, I selected pupils with contrasting personal characteristics (e.g. articulateness and shyness) in order to address

Black's (2004) concern around treating pupils homogenously. Taken together, these strategies meant that I could begin to explore the differential effects of peer assessment on groups of children in my class who had a wider range of pupil characteristics than those studied in previous research (Brown and McIntyre, 1993; Cooper and McIntyre, 1996).

Having recorded the different discussions and sequences of peer feedback, I then faithfully transcribed them word for word (Edwards and Mercer, 1987; Mercer, 2000, 2007). If a spoken word or phrase was unclear then this was indicated in the transcript using the word (*inaudible*). I punctuated transcripts and provided relevant background context for each one which is included in my findings chapter (Chapter 4). In line with Mercer (2000) any words and phrases emphasised by children were underlined. Whole sequences of dialogue can be transcribed or researchers can choose to select relevant aspects of these to include in studies (Swann, 2001; Mercer, 2010). Alternatively all recorded data can be transcribed if it is going to be quantitatively analysed. In this study, I transcribed all talk that had occurred between pairs of children in the peer assessment task context and statistically analysed these sequences of talk by counting the frequency of words and phrases, associated with *exploratory talk*, prior to and after the talk intervention (Mercer et. al, 2004; Mercer and Sams, 2006; Mercer, 2010). Since audio recordings are unable to record visual data, I wanted to use other data collection techniques which would help to address this limitation.

Observations

One such way of capturing visual data in the classroom, such as children's body language during peer assessment, might be to use video technology. Such technology has been used in previous studies which have explored the effectiveness of the *Thinking Together* intervention (e.g. Mercer and Sams, 2006). Video technology can help the teacher-researcher to explore lessons in depth, identify problems which need to be addressed and pupil and teacher behaviour is easily evidenced (Hopkins, 2008). Despite these advantages, the presence of video technology in a classroom can be intrusive for younger children (Hopkins, 2008). Given that children in the classes I

taught were already finding the digital voice recorders distracting, I felt it was unsuitable to add a further piece of equipment that might have distracted them from the task of peer assessing one another's work. I felt it was therefore important to use a method of data collection that would be less intrusive for pupils and one which they already had some familiarity with.

I therefore decided to use observations, as a data collection instrument, for all the research questions identified earlier since children were already used to me and other members of staff observing them as part of their daily learning experiences. These observations allowed me to contextualise some of the dialogue and talk represented in the transcripts. Observations in educational research might be systematic where predefined categories are used to quantify certain classroom behaviours (McIntyre and MacLeod, 1979). Any behaviour which falls outside these categories is not recorded by this kind of observation and it has been described as 'mechanistic' (McIntyre and MacLeod, 1979: 120). Systematic observations have been challenged since researchers might overlook other important information or behaviours in the classroom which might help to address key research questions in a study (Cohen et. al., 2008). However McIntyre and MacLeod (1979) dispute such claims and argue that even with more open ended approaches to observation, information might be omitted as there is variation in the way that different researchers construct and view reality. For example, one researcher might choose to focus on an event or issue another feels is unimportant. McIntyre and MacLeod (1979) also argue that it is easier to validate arguments using a systematic approach to observation as these can be supported using quantitative findings such as the number of times different behaviours are observed in the classroom.

Nevertheless, observations can be more open ended and recorded as field notes offering more flexibility for the researcher. They might be advantageous if it is not possible to anticipate the kinds of behaviour that will be observed in contexts of peer assessment. The concept of 'thick description' has been noted by Ponteretto (2006) who claims that researchers conducting open ended observations should: ensure that contextual details are explicit; the details of participants and informants are given;

times of certain events are included; and aspects of verbal and nonverbal communication are described. If observations are clearly recorded and reported then readers might be able to judge the extent to which findings from one context have relevance for another (Stake, 1978). Yet a less systematic and open ended approach to observation may lead researchers to make claims which are unsubstantiated due to a lack of quantitative evidence (McIntyre and MacLeod, 1979).

Whilst this might be the case, in my study I aimed to create a rich portrayal of a small group of pupils' learning experiences during peer assessment so a flexible and more open ended approach seemed to be most suitable. I observed different pairs of children engaged in peer assessment activities for the same amounts of time and recorded my findings using 'thick description' (Ponteretto, 2006). It was also important to resist drawing firm conclusions or making judgements too quickly (Hopkins, 2008). It was also important to reduce, as far as possible, the impact that I, as the class teacher, had on classroom behaviours during peer assessment (McIntyre and MacLeod, 1979). A further shortcoming of both systematic and open ended observation schedules is that they may fail to elicit pupils' views about classroom events (McIntyre and MacLeod, 1979). It was therefore also important to consider other data collection instruments, such as interviews, so pupils had the opportunity to offer their opinions and perspectives (Powney and Watts, 1987; Cohen et. al., 2008; Hopkins, 2008).

Interviews

I decided to use interviews with participants/informants to answer research questions two and three focusing on pupils' views around the effectiveness of *Thinking Together* as an intervention for developing their use of effective talk and how the talk lessons had changed the ways in which they used PA to improve the quality of their own and one another's learning. As with observations, interviews can be heavily structured or unstructured and may differ in their formality (Powney and Watts, 1987; Cohen et. al., 2008; Hopkins, 2008). Powney and Watts (1987) have provided a helpful distinction between two different kinds of interview. The first kind is known as 'respondent' style interviewing. Here the researcher chooses questions to be included in the interview in

advance and faithfully adheres to these throughout the interview (Powney and Watts, 1987). Therefore this approach to interviewing concentrates on the concerns, subjects and questions of the interviewer rather than the interviewee (Powney and Watts, 1987).

Consequently it has been criticised for being inflexible and not giving the interviewee a voice to discuss other issues that might be important to them (Powney and Watts, 1987). The interviewee may not have the opportunity to offer insights if these fail to correspond with the questions being asked (Powney and Watts, 1987). This approach may be unsuitable for younger children as it might not give them the opportunity to offer their opinions on peer assessment, something which is much needed in the wider literature given the neglect of primary and elementary education (McIntyre et. al., 2005; Pedder and McIntyre, 2006; Van Zundert et. al., 2010; Topping, 2010).

In contrast to ‘respondent’ style are ‘informant’ style interviews (Powney and Watts, 1987) which I trialled in my pilot study during my first year of research with my year four class. This was because, as mentioned previously, I felt that a more structured approach might inhibit children from expressing their views (McIntyre et. al., 2005; Pedder and McIntyre, 2006). During informant style interviews, the interviewee has far more control over the interview’s agenda and direction although there may still be a degree of structure imposed. The questions asked by interviewers tend to be open ended and exploratory. The interviewer typically uses a probing strategy where informants are encouraged to exemplify and contextualise certain comments made, provide clarity over anything that is unclear and give examples of any points raised (Cohen et. al., 2008). Powney and Watts (1987) argue that this approach enables researchers to better understand ‘... the perceptions of a... person... within a situation’ (Powney and Watts, 1987: 18).

However, this kind of interview may be difficult to analyse as each one might focus on different themes depending on the issues and topics raised by the interviewee (Powney and Watts, 1987; Cohen et. al., 2008). In my pilot study, I also found that children had difficulties ensuring their responses were relevant to aspects of peer assessment being

explored. This may be because younger children are still acquiring language skills and developing their understanding of how to engage in relevant conversation (Grice, 1975). For instance, children often spoke about issues which were irrelevant to their experiences of peer assessment because questions were too broad and open (Grice, 1975).

In light of this, I adopted a more flexible approach to interviewing, in my main study, which drew upon the principles of both 'respondent' and 'informant' styles depending on the context of the interview (Powney and Watts, 1987). I ensured that each interview included the same list of core topics linked to the aims of my research. This enabled me to compare and contrast the accounts of different children across the same topics (Kvale, 1996; Robson, 2011). Yet within each topic, I was also able to facilitate an 'informant' style conversation (Powney and Watts, 1987) so children had opportunities to express views which were salient in their minds (McIntyre et. al., 2005; Pedder and McIntyre, 2006). This also meant that it was appropriate to adjust my interviews according to the needs, dispositions and characteristics of my pupils - using my professional knowledge to make such adjustments and refinements.

Kvale (1996) outlines some criteria for conducting effective interviews which proved helpful in the development of my interviewing strategy. For instance, quality interviews enable informants to offer suitable and detailed insights in relation to the questions being asked. They also involve informants providing responses which exceed the length of the questions being asked (Kvale, 1996). Kvale (1996) also suggests that it is important to ensure that the responses given by the interviewee have been properly understood by the interviewer who may ask for confirmation. It was therefore important to ensure I had correctly understood a response given by my pupils if this was necessary. Good interviews will also be written down verbatim in a similar way to the classroom talk recorded by the digital voice recorders (Hopkins, 2008; Mercer, 2000, 2010). Having considered my approach to interviewing, I now turn my attention to mind mapping as a further method of data collection used in my study.

Mind mapping

I used mind maps, for research questions one, three and four, which focus on the kinds of talk pupils use in contexts of PA; how the talk intervention changes the ways in which pupils use PA as a learning tool; and pupils' views on effective PA processes. Mind maps made it possible to explore pupils' experiences and perceptions of peer assessment within my classroom following their participation in the *Thinking Together* talk intervention (Budd, 2004; Meier, 2007; Butler-Kisber and Poldma, 2009; Wheeldon and Faubert, 2009; Wheeldon, 2011; Wheeldon and Ahlberg, 2011). Wheeldon (2011: 520) argues that mind maps are produced by those participating in a study and help to elicit the 'individually constructed realities of participants' and 'participants' experiences'. The mind maps were produced in children's *Thinking Together* groups so they were able to discuss issues with one another before writing these down (Vygotsky, 1962, 1978; Mercer, 2000; Dawes and Sams, 2004a, b). However, a limitation of this approach to data collection is that one child might dominate discussions leading to other children's views and opinions being omitted from the mind maps (Cohen et. al., 2008; Burgess-Allen and Owen-Smith, 2010).

Burgess-Allen and Owen-Smith (2010) also show that the person mind mapping might discard points made by members of the group that are poorly articulated or unclear. Instead they may choose to document only those which are made by more articulate members. In a similar way to whole class discussions mentioned earlier (Black, 2004), the maps might not always genuinely represent the views of all members in the group (Burgess-Allen and Owen-Smith, 2010). Consequently I encouraged and modelled the use of ground rules, when children were producing the mind maps, in order to minimise this drawback (Dawes and Sams, 2004a, b). For example, children had to take turns, ask questions and ensure everyone was involved in discussions and mapping. Additionally I asked *all* children in a group to represent their views in a different coloured pen (Burgess-Allen and Owen-Smith, 2010). This ensured the mind mapping sessions were more inclusive and brought out the voice of different pupils in the sample.

Once the mind maps were completed, I followed these up by informal discussions with the pupils about some of their content particularly if points were unclear. This proved to be beneficial in my pilot study too as it was sometimes a challenge interpreting the mind maps and ‘getting beyond... the ‘what?’ questions to exploring the ‘why?’ questions’ (Burgess-Allen and Owen-Smith, 2010: 413). Having considered how mind maps were a useful data collection technique in my study, I now turn my attention to documents as a further way of contextualising some of the pupils’ experiences during peer assessment.

Documentary evidence: pupils’ work

In order to answer research questions one to three and five focusing on the kinds of talk used by pupils, the impact of the talk intervention and how processes lead to outcomes during PA, documentary evidence, such as pupils’ work, was used. Dana and Yendol-Hoppey (2014: 101) show that ‘classrooms naturally generate a... paper trail that captures much of the daily classroom activity’. They suggest that when teachers are engaging in an action research study such as this one, ‘such documents become data and take on new meaning’ (p.101). Indeed I found from my pilot study that using examples of children’s work helped me to contextualise some of the other findings from observations and audio recordings (Altrichter et. al., 1993). In this study, pupils’ work in year four also provided examples of written peer feedback as a result of the discussion between children.

Although documents, such as pupils’ work, can be useful for collecting information about certain aspects of classroom life, they have been criticised for omitting other details (Suzuki et. al., 2007). Suzuki et. al. (2007) describe documents as ‘mute or material culture’ (p.314). Moreover this kind of data cannot ‘speak’ (p.317) so must be viewed and analysed by referring to data generated by the other research instruments. It was also important to provide clear contextual details about each piece of ‘student work’ (Dana and Yendol-Hoppey, 2014: 101). Furthermore, if children had written comments in their work which were unclear, these then needed to be followed up in

further discussions in order to minimise the limitation that such documents are ‘mute’ (Altrichter et. al., 1993; Suzuki et. al., 2007; Taber, 2007). If in this section I have justified the research methods I used in my study, I now turn my attention, in the next section, to the data analysis procedures adopted.

Data analysis: thematic coding and quantitative content analysis of transcripts

The data generated by different data collection methods were analysed using thematic coding analysis and the findings are presented in the next chapter in relation to each of the research questions listed at the beginning of chapter three (Braun and Clarke, 2006; Robson, 2011). This is a ‘flexible’ approach to data analysis which produces a ‘rich and detailed, yet complex, account of data’ (Braun and Clarke, 2006: 78). This approach means that the researcher has an ‘active role... in identifying... themes’ (Braun and Clarke, 2006: 80). It involves the use of codes and themes. A code has been defined as a ‘word or short phrase’ that captures an interesting aspect of the data (Saldana, 2013: 3). A theme is more extensive and incorporates data with similar codes (Saldana, 2013). However, this approach to data analysis does require a degree of interpretation and subjectivity when deciding themes and their content. An extract from Braun and Clarke (2006: 82) supports this idea: ‘there is no hard-and-fast answer to the question of what proportion of your data set needs to display evidence... for it to be considered a theme’.

Nevertheless, Braun and Clarke (2006) outline several stages researchers need to follow when conducting thematic coding analysis of data in order to make this process clearer. First, they suggest that it is important for researchers to become aware of the content of the data generated. This requires them to examine key words, phrases and elements of the data several times over and jot down any provisional thoughts. Next, researchers begin to code the data. This involves classifying ‘data into meaningful groups’ but these are smaller than the ‘overarching theme’ (Braun and Clarke, 2006: 88-89). The third stage requires researchers to assemble ‘codes into potential themes’ (Braun and Clarke, 2006: 89). In the fourth stage, it is important for the researcher to be reflective and question the suitability of themes identified in the previous stage. For

instance, it might be more appropriate to have a single theme which incorporates the coded data from several previously identified themes which are no longer required (Braun and Clarke, 2006). It is also crucial to ensure that each theme is individual and the findings within it share similarities. In the final stage, themes should be labelled according to their underlying characteristics (Braun and Clarke, 2006).

In addition to thematic coding analysis, I also analysed the audio data recorded in transcripts. I conducted a series of data sweeps where I repeatedly read my data and became familiar with its content. These sweeps initially involved qualitatively analysing data for *disputational*, *cumulative* and *exploratory* talk particularly for children in year four who were taking part in my pilot study (Mercer, 1995, 2000; Dawes et. al., 2000). For my main study, I quantitatively analysed my transcripts both before and after the *Thinking Together* intervention for different pairs of children, in year three, to calculate the frequency of words and phrases linked to ‘exploratory reasoning’ including ‘questions, pronouns, names and other keywords’ (Littleton et. al., 2005: 179). As peer assessment is an activity which requires learners to critique and comment on one another’s ideas, a focus on these kinds of words was relevant since they suggest that ‘language’ is ‘being used to reason together and encourage the inclusion of other’s perspectives’ (Littleton et. al., 2005: 179).

Initially this deductive analysis was going to concentrate on the frequency of words and phrases in table 3.2 below:

Table 3.2: key words and phrases

Key words	Purpose
Because and 'cos	used in explicit reasoning
I think	used to introduce hypothesis
If	used to reason about problems
Why	task-related questions
Which	task-related questions
What	task-related questions
You	used in questions

(Adapted from Littleton et. al., 2005, p.179)

However, throughout the research it became clear that these did not capture every aspect of *exploratory talk* or high quality classroom talk (Herrlitz-Biró et. al., 2013). According to Herrlitz-Biró et. al. (2013) there might also be other important indicators that suggest children are engaging in critical discussion and proposing alternative viewpoints. In line with their suggestion, I therefore decided to scan the data for a wider range of terms that could indicate the presence of *exploratory talk* or more effective kinds of classroom talk in the transcripts. These words and phrases are shown in table 3.3 below:

Table 3.3: wider range of key words and phrases suggesting use of exploratory talk

Key words	Purpose
Because and so	used in explicit reasoning
I think, think	used to introduce hypothesis
But, however	used to introduce alternative viewpoints/critique ideas
If	used to reason about problems
Why	task-related questions
Which	task-related questions
What	task-related questions
You	used in questions
Would, should, could, can	Reasoning or hypothesising
May be/might	Reasoning or hypothesising

(Adapted from both Littleton et. al., 2005, p.179 and Herrlitz-Biró et. al., 2013, p.1402)

I used the ‘Find’ tool on *Microsoft word* to scan how often such words and phrases occurred in the transcripts for the five different pairs of children prior to and after their involvement in the *Thinking Together* talk intervention. It was important to select ‘Find whole words only’ using this tool on *Microsoft Word* instead of simply matching

the case. For example, I initially searched for the word ‘so’ to indicate reasoning by clicking on ‘Match case’. However, this search included words such as ‘some’ and ‘also’ which were irrelevant. Therefore, selecting ‘Find whole words only’ meant that the search would specifically find that key word (e.g. so, can) on its own. In addition, it was important to check that each key word or phrase had been used in an appropriate reasoning context by locating it on the transcript (Herrlitz-Biró et. al., 2013). I then presented the data in bar charts using *Microsoft Excel* to show any differences in children’s use of different aspects of classroom talk in contexts of PA before and after the talk intervention.

Following this deductive phase of data analysis, I began a more inductive and exploratory phase where I conducted further sweeps across my data which resulted in the formation of further categories of talk (e.g. unspoken assessments) which were also grounded in the discourse that had been recorded. This ensured that important aspects of children’s talk, excluded by the existing categories, were also incorporated, understood and contextualised in my research (Mercer, 2010). Having considered the ways in which my data were analysed, the next section of this chapter outlines the criteria against which I would like the quality of my study to be judged (Patton, 2002).

Criteria for judging claims to knowledge creation in my study

As my research is interpretive and socially constructivist, it is unsuitable to evaluate it against a set of criteria for positivist research (Susman and Evered, 1978; Feldman, 2007). For example, it is not an aim of this study to make statistical generalisations (Onwuegbuzie and Leech, 2007). Instead the purpose of the study is to gain a rich, detailed insight into peer assessment by analysing my classroom practice in two different schools (Yin, 2009, 2013). This insight may enhance an aspect of professional practice resulting in different ways of working (Lewin, 1946; Hopkins, 2008). Therefore, it might be more appropriate to consider different kinds of generalisation given the qualitative nature of the study.

The first is Yin's (2009: 43) 'analytical generalization' where I analysed the findings from my study and considered how they related to wider psychological and educational theories (Vygotsky, 1962, 1978; DeVries, 1997; Salomon and Perkins, 1998; Matusov and Hayes, 2000; Mercer, 2000). I was particularly concerned with the extent to which my findings challenge or support existing theories and concepts linked to the social context of peer assessment such as Piaget and Vygotsky's ideas regarding the role of the social context in child development. The second is Stake's (1978: 7) 'naturalistic generalization' which entails readers of qualitative and interpretive research considering the extent to which findings apply to their unique contexts and settings. In order for readers to make such generalisations, as previously noted, I provided rich and detailed description about my professional context and setting, the background of the children in the sample and the details of the peer assessment intervention (Ponteretto, 2006).

I also needed to ensure that my findings were reliable, genuine and trustworthy. I therefore used a range of data collection methods for each research question to triangulate findings (Jick, 1979; Golafshani, 2003; Oliver-Hoyo and Allen, 2006; Babbie, 2007; Cohen et. al., 2008). However, this is a convergent model of triangulation based on positivist assumptions about research. It might fail to reveal contrasting perspectives in the data which are also important for examining the social context of peer assessment with different groups of younger learners. An extract from Mok and Clarke (2014: 408) supports this idea: 'It is essential that triangulation is seen not only as a validation strategy for the purpose of obtaining convergence... but also as an approach to... elucidating divergent findings as a route to additional knowledge'.

I therefore employed a divergent model of triangulation in my study where contrasting pupil viewpoints were examined in depth (Mok and Clarke, 2014). This enabled me to explore the impact of the *Thinking Together* intervention on different groups of learners and elicit the diverse range of views held on peer assessment by such pupils. For instance, pupil characteristics appeared to influence children's views on peer assessment and how successful it had been. In order to enhance my professional

practice, I needed to explore these contrasting perspectives so peer assessment could be improved in my setting.

My research also needed to meet guidelines for successful qualitative and interpretive studies (Patton, 2002). This meant presenting authentic findings and avoiding ‘the temptation to ‘look good’’ (Dowling, 2006: 8). For example, I report in Chapter 4 where my intervention had the greatest impact but also where it perhaps had less impact on the quality of children’s learning. In addition, I ensured that my study was credible by: identifying research questions that addressed gaps in current peer assessment literature; using several appropriate data collection techniques to answer these questions; exploring different perspectives in data in line with my ontological assumptions; providing detailed examples from the data to support arguments and assertions; ensuring changes to my professional practice could be substantiated in light of findings; being honest throughout the process both as a professional and researcher so a genuine and trustworthy account of my research was created; and by being ethical at all stages; (Patton, 2002; Dowling, 2006; Feldman, 2007; Heikkinen et. al., 2012). Having considered the criteria against which I would like my study to be judged, I now explore the ethical aspect of these criteria in more depth.

Ethical considerations

As this piece of classroom research focused on younger children, who I taught, several important ethical principles were adhered to throughout the process (UNICEF, 1989; Malin, 2003; Flewitt, 2005; BERA, 2011). I first gained permission from the Research Ethics Committee at the University of Leicester’s School of Education in February 2015. This committee provided consent for my research to be carried out between February and November 2015 providing I adhered to some of the ethical principles which I outline in this section. These ethical issues concern informed and parental consent, confidentiality, anonymity and my role as a both a researcher and participant in action research (UNICEF, 1989; Malin, 2003; Flewitt, 2005; BERA, 2011).

Before embarking on any data collection, I needed to have formal permission from parents and children (Mahon et. al., 1996; BERA, 2011). I wrote to the parents or guardians of children in my class to clearly explain the purpose of my study (see Appendix D). In this letter, I made it clear that they could withdraw their child from the study if they felt this was necessary. Moreover, I indicated that parents may ask any questions about the research should they wish to do so (Cohen et. al., 2008). In addition to parental consent, I obtained informed consent from the pupils in my class (UNICEF, 1989; Walford, 2005; BERA, 2011). I sent a different letter to them (see Appendix E), using child friendly language and pictures, so they understood the purpose of the study, how data would be collected and their right to withdraw from my study at any point if they felt they wanted to (UNICEF, 1989; Walford, 2005; BERA, 2011).

Following such ethical procedures meant that my study satisfied the requirements of Article 12 of the *United Nations Convention on the Rights of a Child* (UNICEF, 1989). This article outlines the importance of children being able to have a voice on issues which might involve them (UNICEF, 1989). In terms of my research this article was relevant since it allowed children to exercise their right to withdraw from the study. Several children decided they did not want to participate in the study and I respected their right to withdraw. In addition, for those taking part, Article 12 was also relevant since it emphasises the importance of hearing and valuing children's opinions and views, something much needed in the PA literature and addressed in my study (McIntyre et. al., 2005; Pedder and McIntyre, 2006; Topping, 2010).

Furthermore, the findings generated by different data collection instruments needed to be confidential throughout the research process (Einarsdóttir, 2007; BERA, 2011). This meant taking several steps to ensure that the data generated was stored securely. I ensured this happened by locking away any hard copies of data, such as mind maps and children's work, in a secure filing cabinet in my classroom cupboard. Furthermore, data such as transcripts of children's dialogue, were securely stored on a memory stick and computer which were both password protected. Individual word files with data were also protected by a password to ensure that data remained

confidential and secure throughout the process. I also needed to ensure anonymity for participants which meant changing children's names in the findings generated (Zeni, 1998; Tickle, 2001; Sikes, 2006; Einarsdóttir, 2007; BERA, 2011). For instance, Zeni (1998: 15) suggests that it is wise to 'use pseudonyms even in your field notes'. Similarly the confidentiality of children's identities were protected using these 'pseudonyms' which included any of the English or mathematics work generated by them throughout the study (Zeni, 1998: 15). I use pseudonyms such as Steven, Helen, Michael and Bella in the next chapter to protect pupils' identities.

It is also important to be aware of how power relations can influence research findings. For example, my role as the children's class teacher had the potential to lead them to provide answers that they felt that I would like to hear. This may limit the authenticity of findings if pupils feel pressurised to conceal their real opinions (UNICEF, 1989). Therefore, as mentioned earlier, I drew upon methods of data collection, such as mind maps and audio recordings, which enabled pupils to voice their opinions independently of the teacher. For instance, children had opportunities to share their opinions of the *Thinking Together* intervention and how it had influenced the quality of their learning in contexts of peer assessment. Having considered how I addressed ethical issues in my study, it is now time to summarise the key aspects of my research design.

Chapter summary

This chapter has provided details of the research design I used in my study. My study has been designed so that I was able to examine, in detail, the views of children surrounding the social context of peer assessment which help to attend to an important gap in the literature reviewed earlier on in Chapter 2 (Vygotsky, 1962, 1978; Mercer, 2000; Kollar and Fischer, 2010; Topping, 2010; Van Gennip et. al., 2009, 2010). The study of this context involved exploration of key social processes, such as talk and dialogue, which may also influence the quality of younger children's learning during peer assessment. Given that I valued the various views, opinions and perspectives of participants in my study, the chapter began by arguing that my research best reflects a

set of interpretive and social constructivist assumptions (Smeyers, 2001; Johnson and Onwuegbuzie, 2004; Scott, 2007; Robson, 2011). I also argued that my use of quantitative data analysis is entirely consistent with these assumptions. Then I provided details of the action research interventionist case study design I used. The cases studied were pairs of children I taught in my year three and four classes (seven to nine year olds) over two years in different settings. The study of specific cases allowed me to explore peer assessment practices in depth and intervene to change aspects of professional practice in line with my interventionist approach (Lewin, 1946; Stake, 1978; Hopkins, 2008; Yin, 2009, 2013). The *Thinking Together* intervention was used to guide children to use talk as a tool for learning in small groups (Mercer et. al., 1999; Dawes et. al., 2000; Mercer et. al., 2004; Rojas-Drummond and Mercer, 2004; Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005; Mercer and Sams, 2006; Mercer et. al., 2009). They then offered their views on how useful they felt this *intervention* had been for developing their effective use of talk in contexts of peer assessment (McIntyre et. al., 2005; Pedder and McIntyre, 2006).

After outlining the action research strategy used, I provided details of my sampling strategy and how methods of data collection corresponded to the research questions identified at the beginning of this chapter (Cohen et. al., 2008). As my research focused on pairs of children within the classes I have taught, a *purposive sampling* strategy was used where I purposely selected participants to take part based on their pupil characteristics such as shyness, articulateness, prior attainment and motivation levels (Cooper and McIntyre, 1996; Robson, 2011; Silverman, 2015). The methods of data collection included audio recordings of pupil talk and interviews, open ended observations recorded as field notes, pupils' work, and mind maps (Powney and Watts, 1987; Altrichter et. al., 1993; Burgess et. al., 2006; Whitehead and McNiff, 2006; Cohen et. al., 2008; Hopkins, 2008; Dana and Yendol-Hoppey, 2014). The data was inductively analysed using thematic coding analysis (Braun and Clarke, 2006; Robson, 2011). I also analysed the transcripts deductively, using predetermined categories of talk (Mercer, 2000), and inductively to identify any other kinds of talk which are grounded in the data and would otherwise be excluded (Mercer, 1995).

I have also ensured my research satisfies the criteria for creditable qualitative and interpretive research by: using a range of appropriate research methods to answer each question; providing the opportunity to report contrasting pupil perspectives in my findings; ensuring that rich and detailed examples are given from the data to substantiate any arguments or comments made; outlining that changes to classroom practice will be well justified in relation to the findings generated; and by ensuring that ethical principles were followed at all stages (Patton, 2002; Dowling, 2006; Feldman, 2007; Heikkinen et. al., 2012; Mok and Clarke, 2014). The final part of my chapter outlined the steps I took to ensure my research is ethically sound. These steps included: obtaining permission from parents and gaining informed consent from children; ensuring findings were confidential and data was stored securely throughout the research process; findings remaining anonymous through the use of pseudonyms which were extended to pieces of work children had produced; and ensuring the voices of pupils were heard throughout the research process (UNICEF, 1989; Mahon et. al., 1996; Zeni, 1998; Tickle, 2001; Sikes, 2006; Einarsdóttir, 2007; BERA, 2011). In the next chapter, I present the findings from my research in relation to each of my research questions examining the social context of peer assessment.

Chapter 4: Findings

In the previous chapter, I provided details of the action research case study strategy used, information on the informants/participants from each setting and on the data collection and analysis procedures. This chapter presents findings from the two case studies described in the previous chapter. The research findings presented here draw into sharp focus the social and interactive nature of the processes of peer assessment, such as different kinds of classroom talk, and the influence of such PA processes on children's learning. I present the findings according to each research question identified in the previous chapters:

RQ1. What kinds of talk emerge during peer assessment when social interaction is allowed and how useful are these for enhancing pupils' learning?

RQ2. To what extent do different groups of children consider the *Thinking Together* intervention is helpful in developing their use of effective talk in contexts of peer assessment?

RQ3. How does the *Thinking Together* intervention change how different groups of learners use PA to improve their own and one another's learning?

RQ4. What factors do pupils consider important influences on the effectiveness of PA processes and in light of this feedback how can PA be improved further?

RQ5. How does PA, as a learning process, influence pupils' learning outcomes including their ability to self-assess?

Within each research question, findings are organised according to themes which emerged from qualitative data analysis (Robson, 2011). This qualitative analysis is complemented by tables and graphs which represent the quantitative analysis carried out on transcripts of pupil talk in contexts of PA. As mentioned in Chapter 3, the first case is a year four class I taught at a large primary school in Coventry whilst the second is a year three class I taught at a school in Devon. In addition to the findings presented and described in this chapter, an example of a full transcript of an informant style interview can be found in Appendix A; a full transcript of a whole class

discussion can be found in Appendix B; and field notes recording my observations and reflections can be found in Appendix C. Having provided a brief overview of the chapter, I now report findings for my first research question, focusing on the different kinds of talk year 3 children used during their first peer assessment task prior to the talk intervention.

RQ1. What kinds of talk emerge during peer assessment when social interaction is allowed and how useful are these for enhancing pupils' learning?

In order to assess the kinds of talk used in PA task contexts when social interaction is allowed, year 3 children were given an open ended task where they had to generate questions or calculations which would have a specific answer and comment on one another's ongoing ideas. The findings suggest that the kinds of talk and interaction that emerge in the PA task context may be influenced by pupils' characteristics. In particular:

- Pupils with lower prior attainment and particular behavioural difficulties tended to use talk with a *disputational* orientation which inhibited their learning;
- A mixture of *cumulative* and *exploratory talk* was evident in the pair where one peer had higher prior attainment than the other;
- *Exploratory talk* and richer peer feedback tended to be evident in discussions with pupils who were articulate and had higher prior attainment; and
- Some discussions were characterised by limited interaction particularly when pupils were shy and less confident.

Most of the talk in this section focuses on children's social interactions prior to their participation in *Thinking Together* so I could examine in more detail how social processes affect children's learning in the PA task context before any intervention. However, talk recorded for Lucy and Sophie only focuses on their interactions

following the intervention as they accidentally deleted the audio recording on the digital voice recorder.

Disputational talk

Steven, a boy who can present challenging behaviour and Helen, a girl with dyslexia and lower prior attainment in mathematics, worked on the same task finding different ways of making twenty-five. Both of the pupils are also eligible for the pupil premium, entitled to receive free school meals and are working at a similar academic level. An example of the written work they produced is shown in figure 4.1 below:

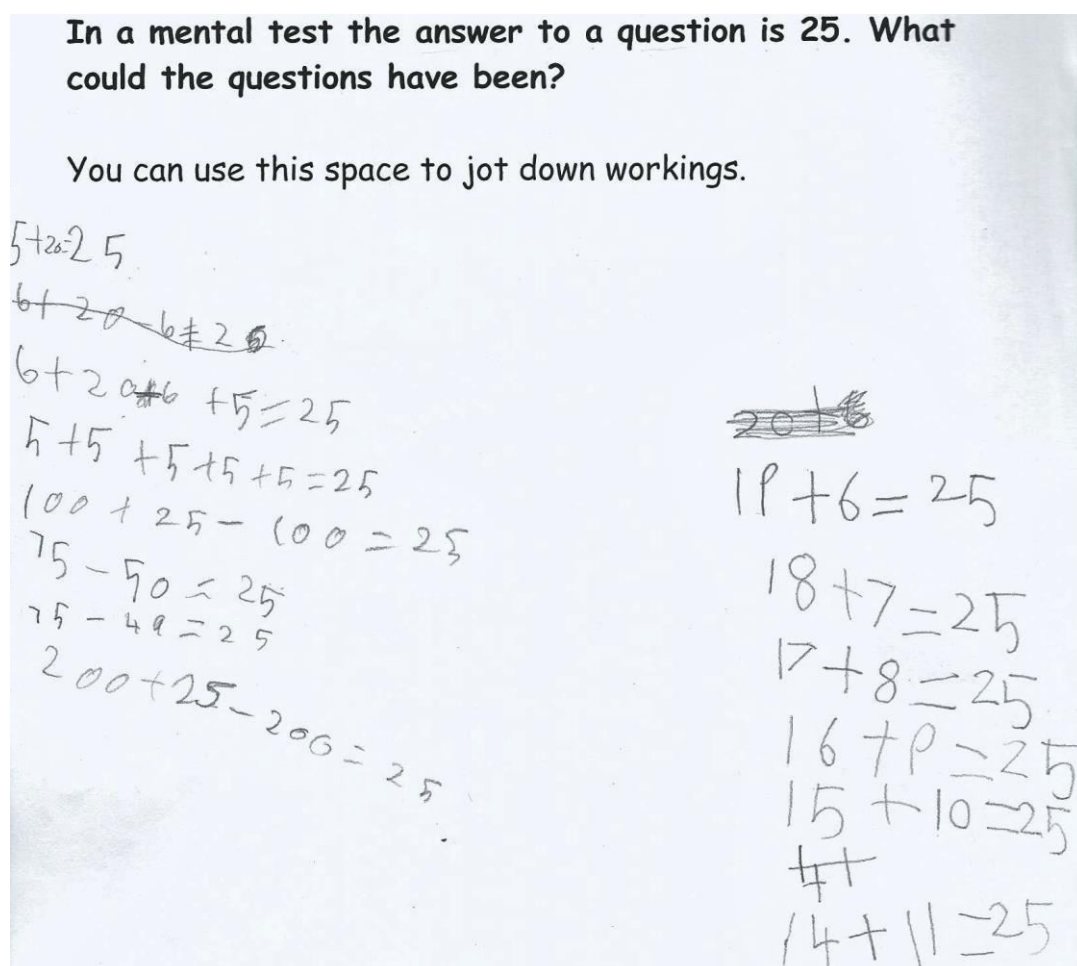


Figure 4.1: Steven and Helen's work around the number 25

The following transcript represents the dialogue that occurred between Steven and Helen whilst they were producing this piece of work. Arguably it closely resembles the features of *disputational talk* in the PA task context as there is limited collaboration between the peers:

Transcript 1: Steven and Helen's discussion around 25

HELEN: Alright, I have one. Nineteen...

STEVEN: No, no, no. Do my one.

HELEN: ...add one. I'll do it. Nineteen...six add twenty, take away six.

In this extract, Steven is keen to dominate and control discussions by ignoring Helen's responses and focusing on his: 'No, no, no. Do my one'. Helen also highlights Steven's inability to listen further on in the conversation: 'I did tell you but you didn't listen'. Steven is simply concentrating on his sums and discarding any contributions offered by Helen. Further on, Steven continues to dominate, contradict and compete:

HELEN: Yeah. It's like a pattern. So it's like 17, 16, 15, 14....

STEVEN: No, did you get mine? Because I had 100 and then **I add 20**. And then I just took the 100 away and then I just had 25.

HELEN: Seventeen add...it's just like a pattern, isn't it? So 17 add....

STEVEN: Too easy. That's too easy (overlapping conversation).

HELEN: Yeah, I know. (Chuckles). It's like a pattern so you're going down and down, you're not going up and up. So nineteen....

Here Helen enthusiastically identifies a pattern she has spotted but Steven appears to be disinterested in her response instead stating 'No, did you get mine?' He also dismisses Helen's work as 'Too easy' even though she was offering valid insights. This appears to coerce Helen into agreeing with him: 'Yeah, I know' as, according to

Helen, she can lack confidence in mathematics (see Appendix A). Thus, this kind of *disputational talk* from Steven is preventing him from assessing Helen's ideas and providing her with supportive and developmental feedback. Helen does not appear to be assessing or engaging with Steven's ideas either and fails to pick up on his incorrect calculation making 20 instead of 25: 'Because I had 100 and then **I add 20**. And then I just took the 100 away and then I just had 25'.

Further on into the discussion, both children appear to be contradicting one another:

STEVEN: (Overlapping Conversation) 75 take away 50. Does that equal 25?

HELEN: What is it? So 75....

STEVEN: I can work it out myself.

HELEN: No way.

STEVEN: Yes way.

HELEN: Would it? No, I don't think so Steven.

STEVEN: Equals 25.

Although there is now some questioning about the possibilities, Steven is working individually rather than collaboratively. There is limited interaction and a further dispute where Helen says 'No' and Steven replies with 'Yes'. In this example, Steven worked on his own correctly identifying that '75 take away 50' makes the total. However, he does not explain to Helen why this works and she continues to be puzzled: 'No, I don't think so Steven'. Steven seems to ignore this response perhaps because he did not listen carefully. This prevents him from assessing the needs of his partner which might involve disputing her claim with a clear explanation. As I explore further on under RQ2 and 3, Steven and Helen's talk changed significantly following the talk intervention resulting in more positive and purposeful communication in the PA task context.

A mixture of cumulative and exploratory talk

In some pairs, the kinds of talk used by peers differed. For instance, Bella, a higher achieving girl, appeared to dominate discussions and use talk to explore key concepts whilst Daisy, a lower achiever in mathematics, appeared to provide affirmative feedback closely resembling the features of *cumulative talk*. An extract from the transcript exemplifies this:

Transcript 2: Bella and Daisy's discussion around 25

BELLA: You've just said that one.

DAISY: Oh yeah. 21 add 4 equals 25.

BELLA: Yes. Now, because you've done all of them correct, we can learn a little bit more about it. Okay. Right, I think I know another one to get you thinking. 2 add 23 equals 25. Was I correct?

DAISY: Correct.

From my observations (Appendix C), I found that Bella had actually shown Daisy the answer (of four) using her fingers so Daisy was able to calculate '21 add 4 equals 25'. Bella asked Daisy 'Was I correct?' about '2 add 23'. Daisy simply responds by stating 'Correct' without any further explanation. This kind of talk does not appear to help Daisy reason about the different possibilities involved. This kind of discussion continues further on:

BELLA: Okay, now because you know a little bit about it, we may try and get to take away sums. Should we try to do that? Okay, now we can try take away sums. 27 take away 2 equals 25.

DAISY: I don't know if it's correct. Yes it is!

Here Bella also prompted Daisy to say '27 take away 2' was correct: 'Yes it is!' This evidence suggests that uncritical *cumulative talk*, in the form of affirmative feedback, was being used by Daisy which may have been because she did not understand.

Nevertheless, further on Bella posed another problem for Daisy to solve which shows she is beginning to explore possibilities in more depth:

BELLA: ... I'll say 32 take away 75 equals 25.

DAISY: Wrong.

BELLA: Okay. How was it wrong?

DAISY: Because it doesn't get to 25.

In this instance, Bella already appears to know that the calculation will not equal twenty-five. Daisy disputes her assertion without any reasoning which is picked up by Bella who asks her to explain further. At this point, Daisy does realise 'it doesn't get to 25' thus starting to engage in talk which is encouraging her to reason mathematically.

Exploratory talk

Aspects of *exploratory talk* were perhaps more evident for higher achieving learners who already have both the interpersonal and mathematical skills enabling them to reason and hypothesise collectively and individually. An example of the work produced by Michael, a pupil eligible for the pupil premium and free school meals and Phillip, a boy with prior higher attainment in mathematics, is given below in figure 4.2:

In a mental test the answer to a question is 25. What could the questions have been?

You can use this space to jot down workings.

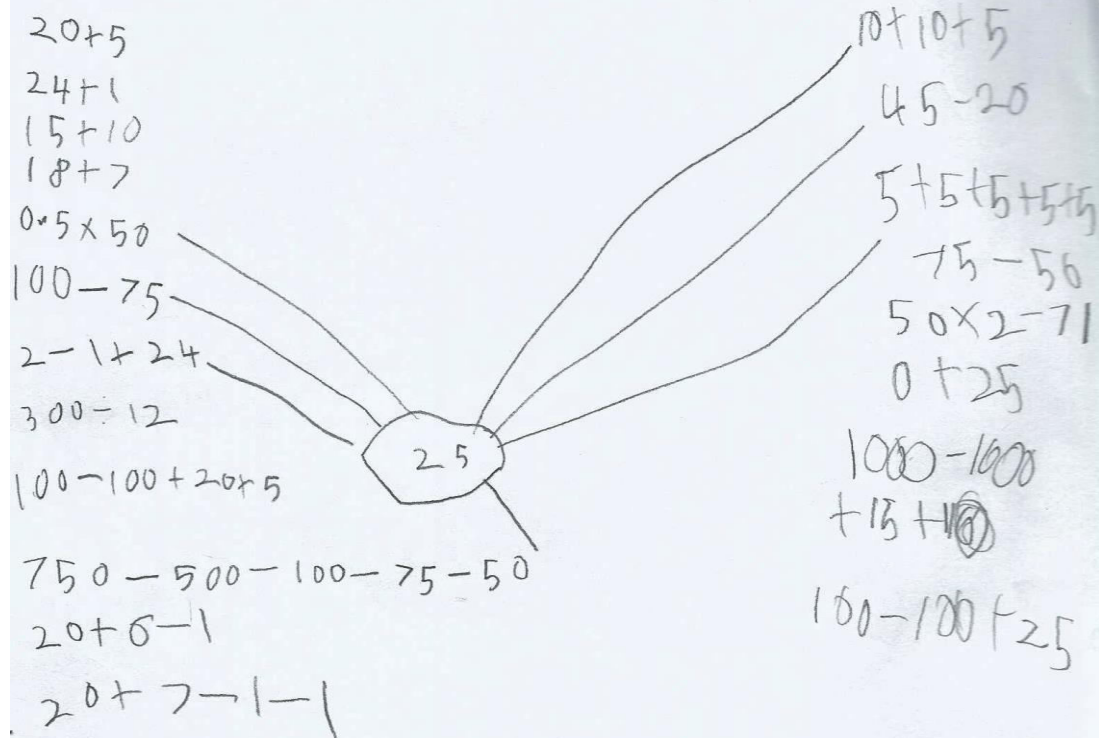


Figure 4.2: Michael and Phillip's work focusing on the number 25

In Michael and Phillip's discussion, disputes still occurred but more subtly leading to greater understanding as in the example below:

Transcript 3: Michael and Phillips' discussion around 25

MICHAEL: I'd say, I don't know, 15 and 15.

PHILLIP: That's 30. So....

MICHAEL: We could do 20 and 5. (Laughter)

PHILLIP: That's 20, alright.

Here Michael incorrectly suggests that ‘15 and 15’ will make twenty-five but Phillip has accurately assessed this mistake and states ‘That’s 30. So...’ This, in turn, encourages Michael to offer the correct response of ‘20 and 5’.

James and Leanne, pupils with higher prior attainment, also worked well together exploring several possibilities at a more advanced level. An example of their written work is given below in figure 4.3:

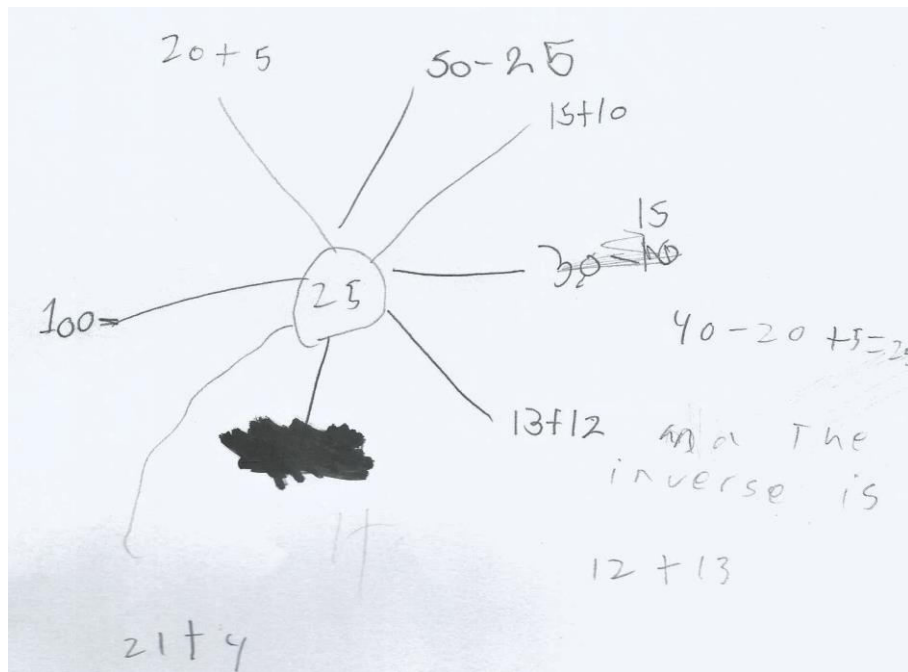


Figure 4.3: James’ and Leanne’s work around the number 25

In their discussion there was evidence of greater collaboration and reasoning together as shown in transcript 4 below:

Transcript 4: Leanne and James’s discussion around 25

LEANNE: But 21 add 4 works.

JAMES: Yeah, but –

LEANNE: Because we've got a 24 and then we add one more to it, add 4, add 1 equals 5, and put on the 20 and that equals 25.

LEANNE: Yeah. So then 50 take away 25 is --

JAMES: 25 **because** 2 times 25 equals 50 so obviously **you** know if you take away 25, so that equals 25.

LEANNE: Yeah. And what will 100 -- what will we need to take away from 100 to equal 25?

JAMES: Maybe we could do 75?

LEANNE: 100 take away 75 --

JAMES: I think that's right. Is it 85? It could be 75 because if you take away 20 from 100 it's 80.

LEANNE: Yeah.

JAMES: You take away the 20 from 100, they equal 80 then you take away 5 from 80 equals 75 so that's right.

LEANNE: And then 85, 100 take away 85 doesn't equal 25.

Here, the children used pronouns (you/we) and questions (what) to involve one another in the discussion, reasoned effectively, built upon each other's ideas critically and identified mistakes. In contrast to Steven, who used first person pronouns such as 'my' and 'mine' suggesting he was only concentrating on evaluating his own ideas, Leanne and James used pronouns suggesting greater collaboration and consideration of one another's perspectives such as 'we' and 'you'. This kind of language would imply they were assessing and engaging with one another's calculations and questions. This is evident in the pupils' questioning: '... what will we need to take away from 100 to equal 25?' In addition, Leanne suggests possibilities such as '21 add 4' but then continues to explain why this works: 'Because... 4, add 1 equals 5, and put on the 20 and that equals 25'. Leanne questions James about fifty subtract twenty-five. James responds with appropriate reasoning: '25 **because** 2 times 25 equals 50 so obviously

you know if you take away 25, so that equals 25'. Occasionally the feedback is affirmative and perhaps matches some of the features of *cumulative talk*. For example, 'Yeah' is used as a response several times to show agreement. Yet this kind of positive feedback enables the discussion to continue and advance. After James has realised the correct solution is seventy-five, Leanne comments: 'And then 85, 100 take away 85 doesn't equal 25' thus drawing an appropriate conclusion. This kind of richer discussion was possibly absent in other pairs since they did not have the interpersonal skills to collaborate, feedback to one another and explore ideas together in the PA task context.

Talk characterised by limited social interaction: unspoken assessments

In a quieter pair of mid to high achieving girls there was limited social interaction but the girls did generate some possible calculations which would result in an answer of twenty-five which are shown below in figure 4.4:

Solve this problem with your classmate. **Comment** on each other's ideas.

In a mental test the answer to a question is 25. What could the questions have been?

You can use this space to jot down workings.

$20 + 5 = 25$	$= 25$	$= 25$
$10 + 15 = 25$		
$14 + 11 = 25$		
$15 + 10 = 25$		

Figure 4.4: Lucy and Sophie's work focusing on the number 25

Nevertheless there was limited peer interaction and feedback as I recorded in my field notes (see Appendix C): ‘... there was little interaction ... as both these girls are normally quite reticent in class. They were quite unsure about what to actually do’. Unfortunately they deleted their recording of talk for this session but the talk intervention appeared to have limited impact on their use of dialogue. Instead the girls took it in turns to complete their calculations arriving at the target number similarly to their previous discussion around the work they had completed in figure 4.4. An example of such interaction is given in transcript 5:

Transcript 5: Lucy and Sophie’s discussion around 100

LUCY: 100 and 0 equals 100.
SOPHIE: Zero, 100 equals 100.
LUCY: 20 add 80 equals 100.
SOPHIE: 10 and 90
LUCY: Equals 100.
SOPHIE: 100 take away 80 equals 20.
LUCY: No, Sophie, that has to equal 100.
SOPHIE: 80 add 20 equals 100.

The girls here were learning about the different possibilities and it is feasible that they engaged in a kind of unspoken assessment only commenting when solutions were irrelevant. For example, when Sophie’s calculation makes twenty instead of 100 this is identified by Lucy: ‘No... that has to equal 100’. At this point, Sophie correctly identifies that ‘80 add 20 equals 100’. However, the girls do little to involve one another directly or discuss concepts together which may have prevented them from

moving onto more challenging calculations which they are arguably capable of. I explore further on, under RQ3, how I adapted the talk intervention to explore how quieter children, such as Lucy and Sophie, might be able to engage in richer peer discussions which, in turn, enable them to use PA more effectively as a tool for learning. Having considered which kinds of talk emerged during PA with these children, and their influence on children's learning in the sample, I now turn my attention to pupils' views concerning the role *Thinking Together* played in developing their use of talk, as a more effective tool for learning, in peer assessment task contexts.

RQ2. To what extent do different groups of children feel the *Thinking Together* intervention has been helpful in developing their use of effective talk in contexts of peer assessment?

A wide range of pupils commented positively on how the talk intervention had helped them to use ground rules and generate more effective talk in the PA task contexts in mind maps, whole class discussions and informant style interviews. However, on the basis of the interview accounts developed by participants in this study the intervention appeared to have the most striking impact on lower achieving learners, some of those eligible for the pupil premium and children whose behaviour had been particularly challenging prior to the intervention.

Pupils link ground rules with peer assessment

Initially in both classes, the children took part in *Thinking Together* and came up with a set of ground rules for talk. An example of the ground rules, used by year 4 children, is given in the photograph (figure 4.5) on page 84.

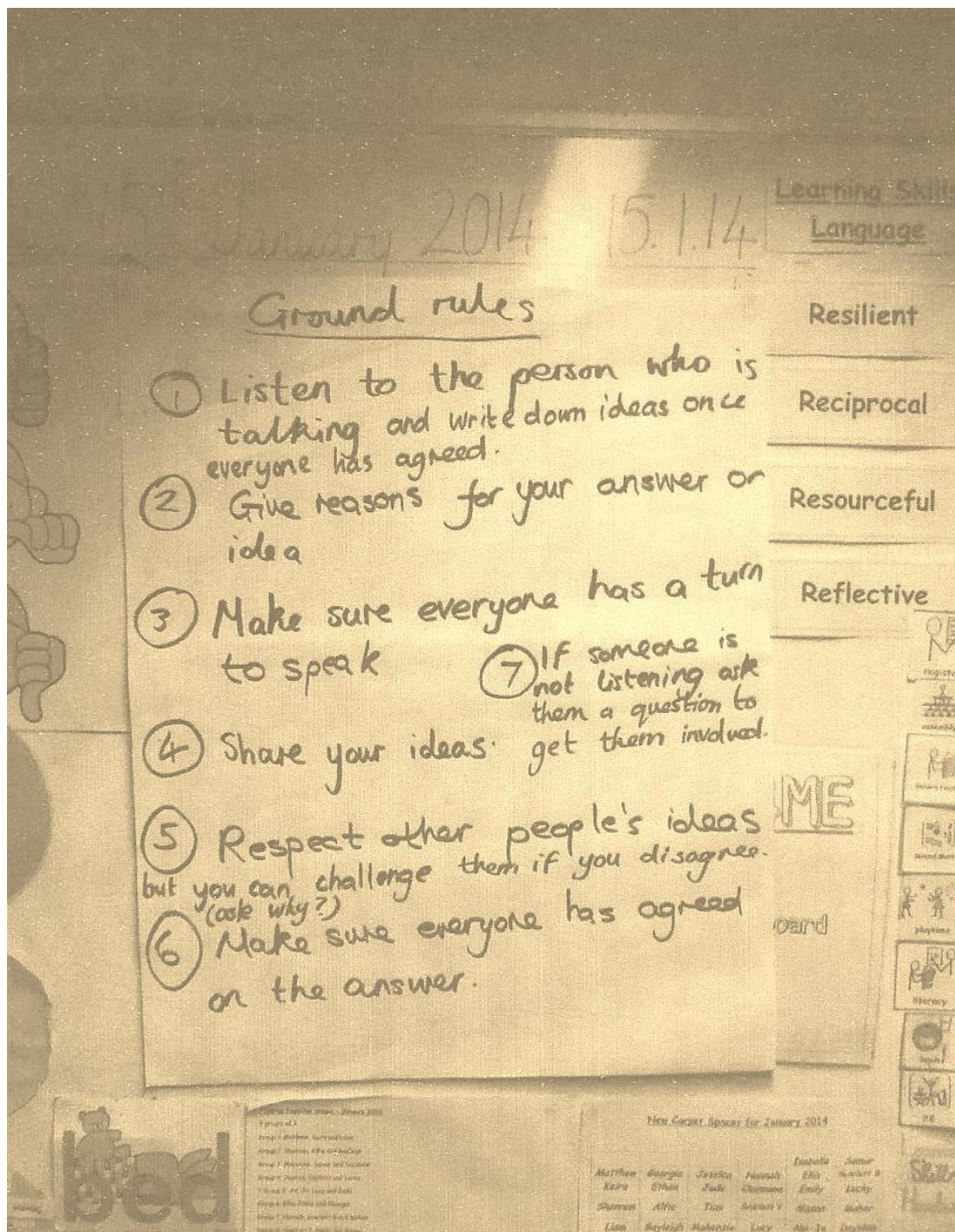


Figure 4.5 – Ground rules

Following the talk intervention in both classes, children recorded their thoughts about how group work had developed in mind maps shown in figures 4.6-4.8 below:

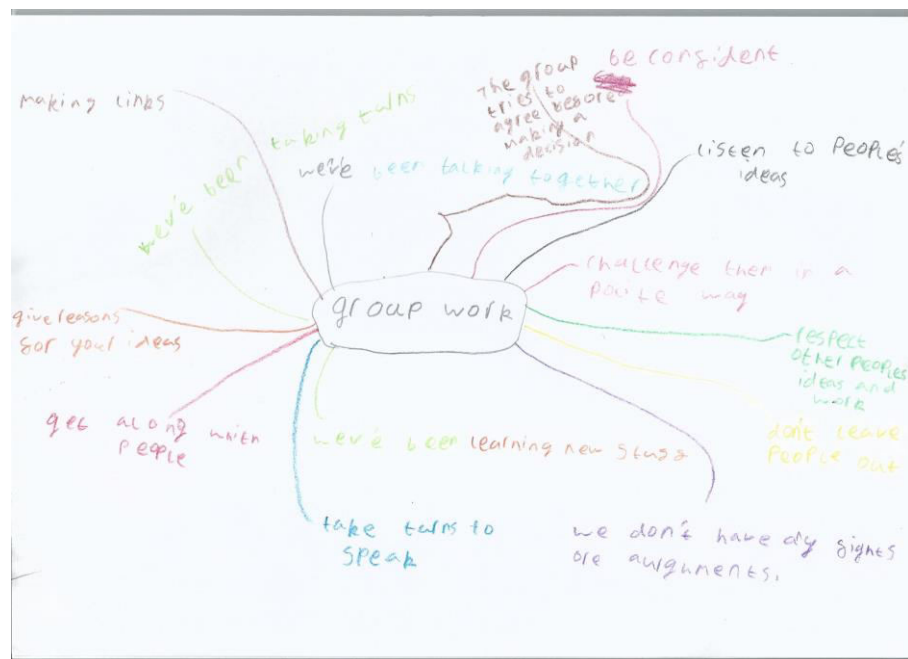


Figure 4.6 – Year 3 pupils' attitudes towards group work following *Thinking Together*



Figure 4.7 – Year 4 pupils' attitudes towards group work following *Thinking Together*

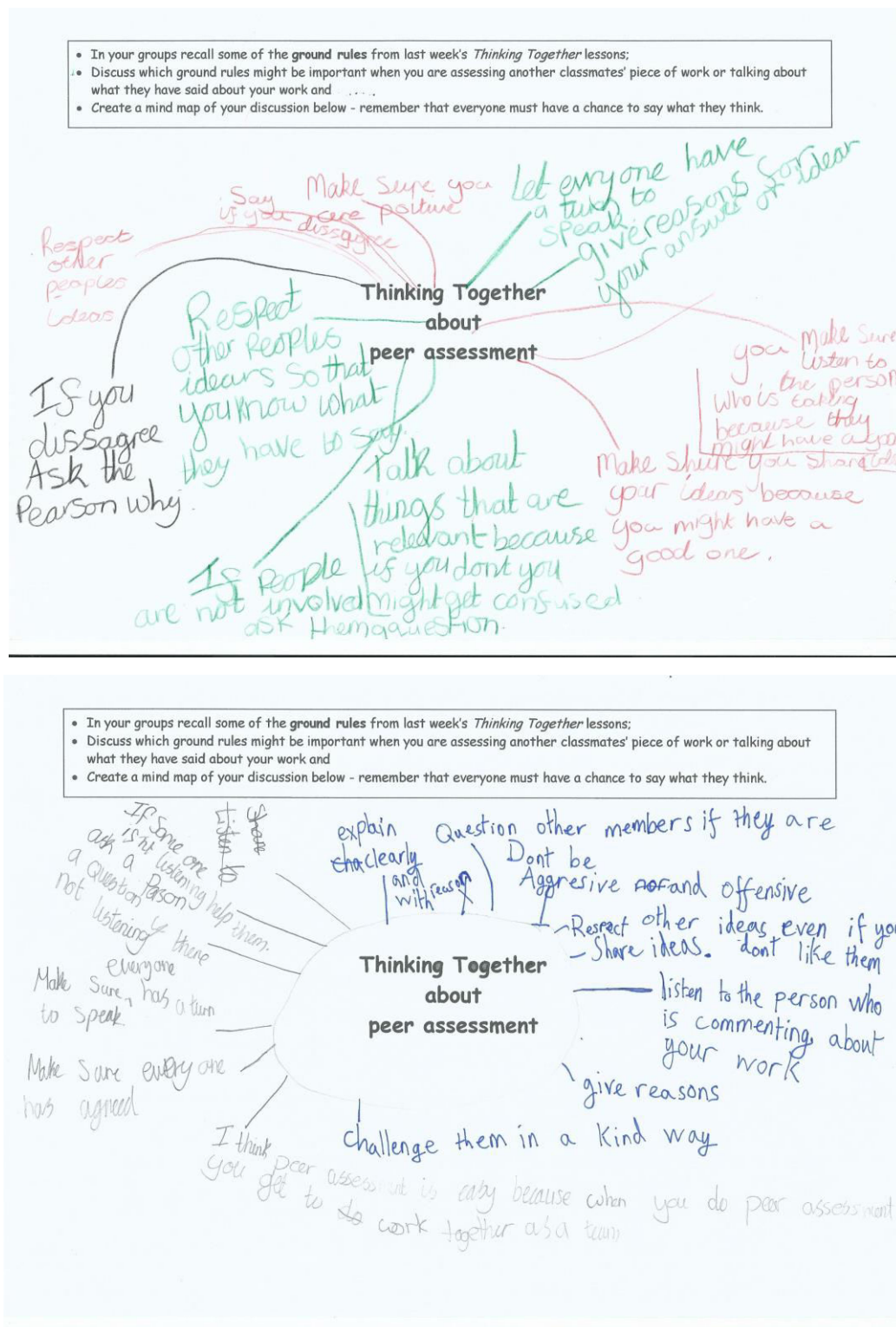


Figure 4.8 – examples of mind maps produced by children in year 4

Data from mind maps suggests that after the intervention, children felt their use of effective talk had developed and their attitudes towards group work were more positive. Year 3 children stated that ‘we’ve been taking turns’ and challenging ‘them in a polite way’. Furthermore, one child felt it was important ‘to respect other people’s ideas and work’. One child stated ‘we’ve been learning new stuff’. Similarly, children in year 4 indicated that ‘we don’t have as many arguments or fights’ and ‘now we get along’. In another mind map, a child said that it is important to ‘respect other ideas even if you don’t like them’, whilst another commented that it was useful to ‘give reasons for your answer or idea’.

A year 3 higher achieving informant in an interview also recalled interactions prior to *Thinking Together*: ‘... because we don’t have the ground rules, we were all like getting annoyed and it was like everybody was like the captain of everyone. And they’ll just go and like, “Ugh, yours is wrong. Look at mine.” Like that. And they were doing it to everybody because we weren’t in groups’’. A year 3 higher achieving girl also suggested disputes had characterised pupils’ discussions prior to the talk intervention: ‘people used to fight and people like don’t be like very nice to other people but now we’re doing the ground rules it’s better’. This comment suggests that prior to the talk intervention there was competition and dominance due to the lack of clear rules for communication.

By contrast, several class discussions with both classes around peer assessment suggested that ground rules had influenced the kinds of talk used in PA task contexts (see Appendix B). In these discussions, children first had the opportunity to recall the ground rules through partner talk before suggesting how they might be important for peer assessment. Importantly these discussions revealed that most children had a much deeper and critical understanding of the relevance of each ground rule for PA beyond the points children had raised in the mind maps earlier.

For instance, in year 4 children felt it was important to give reasons ‘So people know what, why is that, what you said’ and ‘If you got...if it’s really good, you might say “It’s really good” but you don’t know why’. Furthermore, others commented ‘... if you

give them reasons then they'll be like "Oh yes, okay. I understand it" and 'So then they'll now go away knowing what they'll have to do'. In a similar vein, a child in a different discussion felt that this was important as without reasons 'if you say it is good, they will not know what is good about it'. A child with prior lower attainment also suggested that 'if you... said, "That work was really good," you've got to give an idea because then they don't know what, the person who did the work, doesn't know what they've done to make it really that good'.

This was also the case with other ground rules (see appendix B). For instance, listening carefully to one another was seen as a relevant ground rule for assessment according to one year 4 pupil 'because if you don't, and they're saying the right thing, you'll probably write the wrong thing down'. Another child mentioned respectfulness as a ground rule because 'if you don't respect, they might feel... not as clever as the other person'. This view was echoed by another year 4 child, in a separate class discussion, who felt this was important during PA as without it 'It could knock their [the partner's] confidence and they wouldn't belief in their self [sic] anymore and they might not produce as much work'. However, whilst respect was mentioned, children also recognised the need to be critical during PA.

For example, one year 4 pupil suggested you could 'give them a challenge'. They indicated that during PA, 'you could say, "I bet that... we can make this better"'. Another child suggested that challenge could be provided by asking a question such as 'what [do] you think about your work?' In the discussion with year 3, there was also evidence children had used the ground rules in their peer assessment tasks to challenge one another. Steven, who found collaboration particularly challenging prior to the talk intervention (see transcript 1), commented about the relevance of two ground rules for peer feedback: 'respecting other people's ideas, but... challenging them... because, yeah, you might agree with them, but you might say, "Well, that's a bit easy. I think we should challenge ourselves"'. This viewed was echoed by a year 3 girl in the class who suggested '... if it's too easy for you, you don't want to learn stuff that you already know, you might be able to say ...I don't want to do this one; I want it to challenge us'. Thus, children may have been using ground rules as a way to move one

another's learning forwards particularly when they assessed their partner to be working below expectations.

It was interesting to note, however, that other children had different views on the impact of the talk intervention (Appendix C). For example, an interesting point was raised by a year 3 boy with higher prior attainment, who felt that being respectful and challenging simultaneously was problematic during PA: '... there's something wrong with this. If you challenge someone's idea, then it's not really respecting their idea. If you say, "I don't think that's right," that's not really respecting the idea... (therefore) these two are opposites'. Then, referring to the year 3 class's ground rules focusing on the importance of respecting and challenging ideas, the same pupil went onto comment: 'If we do that, then we won't be doing that. If you do that, then we won't be able to do that'. This created a dilemma for the class and children discussed how this could be resolved. One child felt that 'Well, you could say, like you can agree with them, but that maybe on the next one you're like, "Oh, I will challenge"'. I also reminded the children about 'politely challenging' to avoid conflict and disputes in PA task contexts.

Furthermore, Michael, a year 3 pupil eligible for the pupil premium, felt that he had actually spoken less with his partner in the PA task context following the talk intervention (see table 4.3 and figure 4.15 on pages 108-109 and transcript 13 on pages 110-111). He commented that, prior to the intervention, 'There was quite a lot of arguments in the class over who does what and... It's got a lot quieter.... Because they've been working more'. Importantly he felt this was something he had done during the PA task: 'We'd been doing a lot and not saying that much'. He could, nevertheless, recall important ground rules that had enabled the boys to communicate positively with one another: 'Looking and listening ... Respecting other people's ideas and the group tries to agree before making a decision'. As Michael felt he had 'been doing a lot' this might have resulted in a shorter, more succinct conversation as both boys were actively engaged in the number task, still interacting, but using fewer spoken words and phrases as I explore further in RQ3. Although many pupils' previous comments suggest *Thinking Together* was relevant for a wide range of

children who contributed to discussions, interestingly it appeared to have a significant impact on the lowest achieving pupils and those presenting the greatest challenges.

Impact on lower achievers and those eligible for the pupil premium

Both quantitative and qualitative evidence from transcripts of classroom talk and informant style interviews (see Appendix B), suggest that the talk intervention had the greatest impact on the children who had previously found communicating with one another most challenging. One informant, Steven, a year three pupil eligible for the pupil premium who can present challenging behaviour, commented:

We have been thinking together making a decision, a decision before we all agree. So say something, say that you say what's... five add two. And you said it was six, you'd all have to agree with that. But say if Helen didn't agree with it but... said, "Oh no, it can't be because if you count your fingers, five, six, seven. So it's seven." So you have to agree... it seems... all about the ground rules basically.

Thus, as previously mentioned, the ground rules appeared to guide pupils, such as Steven, to use talk as a more effective tool for learning in the PA task context focusing on number. Steven went on to suggest that 'We have been working a bit better than normally' and 'we've got strict groups and we don't argue that much. And it has been a bit better. I'm not saying it's completely better but it has been better'.

He realised that prior to the intervention he had excluded his partner, Helen, from discussions (see transcript 1): 'I didn't like her joining in'. Moreover, he said '... we would all argue and we wanted to be listened to'. With some prompting, he could remember some ground rules which helped him to collaborate: 'Ask everyone before what do they think and take turns to share your ideas'. He then stated 'Before I wasn't exactly... going to do it. But now I am'. He also suggested that, when giving peer feedback to Helen around her ideas in mathematics, all ground rules had been utilised: 'When we've been working all together including Helen, I would say all of them'. He stated 'I have been letting people join in a bit more'.

Importantly I asked Steven how the ground rules had been used during the peer assessment task in mathematics. His response suggests a change in attitude and mindset from previous discussions (see transcript 1 under RQ1): ‘I was helping Helen and make [sic] sure that she was getting them right’. By contrast, field notes (see Appendix C) record how Steven had felt, two weeks earlier, that he would never be able to engage in something like *Thinking Together*.

Improvements in Steven’s attitudes were echoed in my interview with Helen who was Steven’s partner throughout the intervention. Helen reported how challenging Steven’s behaviour had been initially during the *Thinking Together* lessons: ‘He was like telling me off... Then he started having a go at me because I felt angry’. She also commented: ‘We just didn’t really agree and I tried to like, get along to work with him. I’m trying to make us work together but he just couldn’t get the hang of it, really’. As mentioned earlier, this kind of interaction is exemplified in Steven and Helen’s peer discussions around the number 25 (see work in figure 4.1). A further extract from the beginning of their discussion is given below:

Transcript 6: Discussion between Steven and Helen around the number 25

TEACHER: Okay. So what I want you to do is think of lots of questions that get you to 25. So can you think of one?

HELEN: Oh, that’s easy, 20 add 5.

TEACHER: Okay. And then I want you to tell each other what you think of each other’s questions.

STEVEN: Twenty add five.

HELEN: Don’t copy me.

STEVEN: I did [inaudible] quite like....

HELEN: Twenty add....

STEVEN: Stop copying.

HELEN: Twenty add six? You would have to take away one though.

STEVEN: Yeah. Just do my one.

Steven is being competitive, dominating discussions and excluding Helen from these. I asked Helen what had happened after the first few lessons of *Thinking Together* following this discussion. She said: ‘The next time we did it, we actually...like, we got a long a bit better and we learned... the ground rules and stuff’. She mentioned the class ground rules including watching ‘... the person who’s talking, make sure you listen carefully to the person who is speaking and challenge politely’.

Two weeks after children had completed their first activity, focusing on the number 25, I wanted to evaluate the impact *Thinking Together* had had on the ways in which children interacted when giving peer feedback. This time, Helen and Steven engaged in a task around the number 100. An example of the children’s written work is given in figure 4.9 on page 93.

Thinking together about each other's work

The answer is 100. What could the questions be this time? Comment on each other's ideas using the ground rules for talk.

$$50 + 50 = 100$$

$$40 + 60 = 100$$

$$60 + 40 = 100$$

$$30 + 70 = 100$$

$$200 - 100 + 20 + 20 = 100$$

$$20 + 80 = 100$$

$$9000 - 9000 + 900 - 800 = 100$$

$$8000 - 8000 + 800 - 700 = 100$$

$$90 + \boxed{80} = 100$$

$$\boxed{70} + 30 = 100$$

$$\boxed{50} + \boxed{50} = 100$$

$$\boxed{40} + \boxed{40} + \square = 100$$

Figure 4.9: Steven and Helen's discussion around the number 100

I asked Helen what happened this time. She said '... we did the same activity. We were sort of working together a bit more and he was helping me maybe a bit more'.

When probed to suggest why, Helen stated ‘... we learned because you told us that maybe get along a bit better... we probably just learned to do, like, to be kind and stuff to each other’.

Furthermore during this second activity Helen felt that listening skills had improved: ‘... he didn’t speak when I was speaking and when he spoke, I didn’t speak when he was speaking’. Therefore adherence to the ground rules by both peers did seem to change the ways in which the children used talk in the PA task context which I explore further in the next section focusing on my third research question.

RQ3. How does the Thinking Together intervention change the ways in which different groups of learners use PA to improve their own and one another's learning?

The findings suggest that the *Thinking Together* intervention changes the ways in which different groups of learners use PA as a tool for learning by:

- Ground rules being applied in the PA task context by learners enabling them to hypothesise, reason and collaborate more effectively;
- Ground rules being adhered to which, in turn, improves learning behaviours although in different ways for different learners;
- Pupils' characteristics, beyond prior attainment, being carefully considered by the class teacher when matching up pupils to give feedback to one another in the PA task context; and
- Higher achieving learners using questions and modal verbs more frequently as a tool to hypothesise and reason in contexts of PA following the intervention.

I now explore each of these themes in more depth.

Application of ground rules

As mentioned in the previous section, whole class discussions and informant style interviews showed that pupils could make links between the ground rules they had learned during *Thinking Together* and peer assessment. The data from transcripts also showed that pupils, in both classes, were able to apply these rules in order to use PA as a tool for hypothesising, reasoning and collaborating in both English (year 4) and mathematics (year 3) lessons.

For instance, Bella, a year 3 higher achiever, worked with Daisy, a lower achiever, throughout the PA tasks. Table 4.1 and figure 4.10 shows words and phrases, associated with *exploratory talk*, that both girls used prior to and after the *Thinking Together* intervention in a similar PA task context:

Key words	Frequency pre-intervention	Frequency post-intervention
Because and so	10	22
I think, think	3	13
But, though	1	0
If	8	6
Why	0	1
Which	0	0
What	0	6
You	12	30
Would, should, could, can	4	7
May be/might	1	0

Table 4.1: Frequency of words and phrases associated with *exploratory talk* used in the PA task context before and after the talk intervention

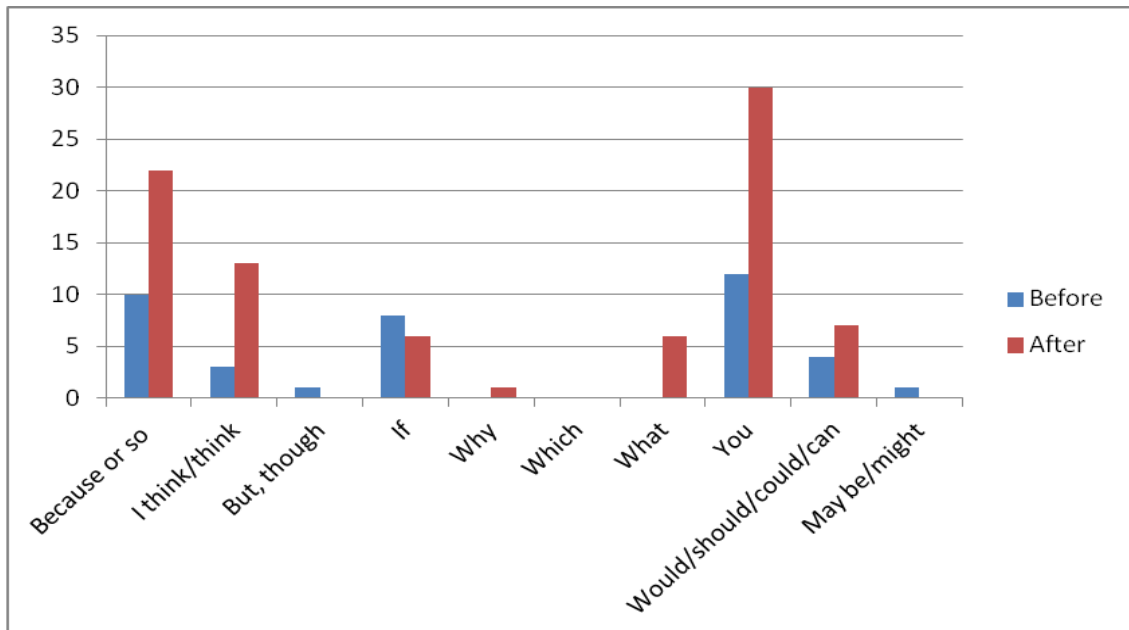


Figure 4.10: Bella and Daisy's use of words and phrases associated with exploratory talk in a PA task context before and after the *Thinking Together* intervention

These findings show a significant increase in words and phrases such as *I think/think*, *because*, *so* and *you*. Daisy commented in her interview that before the talk intervention ‘Me and Bella wasn’t [*sic*] really friends then and we kepted [*sic*] fighting’. She said that after the intervention ‘... we’ve been working together really, really hard and when... we’re working it feels like it’s... easier and she might think it’s easier with me’. She went on to say which ground rules had been used: ‘ask everyone what they think and take in turns to share your ideas and we also used respect other people’s ideas’. Importantly, Daisy also said that during the second PA task she ‘...looked at the ground rules and ... started using them more’. Similarly, Bella felt that it was important to ‘make sure you look at the person who is talking because if you don’t look at the person who is talking it looks like you’re not interested in what they’re saying’.

Taken together, this evidence would suggest that Daisy and Bella were applying the ground rules in the PA task context which meant that they were involving one another in discussions (you), hypothesising (I think/think) and reasoning (because/so) more frequently. Indeed, qualitative data from the transcripts shows that both girls used conjunctions, such as *because* and *so*, in appropriate contexts in order to reason. For example, Daisy suggested that ‘100 add 77 equals 100’. Bella argued and explained why this was incorrect: ‘Because if you add 77... it’s past 100. You have to try and get to 100 not over 100’. In addition, Daisy hypothesises: ‘I think 70 add 30... I think 1 add 99 is 100’. Bella explains correctly why this is the case: ‘Because you know before 100 is 99 and that takes away one so it’s still obviously 99 and then if I add 1 that will be 100’.

In the same vein, children in year four used the ground rules during peer assessment tasks which helped them to use talk as an effective tool for learning. The following children were trying to identify how their work (in figure 4.11) met success criteria but also agreed with one another following a short discussion:

Transcript 8: Daniel and James' discussion around their stories in English

Daniel Okay. So here, it says, "Write in the first person." Okay. First person is like "I", "my", so you check and if you find it, I've got that one correct.

James Yeah. Okay. Right. You got your mark.

Daniel So have you seen the first person yet?

James No.

Daniel So "my" "I", is a first person.










James Yeah.

Friday 17th January 2014

0. empathise with a character
acrossing an issue in a story

Ow no! he's got the
toy I've ^{over} wanted
him if I can play with
the [best] to let's see if it
they can I play with to?
"Yes" you can"
It's happening I can't believe
It's happening now now I can
throw my old teddy but how
will I ^{train} now I my
belly was telling me to go
back I want to but I'm to
guilty what happens if the
headteacher find out.

You are starting to empathise
with the character and describe
their feelings.

L.O. To empathise with a character facing an issue or dilemma in a story	
Has my partner remembered to:	
Write in the first person?	  
Describe how their body feels, how they are moving and what they are thinking?	  
Use sentences which make sense?	  
Which Thinking Together rules have you used when giving feedback?	
Talking relevant	

17th January 2014

To ~~empathise~~ empathise with a character facing an issue in a story

My I did something very bad, yes I cheated. I'm so scared that the teachers are going to find out. My legs are shaking my tummy was turning. What if the teacher finds out? Do I own up or not? I feel so guilty. If I could I wouldn't have cheated. I don't know what to say to the teachers.

Write in first person ☺.

Figure 4.11 – James and Daniel's peer assessed work with the peer assessment checklist they were using to evaluate the work

In this example there was some agreement between peers and they were beginning to justify their responses too by referring to the success criteria.

There was also evidence in other children's feedback that they were hypothesising and reasoning that may be linked to the kind of *exploratory talk* developed by *Thinking Together*. For instance, the following pair attempted to justify feedback and discuss the ground rules they had used:

Transcript 9: discussion between Daisy and Mike about each other's work

- Daisy: Okay, you first. In your work, the impor-...improve was more work and short and big sentences and then the good one was similes, adverbs, and spelling.
- Mike: In yours, it was improved to make sense because it didn't really make sense a little bit. For the good, similes. Share your ideas. Make sure everyone has a turn to speak.
- Daisy: These are the ground rules that we learnt was share...that we may...that we used was share your ideas. Give reasons for your answer.

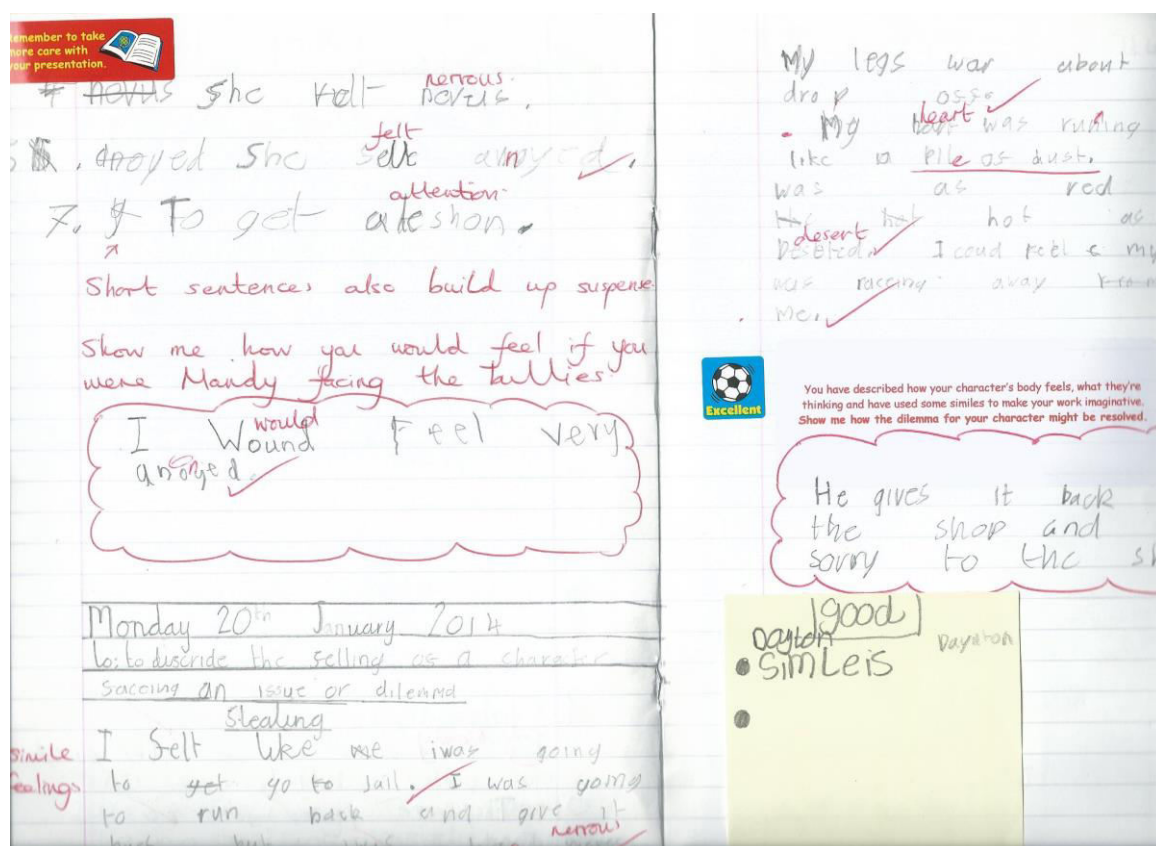


Figure 4.12 - Example of Mike's work from the transcript. Daisy's comments referred to 'similes' and work not really making sense.

Although children in this pair had not given examples to support the comments made, they are relevant and match the content of the work being assessed. For example, they had both used similes and adverbs and the sentence structure of the work was a key area for development. Children in this pair also appeared to be able to link ground rules with the peer feedback provided.

In a different pair, consisting of a girl and boy with prior higher attainment in writing, this kind of discussion was perhaps even richer as they were applying success criteria and ground rules to peer assessment thus generating *exploratory talk* in the PA task context (figure 4.13):

Transcript 10: higher achieving children comment on each other's stories

- Tim Okay. What do you think about me? What was good about my work first?
- Jane Well, you've introduced your name and you described yourself really good.
- Tim Okay. Is there anything I need to improve on?
- Jane No.
- Tim Okay. What...I've got a question. Why...can you give a reason?
- Jane Oh, yeah. So, well, you've introduced your name and that's quite good. Because....
- Tim I sort of ended my paragraph already.
- Tim That's good because...?
- Jane That's good because we know who you are.
- Tim Okay.
- Jane And you described yourself in a good way because we know more about you.
- Tim Okay. So, nothing I need to work on? I've got something for you that's good. So you used a bit of speech in there, and that's good because it's not as boring.

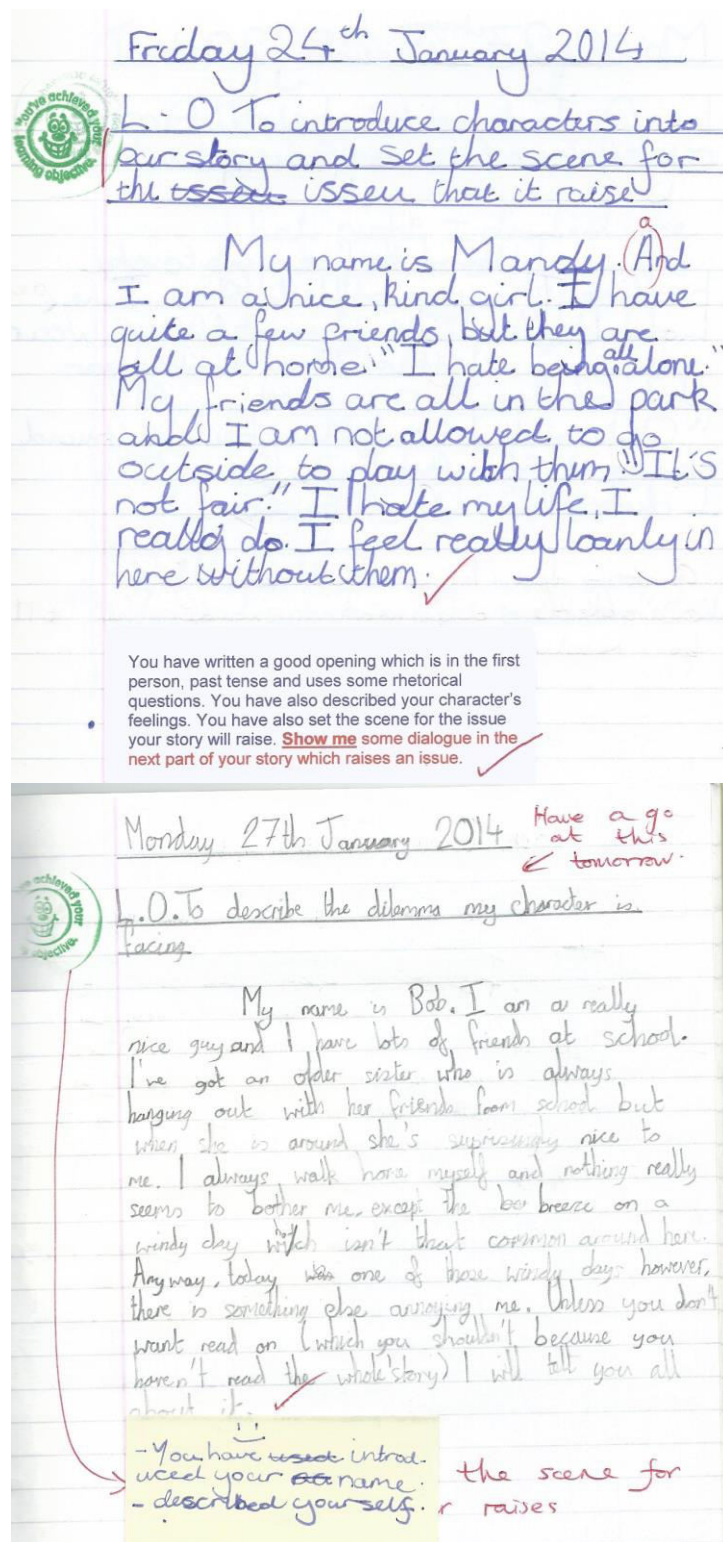


Figure 4.13 – Jane and Tim’s work respectively. The task was to write sections of a story which raise an issue or dilemma for the main character.

During this task, Tim asked Jane if any improvements were needed in his work. Jane simply stated ‘No’ without further development. At this point, Tim prompted Jane to give a reason for her response and she had to refer to success criteria to justify her feedback. The kind of talk used by the children was arguably more beneficial for learning as it involved them questioning one another, hypothesising and reasoning. For example, Tim asked Jane several questions such as ‘... can you give a reason?’ Jane also hypothesised and reasoned in response to a question asked by Tim about why his work was good: ‘That’s good because we know who you are’. Moreover, it showed that both children understood how to make their stories successful which may help them with self assessment further on. Some year three children were also able to use peer assessment and feedback as a more effective tool for enhancing their own and one another’s learning because the intervention appeared to have a positive impact on their learning behaviours.

Impact on pupils’ learning behaviours

As mentioned earlier this was particularly the case for lower achieving pairs with children eligible for the pupil premium. For example, table 4.2 and figure 4.14 shows the frequency of words and phrases, associated with *exploratory talk*, which occurred in the transcripts of talk recorded for Steven and Helen both before and after the talk intervention in a similar PA task context (see figure 4.1 and 4.9):

Key words	Frequency pre-intervention	Frequency post-intervention
Because and so	21 Because (3) So (18)	47 Because (9) So (47)
I think, think	1	14 I think (10) think (4)
But, though	12 But (11) Though (1)	11 But (11)
If	7	10

Key words	Frequency pre-intervention	Frequency post-intervention
Why	0	1
Which	1	0
What	9	18
You	44	50
Would, should, could, can	11 Would (3) Can (8)	34 Would (11) Should (10) Could (1) Can (12)
May be/might	0	4 Might (4)

Table 4.2: Words and phrases used by Steven and Helen

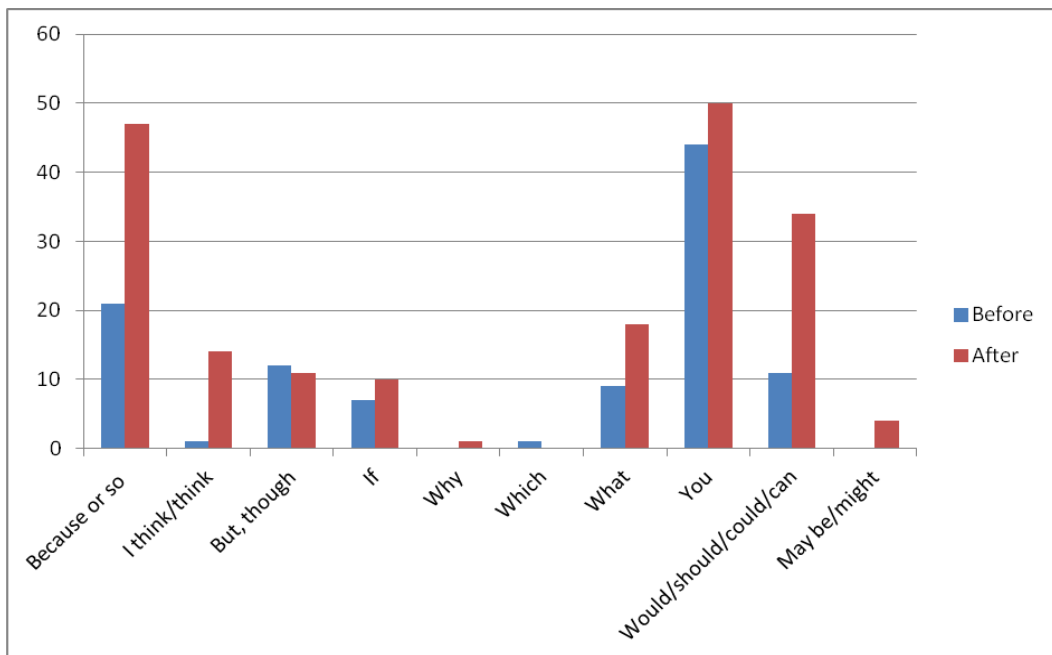


Figure 4.14: Helen and Steven's use of words and phrases associated with exploratory talk in a PA task context before and after the *Thinking Together* intervention

Steven and Helen more than doubled their use of modal verbs and conjunctions to reason, such as *because* and *so*. Their use of phrases to hypothesise significantly increased too from one in their first discussion to fourteen in the second. Importantly, as previous qualitative data has shown, Steven was competitive, ignored the opinions of others and was more concerned with asserting his voice in peer discussions prior to the talk intervention:

Transcript 11: Steven and Helen's discussion around 25

- STEVEN: Two hundred add 25....
- HELEN: ...equals 25. This is cool isn't it?
- STEVEN: No, it's not.
- HELEN: Take away 200, equals....
- STEVEN: Fourteen. Oh yeah, I did (overlapping conversation).
- HELEN: Am I doing all of the hard ones?
- STEVEN: No, you're doing the easy ones.
- HELEN: I don't know.
- STEVEN: Okay. You do all of the easy ones and I do the hard ones.
- HELEN: **Fine.** Add 11.

This kind of talk limited learning particularly for Helen as Steven was doing little to assess and identify the needs of his partner. He also showed a lack of respect for Helen's ideas and disagreed with her without any justification: 'No, it's not'. He tried to dominate and instruct: 'No, you're doing the easy ones... and I do the hard ones'. Although Helen had been patient with Steven hitherto, it was now becoming clear that she was frustrated about being instructed what to do: '**Fine.**'

By contrast, as figure 4.14 illustrates, the talk intervention in particular provided Steven with more purposeful and positive ways of using language as a tool for cooperation and teamwork, enabling him to stay on task, concentrate on his partner more and be far less competitive in the PA task context. This corroborates with Steven's views, also mentioned in the previous section, about how he had developed as a learner: 'It has changed my behaviour a lot at school... So I have been letting people join in a bit more'. In turn, this meant that he was able to include Helen more in the discussion, interact, acknowledge her responses and consider her learning needs to a greater extent. An extract from the transcript supports this point:

Transcript 12: Steven and Helen's discussion around 100

STEVEN: Don't you think this is right? So, 200 take away 100. So it's a hundred. And then I'm adding 20 so it's 120. And then take away 20 so it's 100. Isn't it?

HELEN: Yeah. Okay, that would work. (Overlapping Background Noise) My turn.

Here Steven uses the second person pronoun 'you' and asks a question to involve Helen in the discussion and assess his ideas which she is able to confirm with a simple 'Yeah'. Further on, Helen disagrees with Steven:

HELEN: I think I might have a good one, actually.

STEVEN: Do 99 add 1.

HELEN: That's easy. I don't want to do that one, it's too easy.

STEVEN: Okay, I was just giving you an idea.

Here, Steven suggests Helen should do '99 add 1'. Helen does not feel this is challenging enough and responds 'it's too easy'. Steven, this time, replies 'Okay, I was just giving you an idea'. Thus, Steven respects Helen's comments and the discussion continues rather than this causing a dispute.

Further on, Steven appears to be helping Helen with the task and has accurately assessed some of her learning needs when she is trying to calculate what needs to be added to fifty to make one hundred. He also appears to be encouraging Helen which seems to have a positive impact on her understanding:

HELEN: I don't know this might; I don't think it will be but....

STEVEN: Fifty, so fifty. So count with me. What's after 50?

HELEN: Sixty? No, it's 51.

STEVEN: No. What's 10 more than 50?

HELEN: Sixty.

STEVEN: Yeah.

HELEN: Seventy, eighty, ninety, a hundred. So you add on....

STEVEN: Because remember 5 add 5 is 10 but you know with this....

HELEN: So 50 add 50, 50 add 50 equals 100?

STEVEN: Yeah.

HELEN: Okay, good.

The discussion above markedly differs from those prior to the talk intervention. Steven is now able to focus on Helen's work instead of his own which enables him to diagnose some of her learning needs, reshape tasks and move his peer's learning forwards. Helen is unsure about what might be added to fifty to make one hundred.

Steven says ‘So count with me. What’s after 50?’ Helen responds ‘60. No, it’s 51.’ At this point Steven is respectful, supportive and actually reshapes his question: ‘No. What’s 10 more than 50?’ This enables Helen to arrive at the correct answer of 60 which is confirmed by Steven. Helen continues ‘Seventy, eighty, ninety, a hundred. So you add on....’ Helen still seems uncertain so Steven makes links with number bonds to ten engaging in much better reasoning than before: ‘Because remember 5 add 5 is 10 but you know with this...’ Helen then makes the connection too, completes Steven’s sentence and draws an appropriate conclusion: ‘So 50 add 50... equals 100?’

Interestingly, quantitative and qualitative data suggests the intervention might have impacted on other children’s learning behaviours in different ways. As I mentioned under RQ2, one learner, Michael, engaged in discussions which were markedly shorter than his previous one following *Thinking Together*. There were also fewer words and phrases associated with *exploratory talk* used throughout the second PA task as shown in table 4.3 and figure 4.15 below:

Key words	Frequency pre-intervention	Frequency post-intervention
Because and so	11 Because (3) So (8)	10 Because (2) So (8)
I think, think	9 I think (2) Think (7)	1 Think (1)
But, though	3 But (3)	0
If	1	0
Why	0	0
Which	0	0
What	8	0
You	24	3
Would, should, could, can	17 Should (4) Could (4)	5 Would (4) Can (1)

Key words	Frequency pre-intervention	Frequency post-intervention
	Can (9)	
May be/might	0	1 Might (1)

Table 4.3: Words and phrases used by Michael and Phillip

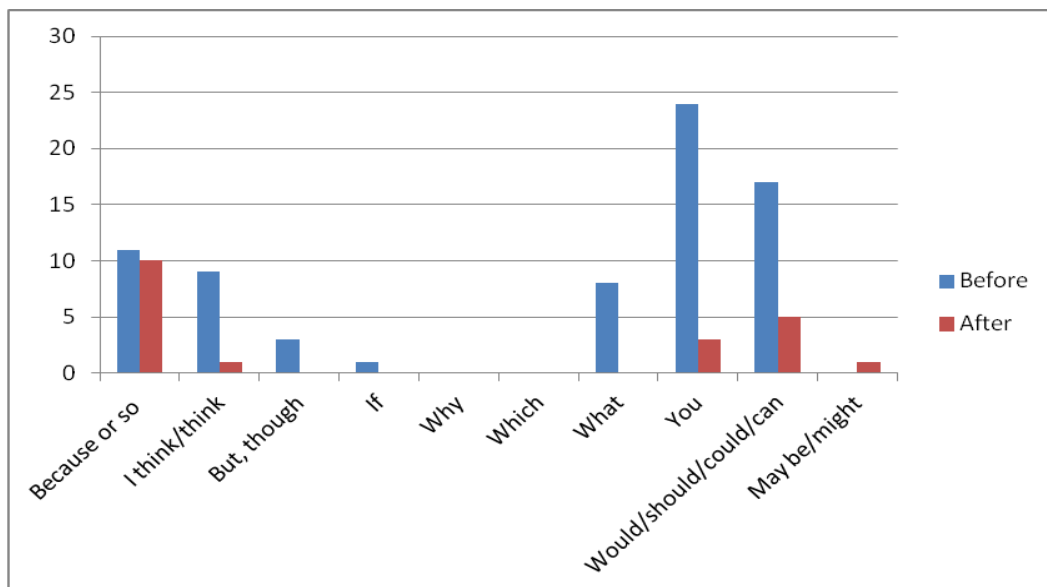


Figure 4.15: Michael and Phillip’s discussion before focusing on the number 25 and after the talk intervention focusing on the number 100

However, Michael felt positive about this: ‘It’s got a lot quieter... We’d been doing a lot and not saying that much’. An example of the children’s work, this time focusing on the number 100, is given in figure 4.16 on page 110.

Thinking together about each other's work

The answer is 100. What could the questions be this time? Comment on each other's ideas using the **ground rules** for talk.

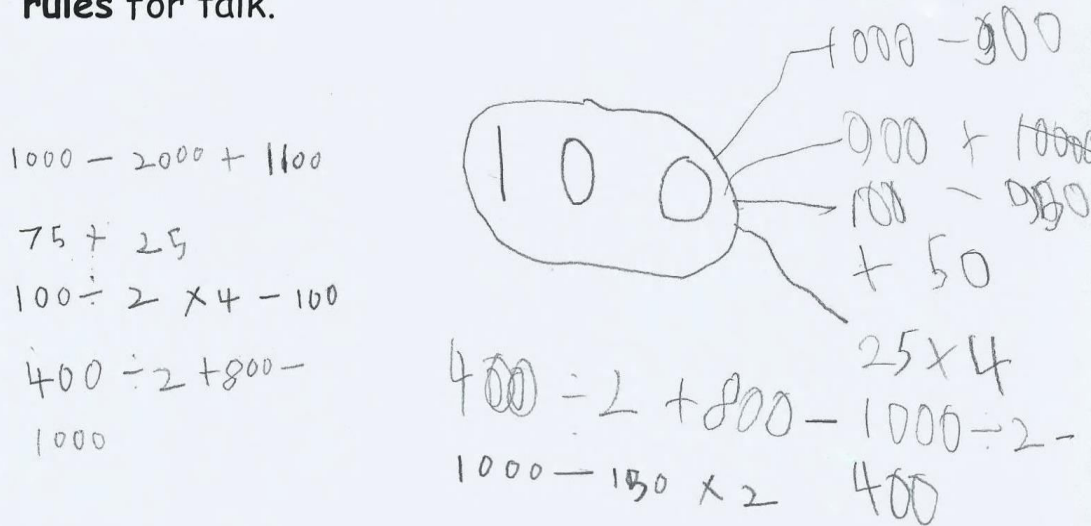


Figure 4.16: Michael and Phillip's work focusing on the number 100

An extract from the transcript which accompanies Michael and Phillip's work above appears to represent cooperation, collaboration and reasoning even though this discussion was markedly shorter:

Transcript 13: Michael and Phillip's discussion around 100

MICHAEL: So shall I do 75 add 25?

PHILLIP: Yeah.

MICHAEL: Add 100 take away. No, I won't.

PHILLIP: (Laughter) No.

MICHAEL: Seventy five.

PHILLIP: Wait 25, add 25 add 25.

MICHAEL: It's 75.

PHILLIP: Add 25. Or we have to get back to four.

MICHAEL: Yeah, that would be a shortest one.

PHILLIP: Twenty five times four. There we go.

The children build upon one another's ideas with feedback which helps the discussion to develop. For example, once Michael has made links between $75+25$ and $100-75$, Phillip realises that '25, add 25 add 25' also makes seventy-five. This is acknowledged by Michael who replies: 'It's 75'. Phillip then refocuses on the task and states: 'Add 25'. An appropriate conclusion is drawn which shows that the children have made links between addition and multiplication: 'Twenty five times four. There we go'. The boys were listening to one another, respecting opinions and agreeing thus following several ground rules. Nevertheless, their discussion was shorter perhaps because the boys' focus was mainly on finding possibilities, 'doing a lot' and consequently commenting on one another's ideas less frequently. Alternatively, pairing up the boys with different peers in the class might have resulted in them using talk as a more effective tool for learning as I explore next.

Characteristics may also influence the quality of dialogue

Similarly to Michael and Phillip, in other pairs there was limited interaction following *Thinking Together*. For example, as shown in RQ1, little interaction occurred between Lucy and Sophie, a pair of mid to high achieving girls who are good friends with one another. In the class, the girls tend to be shyer and often choose to sit next to one another. The talk intervention had little impact on increasing their use of *exploratory talk* in the PA task context. Instead, the girls concentrated more on the task rather than evaluating one another's ideas. By contrast, as mentioned earlier, the use of words and phrases associated with *exploratory talk* increased in the pair consisting of Bella and

Daisy - peers with prior higher and lower attainment in mathematics respectively (see table 4.1 and figure 4.10 on page 96).

Therefore, I decided to pair up Lucy (a quieter, higher achieving peer) with Bella (a more articulate and confident peer) to explore how matching pupils with contrasting personal characteristics, such as quieter and shyer, might influence the kinds of talk used and how this impacts upon the quality of peers' learning in a similar PA task context, this time focusing on the number 150. An example of the work produced by both girls is given below in figure 4.17:

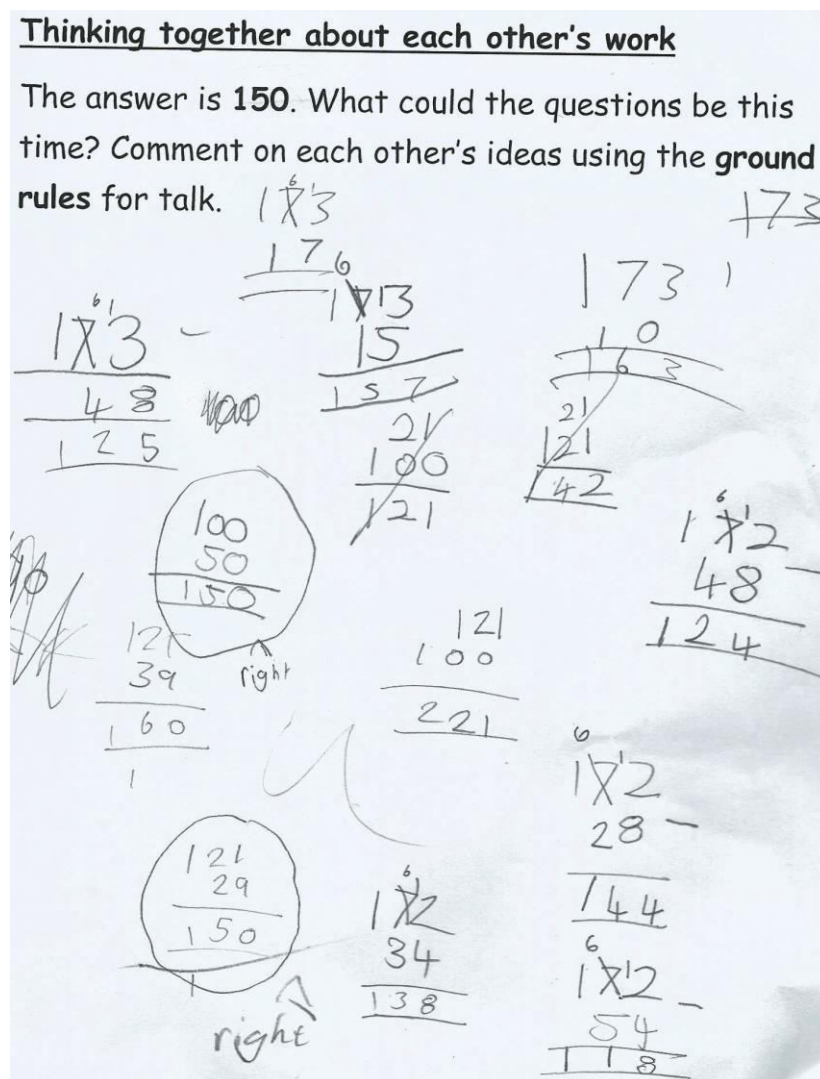


Figure 4.17: Bella and Lucy's work focusing on the number 150

The chart in figure 4.18 shows the frequency of words and phrases used by Lucy and Bella in this task context (figure 4.17) compared with those they had used during previous discussions with their original partners:

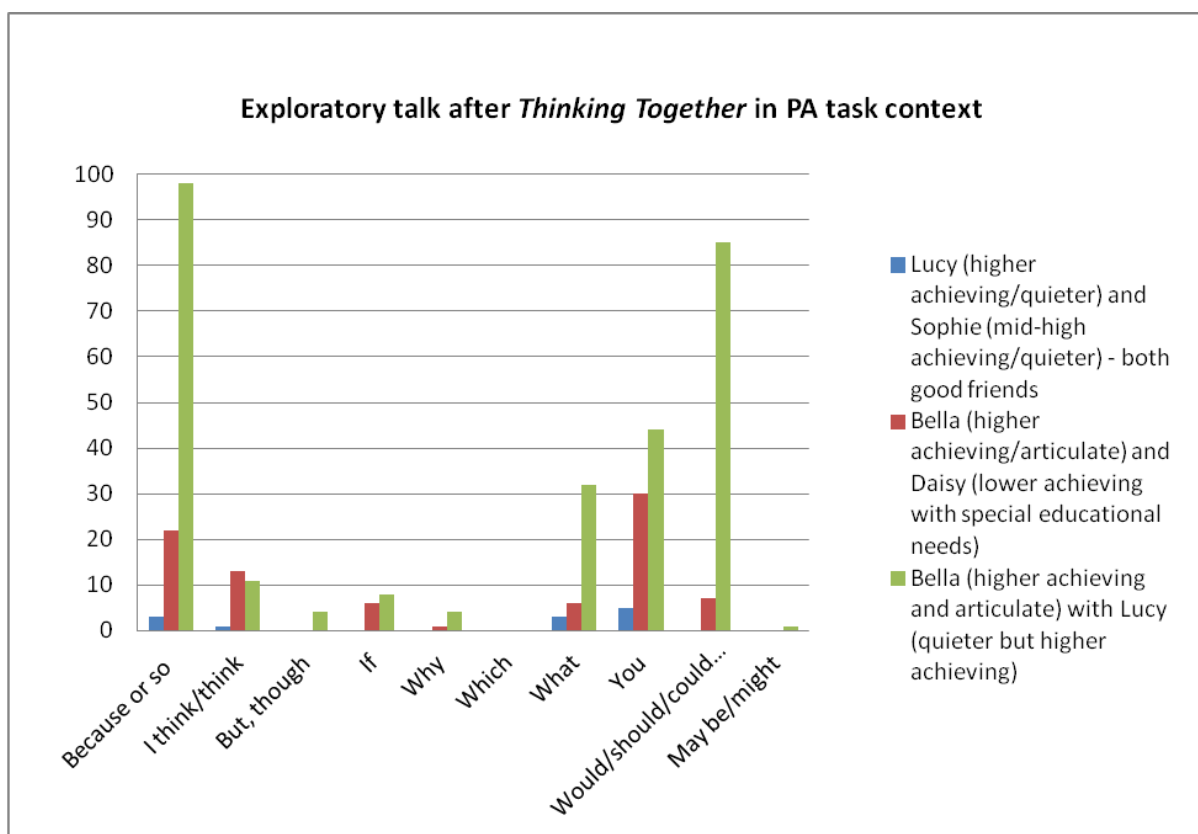


Figure 4.18 – the frequency of words and phrases associated with *exploratory talk* used in PA task context after the *Thinking Together* intervention

Interestingly, the frequency of words and phrases associated with *exploratory talk* increased significantly for both girls in all but one category (I think/think) although this was still significantly higher for Lucy. They spoke at length during the task which lasted around seventeen minutes and the discussion appeared to be richer in its content. The girls also came up with more challenging calculations than they had done previously which meant that they were finding more complex possibilities. Indeed, there appeared to be more interaction and verbal feedback particularly for Lucy and more evidence of reasoning around number than I had previously observed since Bella

was using talk as a tool to guide her equally capable partner to develop her understanding.

Indeed, the following extract from the transcript shows Bella, arguably the more confident and articulate peer, leading discussions and involving Lucy with some helpful questioning:

Transcript 14: Bella and Lucy's discussion around the number 150

- LUCY: 150 equals 150.
- BELLA: Can you try and do one that is kind of hard? Sort of like, if you said about 50, you could...50 add 50, add...no. I'm trying to make this harder. 50 and 50 equals 100. Add another 50 equals 150.
- LUCY: Or 90 and 60.
- BELLA: Okay. Let's think. What other ones should we do? We could do...
- LUCY: We **could** do 80 add 70.
- BELLA: Yeah. I think that equals it. Okay, right.

This discussion appears to encourage Lucy to offer several responses which are correct and confirmed by Bella. Bella also asks which other sums the pair could focus on which helps Lucy find and explore other possibilities. Lucy then uses modal verbs, such as *could*, to hypothesise and speculate: 'We **could** do 80 add 70'.

Further on in the discussion, Lucy appears to be puzzled:

- LUCY: 170 take away 20.
- BELLA: 190 take away 40.
- LUCY: **I can't think of anything.**
- BELLA: What about...you say if this one is correct. 200 take away 50.

LUCY: Yeah, that is correct. And (Overlapping Conversation) yeah, it is. I told you it is.

BELLA: What about 200 take away 70?

LUCY: No. That **would** be 130. I know that by my number bonds.

BELLA: Yeah, so, 30 add 20, add then 100.

Lucy states ‘I can’t think of anything’ and Bella responds ‘What about.... you say if this one is correct. 200 take away 50’. She also encourages Lucy to identify incorrect statements such as ‘200 take away 70’. Lucy responds by stating ‘No. That would be 130. I know my number bonds’. Thus, once again Bella’s questioning facilitates further discussion and encourages Lucy to articulate responses and reason about the number (150) involved. Under RQ5, I present further data showing how questioning, from children such as Bella, positively influenced the learning outcomes of other peers during peer assessment particularly when questions were used as a kind of feedback to drive learning forwards.

These findings suggest that prior attainment might not be the only suitable characteristic teachers should use when pairing up students to provide formative verbal feedback. Instead other characteristics, such as articulateness and shyness, might be equally important in generating dialogue which enables both pupils to make better progress in PA task contexts even after they have received an intervention such as *Thinking Together*.

Differential impact on higher achieving pupils

Thinking Together appeared to have an impact on how other higher achieving and articulate learners use PA to improve their own and one another’s learning but in a slightly different way. Figure 4.19, on page 116, shows James and Leanne’s work in a similar peer assessment task context this time focusing on the number 100.

Thinking together about each other's work

The answer is 100. What could the questions be this time? Comment on each other's ideas using the ground rules for talk.

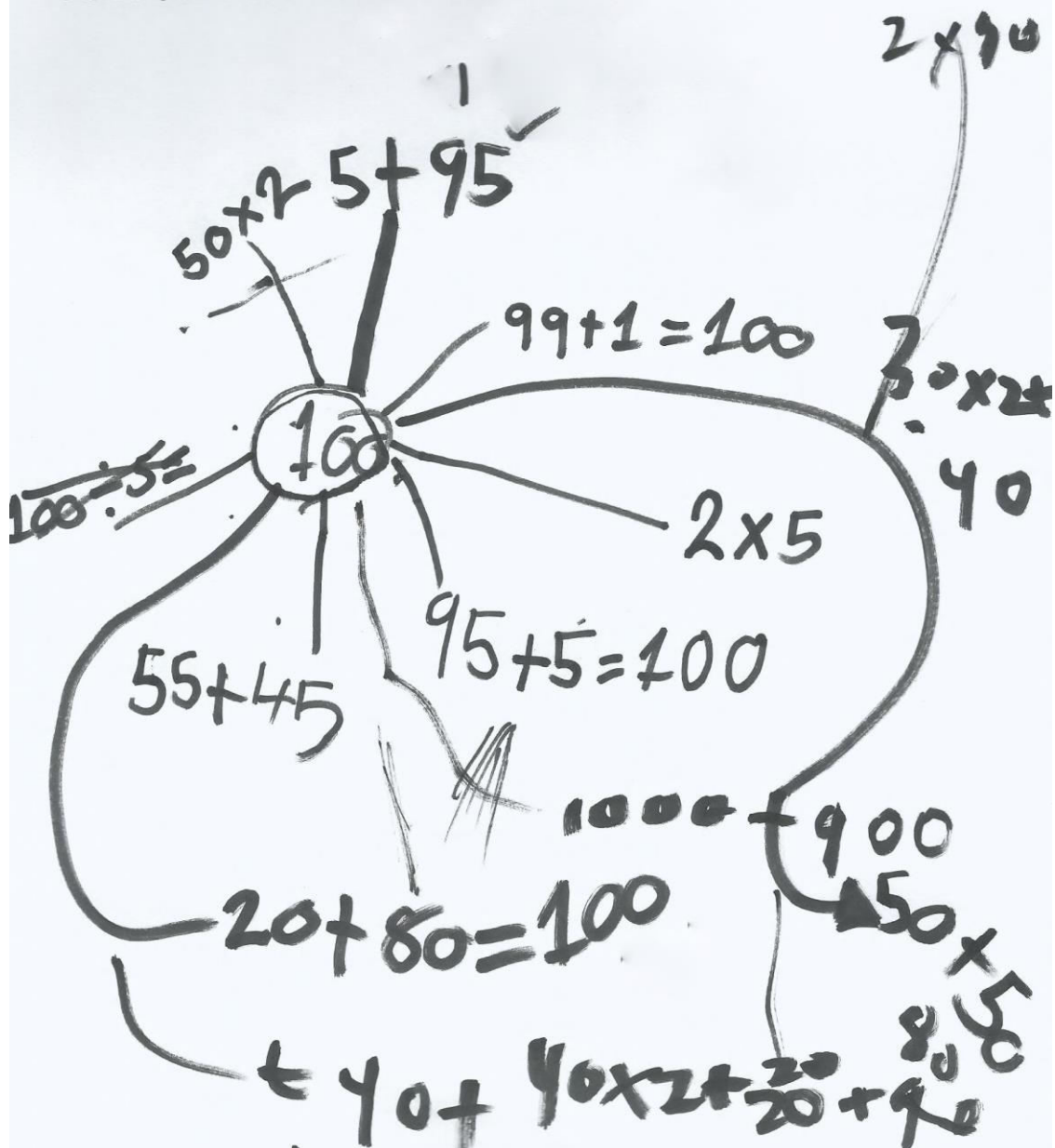


Figure 4.19: Leanne and James' work around the number 100

Table 4.4 and figure 4.20 represents how frequently James and Leanne used certain talk phrases before and after the intervention during these tasks focusing on different numbers:

Key words	Frequency pre-intervention	Frequency post-intervention
Because and so	21 Because (5) So (21)	6 Because (1) So (5)
I think, think	2	1
But, though	0	0
If	3	2
Why	0	2
Which	2	0
What	5	12
You	7	16
Would, should, could, can	8 Could (7) Would (1)	27 Could (13) Should (0) Can (6) Would (8)

Table 4.4: Words and phrases used by James and Leanne

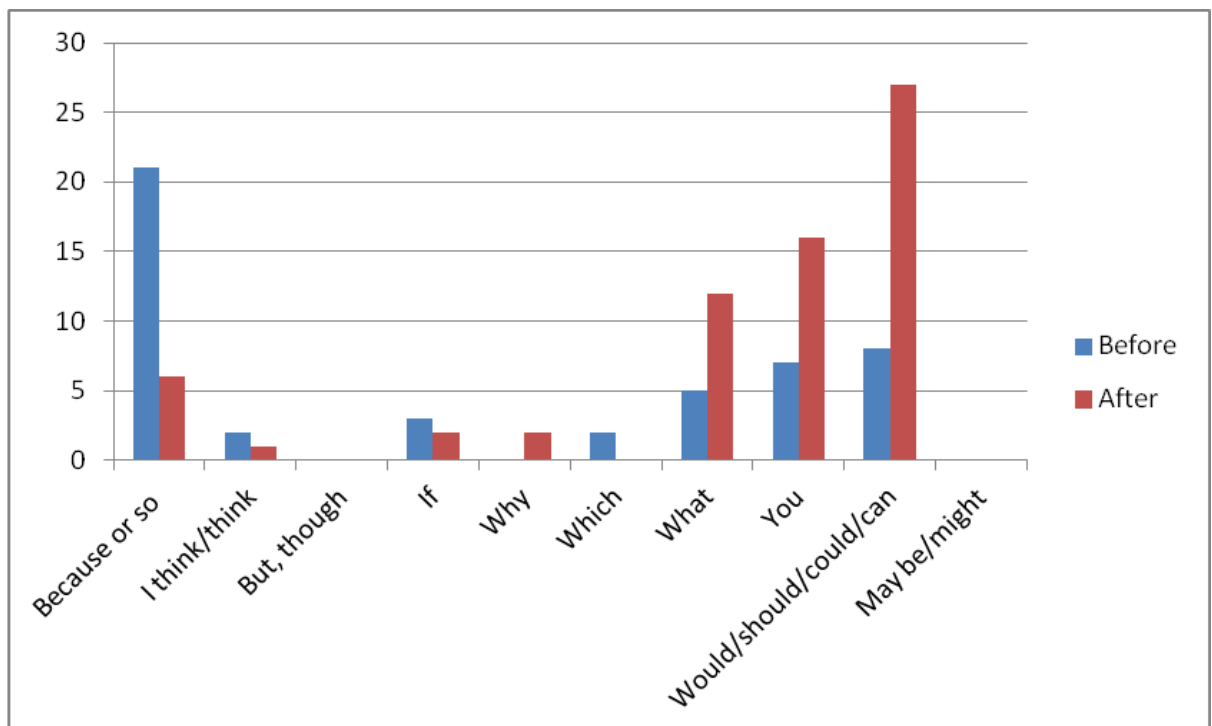


Figure 4.20: James and Leanne’s use of exploratory talk prior to and after the *Thinking Together* intervention

Interestingly, James and Leanne used far fewer conjunctions, such as *because* and *so*, to reason. There are also fewer occurrences of ‘I think’ and ‘think’, phrases which suggest hypothesising in contexts of PA. By contrast, their use of other words such as *why*, *what*, *you* and modal verbs including *would*, *should*, *could* and *can* significantly increased in their second discussion. Therefore perhaps these children used modal verbs and questions more frequently as a tool for hypothesising and reasoning in their second discussion than their first. Several extracts from their discussion exemplify this:

Transcript 15: Leanne and James' discussion around 100

LEANNE: We **could** do 99 add one...

JAMES: Yes. And that, what **would** that equal, then, Leanne?

LEANNE: A hundred.

At the start of their discussion, 'could' is used by Leanne to propose a possibility and hypothesise. James responds by asking 'what would that equal' thus ensuring his partner had understood why this possibility worked. Later on Leanne stated that 'I know we could do 40 times two...' James responded by saying '40 times 2 add...' and Leanne replied '20'. At another point in the conversation, James incorrectly suggests that 'We can do... 95 add a thousand' which is corrected by Leanne with the statement: '95 and a thousand would be 1,095'. Thus, these words appear to have been helping both pupils engage in critical and thoughtful feedback in this PA task context since they allowed both pupils to conjecture and reason.

At other times, the children used a wider range of phrases to hypothesise and reason. An example of this is given in the extract below:

JAMES: We **could** do 2 times 50. (Overlapping Conversation) and that would be the swap round for 50 times two, won't it, Leanne?

LEANNE: Yes. Okay, then.

JAMES: Now, we need to do a thousand. We **can** do a thousand take away...

LEANNE: 900.

JAMES: What?

LEANNE: A thousand take away 900 equals 100 **because** 100 add 900 equals a thousand and you know, one add nine equals 10. **So**, obviously a thousand take away 900 is 100.

JAMES: Yeah, what **can** we do for (Overlapping Conversation). We **could** do (Overlapping Conversation) we **could** do.... we can do 20 add 98. (Overlapping Conversation)

LEANNE: That's not right. It's 20.

Here, James again hypothesises using 'could' and 'can' and Leanne reasons and explains using 'because' and 'so'. The children also appeared to be critiquing one another's ideas especially when one felt the other was failing to reach their full potential. This is exemplified in the following extract from their discussion:

LEANNE: And **what** about 95 add five?

JAMES: Yes, **you** need to challenge **yourself** as well. You can't just do the easy ones. (Overlapping Conversation) We need to go really quickly, [inaudible] just so **you** know. (Laughter)

LEANNE: (Overlapping Conversation) 94 add six equals a hundred.

JAMES: [Inaudible] **you** need to challenge yourself.

LEANNE: Yeah, I said that to **you**.

JAMES: We **could** do 55 add 45.

LEANNE: Yes. 55 add 45, **what** does that equal, then?

JAMES: A hundred.

LEANNE: ... We need to do some take away ones, times ones and division ones.

James is involving Leanne in the discussion using the second person pronoun 'you', he again hypothesises using 'could' ('we could do 55 add 45') and Leanne asks a question using 'what'. Furthermore, one peer engages in both peer and self assessment at this point realising that it is important now 'to do some take away ones, times ones and division ones'.

This helps both learners to move onto more cognitively challenging possibilities. Taken together, the quantitative and qualitative evidence suggests that the talk intervention might have allowed Leanne and James to use PA as a more effective tool to improve their own and one another's learning though, for such pupils, this was more

evident through an increase in their use of modal verbs, questions and pronouns to involve one another in discussions and engage in hypothesising and reasoning around number. Having considered how the talk intervention influenced pupils' use of PA as a tool for learning, I now draw into sharper focus what they viewed to be important influences on the effectiveness of PA processes.

RQ4. What factors do pupils consider important influences on the effectiveness of PA processes and in light of this feedback how can PA be improved further?

A number of issues were identified by pupils when considering factors influencing the effectiveness of peer assessment processes including:

- The quality of dialogue between peers;
- How peers felt about being judged by their classmates;
- The subject knowledge of the assessor and the quality of their explanations;
and
- The duration pupils have to engage in peer assessment.

Throughout the chapter, I also address the issue of further improving the quality of peer assessment so it has a greater impact on the quality of pupils' learning in my classroom.

Quality of dialogue

As mentioned in previous sections, pupils felt that peer assessment processes tended to be more effective when they collaborated leading to talk being used as a more effective tool for learning. This allowed children to involve one another in discussions, consider perspectives other than their own and communicate positively. For example, Steven had been 'letting people join in a bit more'. He also commented that he 'was helping Helen and make [sic] sure that she was getting them right'. He felt this was 'all about the ground rules basically'. This helped Steven to engage in the PA process more positively as shown in previous sections (see RQ2 and 3).

The quality of dialogue was also sometimes enhanced by including more peers in the PA task context (see field notes in Appendix C). In year 4, some pupils had tried PA in triads, similar to *Thinking Together*, which they felt worked more effectively than pairs: 'It's because in two we don't like work...like we don't really talk as much like

we would in three’. Another child commented that ‘You might get some more ideas on how to improve your work’. One child said ‘More people, more dialogue’. Another girl also felt that ‘... the more people we have, the more ideas we have...and if we stick them all together, it would (make) a big idea’.

Peer judgements

Some pupils appeared to feel uncomfortable about accepting peer feedback. For instance, in a year 4 mind map one child felt uncomfortable being judged by a peer: ‘I don’t like peer assessment because people judge your work’. Another child felt that sometimes their work was marked wrong when actually it was right suggesting mistrust in the accuracy of peer judgements (figure 4.21). A different pupil indicated that they would feel uncomfortable about their friend assessing them as they might ‘take the mick out of you’ (figure 4.21). Moreover, another peer said ‘I dislike were [sic] they say if my work is messy’. Interestingly, a different pupil in a class discussion (Appendix B) had commented that PA was complicated when writing was difficult to read: ‘if it’s like really small, you can’t really like see it so it’s hard to tell them what like...what it is’. Such a comment might therefore lead to feedback around sensitive issues such as handwriting which may result in other peers feeling dejected.

By contrast, other pupils, during the interviews, felt that PA was better as pupils could communicate using language they are more familiar with. A year four child commented: ‘... sometimes we understand the children more than the adults...’ Helen, in year 3, also felt more confident about working with her partner Steven following *Thinking Together*: ‘I just don’t get worried. When I’m doing it with the teacher, I get worried when we do it with a child I don’t’. She commented that PA was effective for her ‘when I’m working with another child, someone who’s a bit better at me at maths’. Thus, children appeared to have mixed feelings about accepting peer feedback and critiquing one another’s work and ideas.

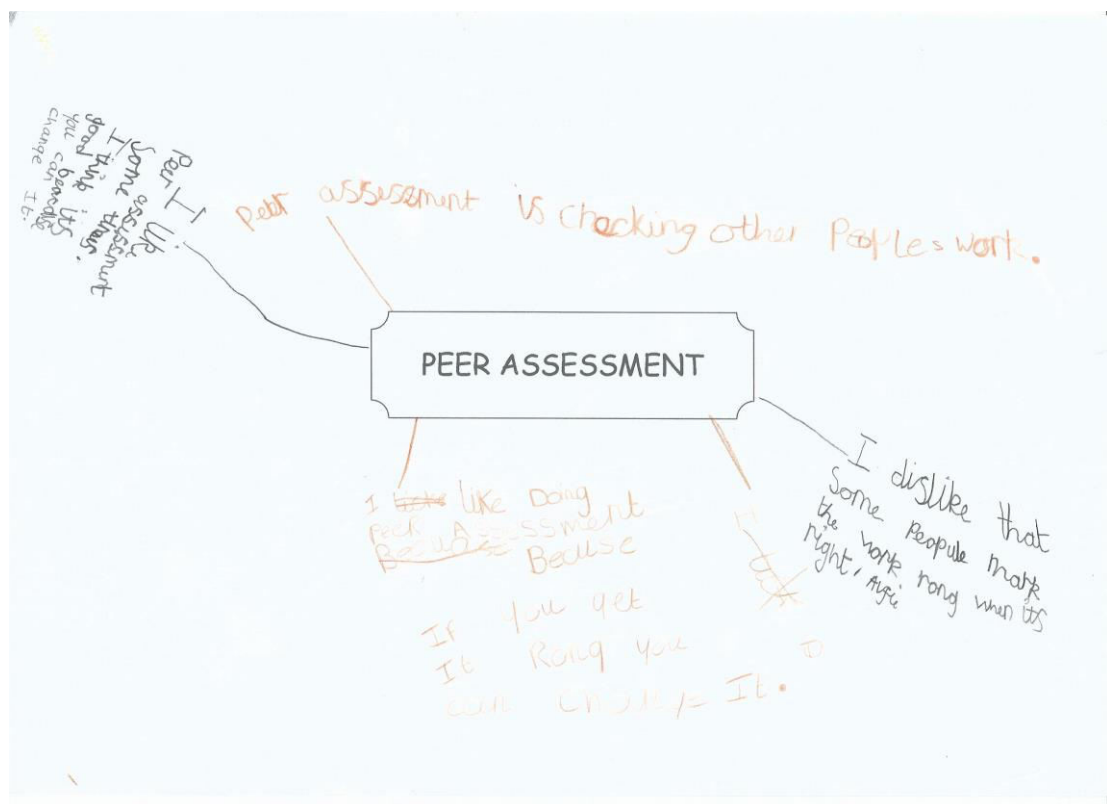
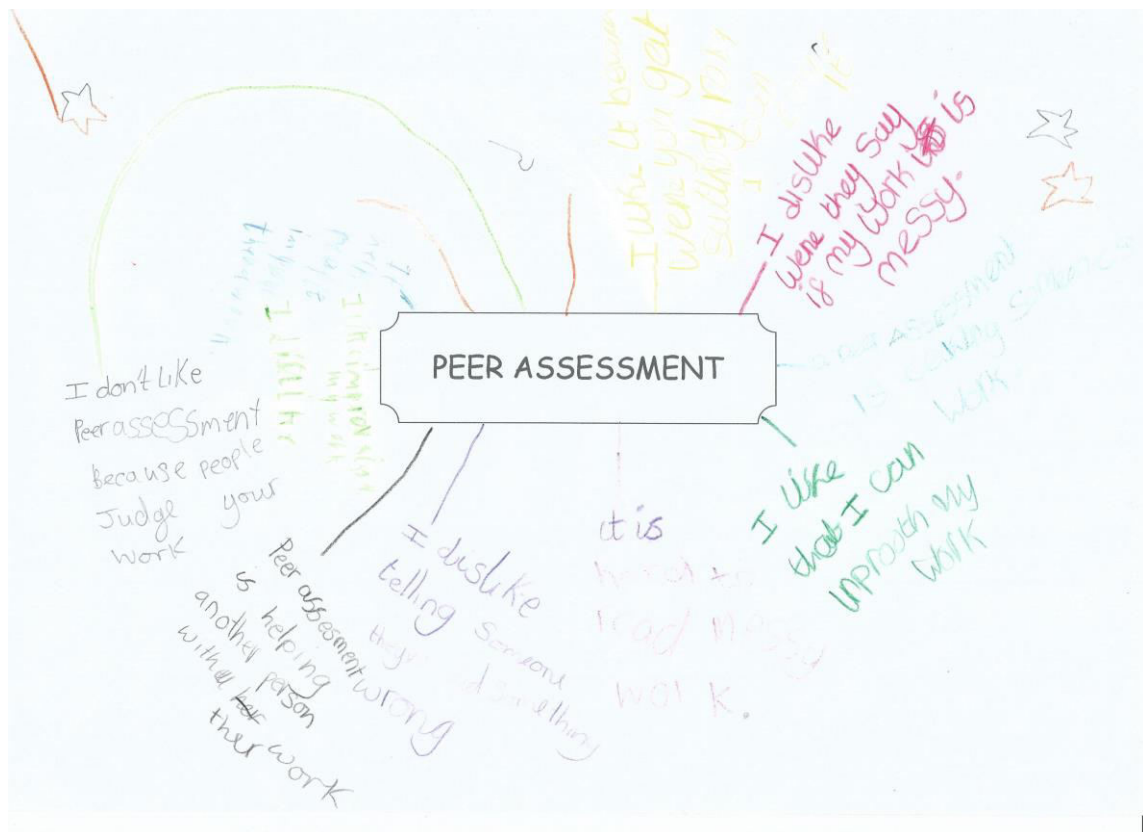


Figure 4.21 – example of two mind maps produced by year 4 children before taking part in *Thinking Together* which focused on their likes and dislikes about peer assessment

Explanations and subject knowledge

The confidence pupils had in their English and mathematics subject knowledge also tended to be linked to the quality of PA processes. Some children in year 4 were unfamiliar with the process of giving effective feedback. One child suggested that this barrier could be overcome by the use of a prompt where children could first say what was good about the work and then how it might be improved (see Appendix C). Although children could link the ground rules with PA, these were useful only when children had developed the skills to actually peer assess. These skills were also linked to children's subject knowledge. For instance, if children were not really sure what the first person or past tense was in the context of story writing, it was then difficult for them to indicate whether their partner had used these features in their work too (see Appendix C).

Subject knowledge and understanding was also an issue for some lower attaining pupils in year 3 which occasionally prevented them from explaining concepts clearly. For example, Helen said that she felt Steven's explanations had sometimes limited her understanding in the PA task context. She commented, 'He just said, "Oh, that's wrong. You have to do, like, this number has to be..." Like he... didn't exactly like explain it to help me. He just said the answer'. She felt that Steven explaining it more to her would have made it 'a bit... clearer'. Helen also commented: 'I think that we should all like try to help each other but not really like tell all the answers and stuff'. Thus, clearer explanations during the PA process might have resulted in better understanding for pupils.

Time to adequately engage in peer assessment

Finally, lack of time was mentioned as a barrier to effective peer assessment. My field notes (Appendix C) also recorded this on 20.1.14: 'There was not enough time to complete the peer assessments in the lesson as the children were busy writing and the PA may have disrupted this process'. Another child in a year 4 whole class discussion also suggested, during PA, they were trying to read and critique each paragraph but simply ran out of time: '... we were doing it for every paragraph that I wrote so... what

do you think is good about this paragraph and what's...what could you improve on on this paragraph instead of going to the end'. This meant that peer feedback was not always completed thus limiting its effectiveness.

Interestingly, Steven in year 3 also admitted that he did not always engage critically with other people's ideas during *Thinking Together* lessons focusing on the meaning of different 'talk' words such as *discuss*, *row* and *argument*. He said 'I was saying I knew but half of them I didn't exactly know'. He felt 'a bit more time' might have been useful as children were agreeing without understanding just to ensure the task was completed: 'we still agree and the lessons done so maybe a bit more time we might be a bit perfect'. He continued 'Because... we normally go through it and then we say that we know what it is but really we don't have a clue what it is'. Thus, children may need adequate time to explore ideas with one another if PA is to have a positive impact on their learning.

RQ5. How does PA, as a learning process, influence pupils' learning outcomes including their ability to self-assess?

A number of themes emerge from the findings which suggest how PA, as a learning process, influences outcomes for learners. These themes suggest that:

- Social interactions during PA lead to self awareness and encourage learners to self-assess;
- Feedback sometimes prompts children to self-assess particularly when it is inaccurate or misguided; and
- Outcomes of PA are greatly enhanced by peers using effective questions, as a form of feedback, to guide learners to reach their full potential in the PA task context.

Data is now presented which is relevant to each of the themes identified above.

Interactions leading to self awareness and self assessment

One pupil, Steven, recalled his behaviour prior to the talk intervention: 'Well, we won't, let her [his partner] in and do some stuff... I was like, no, no'. He admitted he had excluded others from the discussion and been unkind. However, he appeared to become more self-aware following positive social interactions in the PA task context: 'now we've got... groups and we don't argue that much.... [and] we've been working all together... I have been letting people join in a bit more... It has changed my behaviour a lot at school'. As a result of using the ground rules to communicate, Steven had realised how his interpersonal skills had positively developed in contrast to the disputes evident in previous discussions (for example, transcript 1 on page 73).

Other children focused on how peer feedback had enabled them to develop as individual learners. For example, one higher achieving year three boy commented: 'they just taught me some stuff. And then I had to like, I taught them... what I knew so. And like it just, from my writing made it a bit more, it's like a bit more exciting'.

Similarly, a year four class discussion revealed that some children felt the peer assessment tasks made them aware of certain elements they could include in their work to make it better. For instance, one child suggested that another peer in his group ‘was giving a reason why she liked it and it was giving her ideas... for her story’. Another child said that ‘... we worked as a table because if we wrote a story next time similar to this we could... use some of the ideas other people have used’. One pupil also realised he could have included other features in his work as a result of the peer discussions: ‘I could use a little bit more speech and maybe a rhetorical question’.

Feedback prompting self-assessment

However, some children were more sceptical about the feedback given and this prompted them to self-assess in order to check its accuracy. Children did not always appear to trust their peer to give reliable feedback as in the example below from a year 4 class discussion focusing on how feedback was used:

Trancript 16: self assessment

Teacher: ... Can anybody tell me how often have you like used your partner’s feedback when you’ve done peer assessment? How often do you actually use the comments to actually improve your work? Yeah?

Lauren: ... unless I can find it actually in my work, I will use it next.

The child indicated that she would only use the peer feedback if she could find the mistake in her work too. Thus, the feedback was prompting her to self-assess and validate the feedback she had been given. Similarly, feedback provided by children in the year 3 class occasionally prompted peers to self-assess when they underestimated the capabilities of their partner:

Transcript 17: lack of challenge

STEVEN: Do 99 add 1.

HANNAH: That's easy. I don't want to do that one, it's too easy.

STEVEN: Okay, I was just giving you an idea.

Here, Helen seems to feel that Steven has misjudged her ability to solve more complex problems and responds '... it's too easy'. Furthermore, Helen was able to self-assess her learning needs since occasionally her partner, Steven, provided too much support preventing her from working out answers independently. Helen's comments in her interview suggest self-awareness around this issue:

He just said, "Oh, that's wrong. You have to do, like, this number has to be..." ... he didn't exactly like explain it to help me. He just said the answer..... he can't do it for me... That's not making me learn and one day, I'll just think, "Oh, what is it again?" And I won't have him to tell me so I need to actually work it out and know it myself.

Helen realised that too much support might limit the quality of her learning and she valued the need to genuinely understand concepts so she is able to 'know it'. Thus, Helen's perception of Steven's feedback prompted her to critically self-evaluate her actual needs as a learner rather than those that had been assumed.

In another example, a peer's inaccurate assessments prompted them to reassess their mathematical thinking following discussion:

Transcript 18: Lucy and Bella's discussion around 150

LUCY: We could do 80 add 70.

BELLA: Yeah. I think that equals it. Okay, right.

LUCY: 70 add 80 equals 150.

BELLA: You just said that one.

LUCY: No, I said 80 add 70. And this time, I said 70 add 80.

BELLA: Oh, you could have...yeah, you swapped them...

For example, Bella comments ‘You just said that one’ which prompts Lucy to reply: ‘No, I said 80 and 70. And this time, I said 70 add 80’. Thus, Lucy has used the commutative law in mathematics to find a different possibility. This then leads to greater understanding for Bella who reassesses her thinking and comments: ‘... yeah, you swapped them’. Thus, arguably the role between *assessor* and *assessee* becomes blurred in such a discussion as both children are learning from one another.

In a different conversation, Daisy realises Bella has made a mistake when assessing her answer:

Transcript 19: Bella and Daisy’s discussion around 100

BELLA: What’s two add seven?

DAISY: Um...

BELLA: You should know that seven add two.

DAISY: Nine.

BELLA: No. What?

DAISY: **It is.**

BELLA: Oh yeah, you're correct there. (Laughter) Yeah, you're correct.

Bella asks ‘What’s two add seven’ which Daisy answers correctly following the comment ‘You should know that’. This is then mistakenly challenged by the higher achieving Bella who states ‘No. What?’ Interestingly, this time Daisy shows greater

confidence and states ‘It is’ and Bella agrees: ‘Yeah, you’re correct’, after having some time to think about it. This kind of dispute again encourages Bella to reassess her thinking due to interactions in the PA task context.

A year 4 class discussion also highlighted that one of the ground rules (‘challenge them if you disagree’) might prompt the assessee to self-assess:

Transcript 20: challenge one another

TEACHER: Fantastic. Okay. Also, what is it...what else is really important to give, if you’ve said it’s really good. What else must you do as well?

FRANK: A challenge.

TEACHER: You could challenge them, couldn’t you? How could you challenge them if you thought something maybe about their work? Frank can you think of anything?

FRANK: Ask them a couple of questions, like, what [do] you think about your work?

Indeed in the year 3 discussions around different numbers, there was some evidence that words such as ‘what’ were being used in questions as a tool to encourage partners to develop their ideas and self-assess as I explore next.

Peer questioning and guidance

Often peers fed back in the form of a question as a way of identifying next steps and moving learning forwards which meant that PA, as a process, had a positive impact on pupils’ learning. For example, as I previously highlighted under RQ3 in the discussion around 150 between Bella and Lucy, effective questioning is used:

Transcript 21: Bella and Lucy’s discussion around the number 150

BELLA: ... Let’s think of more to do. So, like, say...

LUCY: 300 take away 150.

BELLA: What about 100 add...what would you add?

LUCY: 50, I've already said that one.

BELLA: I know, I suppose, I'm trying to make your mind go on a bit...what about if you have 400 take away...

LUCY: Take away 250.

BELLA: So what's the pattern that you could see in that?

LUCY: You could add...so you could have 200 take away 50, 300 take away 150, 400 take away 250, 500 take away 350, 600 take away 450, 700 take away 550, 800...

Here, Bella actually says 'I'm trying to make your mind go on a bit' suggesting she has accurately assessed Lucy's ability to find other possibilities. She then suggests: 'what... if you have 400 take away...' Lucy completes the sentence: 'Take away 250'. Now Bella skilfully uses questioning to assess whether Lucy has spotted a pattern: '... what's the pattern... ?' Lucy is able to clearly identify the pattern Bella has asked about: '200 take away 50, 300 take away 150, 400 take away 250, 500 take away 350'. Thus, the outcome from this discussion is a much deeper understanding of the task for Lucy than she might otherwise have had without such skilful assessment and questioning from her partner.

Similarly, James and Leanne's discussion included questioning which helped them to identify number patterns, self-assess and move learning forwards:

Transcript 22: James and Leanne's discussion around 25

JAMES: ... So what other sum could we do?

LEANNE: So we could do 200 take away 175 equals 25. So then 200 take away 175 equals 25. So then 200 take away 175 must equal 25 because when we did the one that was 100 take away 75. No, so then what does 300 then this time –

JAMES: 275.

LEANNE: 300 take away 275 equal 25, then 400 take away 375 equals 25. So then, they are all correct.

This questioning again encourages Leanne to identify a pattern she has spotted which is continued by James: '275'. Leanne then self-assesses and realises 'they are all correct'. A further example of children using questions as an assessment tool is given in Phillip and Michael's discussion around the number 25:

Transcript 23: Phillip and Michael's discussion around 25

PHILLIP: Ten, add ten, add five. Shall we move on to the harder ones now?

MICHAEL: Yeah. I can't wait.

PHILLIP: That's quite a hard one, isn't it?

MICHAEL: Yeah. How about?

(Background Noise)

PHILLIP: So 45...wait, 45 (whispers) 45 take away 20. Your turn.

MICHAEL: A hundred take away seventy-five.

Again questioning is used to encourage a peer to challenge themselves in the PA task context: 'Shall we move on to the harder ones now?' This is met with a positive response: 'Yeah I can't wait'. This encourages peers to offer more challenging possibilities thus positively impacting upon the children's learning.

Summary of key findings

This chapter has presented empirical research findings which are critical in answering my five research questions. First, I reported how different pairs of children used

different kinds of talk in their first peer assessment task which appeared to be influenced by pupils' underlying characteristics. I then described pupils' views around the impact of *Thinking Together* on their ability to use talk effectively on a similar peer assessment task and how this changed the ways in which PA was used by groups of pupils to enhance their own and one another's learning. Here, I presented findings which suggest the intervention impacted upon groups in different ways and perhaps had the greatest influence on the learning of children who had found collaboration most challenging previously. I then went on to report children's views around effective peer assessment processes and on how peer assessment, as a social process, influences the quality of learning outcomes. Findings suggest that peer assessment involves discussion, questioning and feedback which encourages learners to self-assess, evaluate their needs as learners and move on to more challenging possibilities and tasks. Taken together, these findings provide important insights into the relationship between the social context of peer assessment, such as collaboration and classroom talk, and the quality of younger children's learning. Having presented findings for each research question, in the next chapter I discuss these in relation to the wider peer assessment literature and conceptual framework identified earlier in order to offer recommendations for professional practice and further research.

Chapter 5: Discussion and conclusions

In this final chapter, I reiterate the purpose of my study and key findings before discussing each of these in light of the research reviewed in Chapter 2 into peer assessment, peer feedback and the *Thinking Together* approach. Then, I propose a model of interactive peer assessment as a discursive and differentiated practice which incorporates the theoretical significance of the findings, presented in the previous chapter, and suggests which theories and concepts have explanatory power when considering the social factors which mediate effective peer assessment processes and outcomes for younger learners. Next, I review the research design and process and reflect on the strengths and limitations of my study. I also consider what kinds of generalisation can be made given the interventionist case study design. Following this, I offer recommendations for professional practice and identify opportunities for further research into peer assessment. I conclude the chapter and thesis by suggesting how my study has made an original contribution to knowledge in the field of peer assessment research.

Continuity, discontinuity and development of previous research

This study explored how social processes, particularly different kinds of classroom talk, influence the quality of younger children's learning in contexts of peer assessment. This focus was necessary as previous peer assessment research has tended to overlook the importance of social processes, such as classroom talk, which I have found to be an important tool for enhancing the quality of learning outcomes during this kind of assessment. Interestingly, the kinds of talk children used in contexts of peer assessment also seemed to be influenced by their underlying characteristics, something which has not previously been described by research. I now discuss each key finding in relation to relevant wider research.

Different kinds of talk in peer assessment task contexts

The first research question explored which kinds of talk children use in contexts of peer assessment, when social interaction is permitted, and how useful these are for pupils' learning. Previous researchers have noted how children find it challenging to collaborate in contexts such as peer assessment, where social interaction and group work is required, without guidance and support (Mercer, 2000; Mercer et. al., 2004; Black et. al., 2006; Baines et. al., 2009; Galton and Hargreaves, 2009; Baines et. al., 2014). As mentioned in the literature review, this might lead to children engaging in either *disputational* or *cumulative* talk which researchers have previously suggested limit the quality of children's learning since there is limited reasoning evident (Mercer, 1995, 2000).

Talk with a *disputational* orientation tended to be used by children in my class with lower prior attainment who have the potential to present challenging behaviour (see findings in RQ1 for Steven and Helen). Without any guidance, their discussions, around the first peer assessment task (figure 4.1), were characterised by disagreements, disputes and competition (Mercer, 2000; Mercer et. al., 2004; Baines et. al., 2009). These findings are therefore consistent with the claims of previous research which emphasise the need for such children to learn how to collaborate before working in such a context (Mercer et. al., 1999; Dawes et. al., 2000; Mercer et. al., 2004; Rojas-Drummond and Mercer, 2004; Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005; Mercer and Sams, 2006; Mercer et. al., 2009). Without this guidance, peer assessment did not happen effectively because pupils like Steven (see transcripts 1-3) were only interested in assessing individual contributions rather than those of their peers.

Interestingly, in this context, both pupils were engaged with the number task but competitive and *disputational* talk was being used so one peer, in this case Steven, could assert his personal superiority as a learner. Thus there appeared to be some evidence in my data of ego-involving responses that went beyond established notions of ego-involving feedback (e.g. Butler, 1987, 1988). For example, Steven's responses

to Helen often tried to direct her attention to his work. Moreover, Steven simply dismissed Helen's work as 'too easy'. This, in turn, meant that he was adopting performance goals during peer assessment (Dweck, 1986; Kamins and Dweck, 1999; Grant and Dweck, 2003). For example, some of the language used by Steven, such as first person pronouns including *I* and *my*, suggest he was trying to outperform Helen, and focus on himself, rather than support and include her perspective in discussions (Dweck, 1986; Mercer, 2000).

Furthermore, this was unhelpful for Helen as she felt dejected and frustrated that her ideas were being dismissed by her partner, Steven, who was not engaging with her part of the task (Littleton et. al., 2005; Mercer and Sams, 2006). In the end, both pupils became disinterested in the task and the dialogue became irrelevant, competitive and conflicting where both children tried to outperform one another (Butler, 1987; Mercer, 1995, 2000; Mercer et. al., 2004). This may suggest that, in contexts of PA, a link exists between *disputational* talk, centred on competition, contradiction and dispute, and ego-involving processes, where a learner who may be competitive and keen to dominate, tries to outperform a peer by asserting their ego in the task context (Dweck, 1986; Kamins and Dweck, 1999; Grant and Dweck, 2003).

However, not all pupils used this kind of talk when interacting in the first PA task context. Bella, an articulate girl with prior higher attainment, and Daisy, a girl with lower prior attainment, used a mixture of *cumulative* and *exploratory* talk in their peer discussions around the number twenty-five (see transcript 2). For example, Daisy's peer feedback often confirmed the ideas of Bella without any reasoning evident (Dawes et. al., 2000; Mercer, 2000). This kind of verbal affirmative feedback most closely resembled the features of *cumulative* talk as Bella was uncritically confirming the ideas of her higher achieving partner (Mercer, 1995, 2000). Perhaps Daisy agreed because she did not have the mathematical understanding to critically engage with these ideas at a more advanced level. Alternatively she may have also felt less secure about criticising someone she felt was more advanced and skilled at the task in question (Van Gennip et. al., 2010). Interestingly, the less confident Daisy did

challenge Bella more following her involvement with *Thinking Together* as I explore further on.

By contrast, Bella, used more features of *exploratory talk* in this PA task context by encouraging Daisy to explain some of her mathematical reasoning (Mercer, 1995, 2000). For example, she asked her peer why certain solutions would not work. In this example, it would therefore seem that an asymmetrical relationship existed in the PA task context where roles for the *assessor* and *assessee* were clearly defined (Kollar and Fischer, 2010). Arguably Bella was guiding her less confident partner to develop her ideas through some useful questioning. Similarly Leanne and James' discussion was characterised by collaboration, questions to involve one another and developmental feedback which moved ideas forward.

Unlike previous research (e.g. Mercer, 2000; Mercer et. al., 2004; Baines et. al., 2007, 2009; Galton and Hargreaves, 2009; Baines et. al., 2014), my study therefore found that certain pupils collaborated effectively in the peer assessment task without guidance. This tended to be the case when at least one peer had better social skills and subject knowledge enabling them to comment on one another's work, suggest improvements and cooperate to move learning forwards. It therefore seems possible that children's underlying characteristics may influence the extent to which they are able to collaborate in a social context such as peer assessment (Brown and McIntyre, 1993; Cooper and McIntyre, 1996). This has been neglected by prior research as, until recently (e.g. Baines et. al., 2014), it has arguably viewed children as a 'homogenous group' (Black, 2004: 36) rather than exploring how individual pupil characteristics influence the quality of collaboration in contexts where peer interaction is required (e.g. Mercer, 2000; Mercer et. al., 2004; Baines et. al., 2009; Galton and Hargreaves, 2009; Baines et. al., 2014).

A further finding, with respect to the first research question, was that some children's talk did not resemble the features of *disputational*, *cumulative* or *exploratory* talk (Mercer, 2000). Instead, they engaged in a kind of silent assessment only speaking when a solution was incorrect. Again, it seems likely that the children's characteristics

(such as shyness in this case) may have meant limited dialogue occurred between peers in the task context so these children received little verbal feedback on their ongoing ideas (Brown and McIntyre, 1993; Cooper and McIntyre, 1996). Having considered the kinds of talk which emerged in the peer assessment task context without any guidance, it is now time to explore which groups of children found *Thinking Together* most helpful in developing their use of effective talk.

Thinking Together and its relevance for peer assessment

The second question in my research, aimed to explore pupils' views about *Thinking Together* and how useful they felt it had been in developing their use of more effective kinds of talk in contexts of PA. The findings corroborate with previous studies which highlight the impact of this talk intervention (e.g. Mercer and Sams, 2006; Mercer et. al., 2009). Children commented positively in their mind maps, whole class discussions and interviews about how the talk lessons had enabled them to use ground rules to collaborate and generate more effective dialogue (Mercer et. al., 2004; Rojas-Drummond and Mercer, 2004). Children also commented on how disagreements and quarrels now occurred less frequently (Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005; Mercer and Sams, 2006; Mercer et. al., 2009). Interestingly, the children in both classes were also able to suggest how each ground rule was relevant for peer assessment and could explain how they had used it in context (Tanner and Jones, 1994; Mercer et. al., 1999; Dawes et. al., 2000; Black et. al., 2006; Black, 2007).

This was particularly the case for more challenging pupils such as Steven and Helen who, as previously discussed, had found it difficult to collaborate in the first peer assessment task leading to competition and disagreement (Dweck, 1986; Kamins and Dweck, 1999; Mercer, 2000; Grant and Dweck, 2003). Their positive comments about *Thinking Together*, evident in interviews, seem to be consistent with the idea that the intervention develops an important set of ground rules which guide such pupils to listen carefully to one another, share views and reasons and respect and consider one another's ideas (Mercer et. al., 2004; Rojas-Drummond and Mercer, 2004; Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005). This may, in turn, enable

children to ‘perceive their environment as safe’ (Van Gennip et. al., 2010: 282) enabling them to be more open, less competitive and engage in more purposeful peer feedback with one another (Black et. al., 2006; Black, 2007; Van Gennip et. al., 2010). These results may therefore also support the idea that ‘psychological safety’ is an important social condition necessary for effective peer assessment with younger learners (Van Gennip et. al., 2010). Furthermore, ground rules may be a powerful tool for ensuring that even the most challenging learners engage in purposeful feedback and discussion as part of this safer environment (Van Gennip et. al., 2010: 282).

In terms of the third research question, I found that *Thinking Together* changes the ways in which pupils use peer assessment to improve their own and one another’s learning in different ways. An important finding was that, following the talk intervention, pupils in both classes were able to apply ground rules in the English or mathematics peer assessment task context so they could adequately justify the written or verbal feedback provided (Black et. al., 2006; Black, 2007; Gielen et. al., 2010a, b). There was a significant increase in aspects of *exploratory talk* used by some pairs in the sample (Mercer et. al., 2004). Moreover, qualitative data from transcripts showed that pupils, like Bella and Daisy, were using this kind of talk as a tool for developing one another’s ideas.

For example, Bella explained to Daisy why some of her solutions were both correct and incorrect leading to greater learning gains for Daisy (figure 4.10). Interestingly, and in contrast to previous discussions, the less confident Daisy also challenged Bella when she had spotted errors in her verbal feedback. Likewise, in year four, some pupils explicitly used the ground rules when feeding back to one another on the quality of their writing. For example, one peer encouraged another to give reasons to justify her feedback (transcript 10). It is possible that ground rules, such as ‘challenge them if you disagree’, had created a climate where constructive criticism had become more socially acceptable amongst peers (Van Gennip et. al., 2009, 2010).

Another important and related finding, relevant for the third research question, was that pupils’ adherence to ground rules, in contexts of peer assessment, improved their

learning behaviours although in different ways. As mentioned earlier, pupils such as Steven and Helen, who had previously engaged in *disputational talk*, communicated more positively during their second peer assessment task following the talk intervention (Mercer et. al., 2004). The language they had become familiar with enabled them to consider, evaluate and develop one another's ideas more positively (Mercer and Sams, 2006; Black, 2007). For example, they used aspects of *exploratory talk* more frequently after the intervention (see figure 4.14) suggesting they were now taking time to engage with and verbally feedback to one another in the PA task context (Littleton et. al., 2005). Furthermore, quantitative (table 4.2) and qualitative data showed that these pupils were spending more time hypothesising (*I think/think*) and reasoning (*because/so*) together around the number given to them (Dawes et. al., 2000; Mercer, 2000). Steven also spent more time involving Helen, this time, using second person pronouns such as *you* and *your* (Littleton et. al., 2005).

The climate for giving feedback had become less competitive, with fewer disputes (Dweck, 1986; Mercer et. al., 2004; Rojas-Drummond and Mercer, 2004; Rojas-Drummond and Zapata, 2004; Van Gennip et. al., 2009, 2010). Importantly, their feedback also related to the number task more specifically and was less about asserting egos in the PA task context. It therefore seems possible that the kind of language children learn to use, as a result of *Thinking Together*, enables them to think less about how they are performing in relation to their peer and more about the extent to which both peers have successfully mastered the task in question as a result of the collaborative effort put in (Butler, 1987, 1988; Kamins and Dweck, 1999; Grant and Dweck, 2003). It would also seem that the language used by both pupils during their discussion acted as a scaffold for their thinking. For example, Steven reshaped explanations to ensure his partner had arrived at the correct solution and had mastered the task successfully (Kamins and Dweck, 1999; Grant and Dweck, 2003). Thus, both pupils seemed to be adopting learning goals centred on deeper understanding of the task in question (Dweck, 1986).

However, in contrast to earlier findings (e.g. Mercer et. al., 2004; Mercer and Sams, 2006), not all children's use of *exploratory talk* increased in the PA task context

following the talk intervention. Some children actually used fewer words and phrases nonetheless still hypothesising and reasoning around the number given to them (100). This was the case with two different pairs of children: Michael and Phillip and Lucy and Sophie. Yet, as shown in the previous chapter, the boys, in particular, felt positive about this as they were engaged in the task though still giving concise feedback to one another. There are several potential explanations for this unexpected finding around the children's learning behaviours following *Thinking Together*.

Perhaps these children attached greater significance to certain ground rules such as respecting and listening carefully than others such as challenging ideas and giving reasons (Dawes et. al., 2000; Mercer, 2000). This would mean children still communicate albeit in a more succinct way where nonverbal communication, such as nodding and pointing, is also important (Hari and Kujala, 2009). Another explanation might again focus on the students' underlying characteristics (Brown and McIntyre, 1993; Cooper and McIntyre, 1996). These children all have higher prior attainment in mathematics but tend to be more reticent in class which might mean that they use talk less frequently as a tool for learning. Consequently, in such pairs, even though these learners had higher prior attainment, neither peer was able to scaffold high quality discussions with the other in these particular social contexts (Mercer, 2000; Shmitz and Winskel, 2008).

By contrast, as mentioned earlier on, other children such as Bella, are articulate and talk frequently in the classroom setting. In addition, and in line with previous studies, Bella and her partner Daisy had used far more features of *exploratory talk*, such as hypothesising, reasoning and questioning, during their second PA task compared with their first (Mercer et. al., 2004; Rojas-Drummond and Mercer, 2004; Rojas-Drummond and Zapata, 2004). Therefore, I paired up the more articulate and confident Bella with the shyer Lucy to explore how matching pupils with contrasting characteristics might influence how they used talk to improve their own and one another's learning during PA.

Interestingly, both the quantitative and qualitative data (see figure 4.17 and 4.18) suggested that talk was being used by both girls as an essential tool for learning helping them to hypothesise and reason at a much more advanced level (Mercer, 2000; Rojas- Mercer et. al., 2004; Drummond and Mercer, 2004; Mercer and Sams, 2006). Thus, these findings seem to question what Topping (2009) meant about peer assessment being carried out between ‘equal-status learners’ (p. 21). This evidence might indicate that, at least in some circumstances, ability should not be used as the only indicator of ‘status’ when teachers match pupils to provide feedback to one another (Van Gennip et. al., 2010; Kollar and Fischer, 2010). Instead it might be more fruitful to consider other characteristics, such as pupils’ levels of articulateness, in order to ensure that, at least one peer, is able to scaffold high quality discussions with the other in the PA task context (Vygotsky, 1962, 1978; Cooper and McIntyre, 1996; Mercer, 2000). When such richer discussions happened, both quantitative and qualitative data suggest that the learning gains for both pupils were significantly greater.

A further unanticipated finding was how the talk intervention changed the ways in which pupils with higher prior attainment, such as James and Leanne, used peer assessment to improve one another’s learning. In contrast to earlier research, following *Thinking Together*, these pupils actually used fewer words and phrases such as *I think* and *because* during their second discussion in the PA task context (Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005; Mercer and Sams, 2006). However, their use of other words such as *what*, *you* and modal verbs significantly increased which aligns with the findings of previous research suggesting the intervention still had had a positive impact on such children (Mercer et. al., 2004; Rojas-Drummond and Mercer, 2004).

Indeed both children provided positive feedback to one another which enabled mathematical ideas to be confirmed and developed in some cases (Mercer et. al., 2004; Black et. al., 2006; Black, 2007). This finding might be partly explained by the circumstances in which the peers’ discussion was recorded. I had chosen to record this discussion when the classroom was quieter, whilst other children were outside playing

games, so background noise would not be picked up by the digital recordings. Interestingly, both pupils were keen to complete this task quickly so they could go outside to play rounders. This may have meant that they chose more succinct ways to communicate with one another, for example, by using modal verbs to suggest possibilities (*It could be...*) and fewer detailed sentences including words and phrases such as *I think* and *because*.

Taken together, these findings suggest that the talk intervention might not only be useful for developing children's awareness of how to engage with scientific, mathematical or logic problems but may complement peer assessment practices too (Mercer, 2000; Mercer et. al., 2004; Mercer and Sams, 2006; Black et. al., 2006; Black, 2007). These findings therefore align with the work of previous researchers who claim that AfL activities such as peer assessment are more successful when children are guided to use talk as an effective tool for learning (Black et. al., 2006; Black, 2007).

Pupils' views around effective PA processes

The fourth research question concentrated on factors which pupils felt were important for shaping the effectiveness of PA processes. In contrast to previous research (Yarrow and Topping, 2001; Min, 2005, 2006; Gielen et. al., 2010a, b; Boon, 2015, 2016), the children in this study placed more emphasis on the importance of high quality dialogue between learners so PA can develop fruitfully. For instance, some children reported that PA had been more successful in triads, similar to *Thinking Together*, than pairs as more discussion was occurring (Dawes et. al., 2000). Moreover, children like Steven felt they were better able to engage in PA because they had learned how to work collaboratively and use language as a tool for learning (Mercer and Sams, 2006; Mercer et. al., 2009). The greater emphasis children placed on dialogue in this study, than previous studies, may have been because until now most research has focused on the outcomes of peer assessment (Min, 2005, 2006; Gielen et. al., 2010a, b; Topping, 2009, 2010; Boon, 2015) rather than explicitly analysing the social processes leading to these. In more socially interactive

circumstances, feedback may be verbal, ongoing, negotiated and developing (Tanner and Jones, 1994; Kollar and Fischer, 2010).

Another important finding concerned how pupils felt about being judged by a peer. The findings here are not entirely consistent with previous literature (e.g. Black et. al., 2003; Pryor and Lubisi, 2002; Frankland, 2007; Topping, 2009) as some pupils felt comfortable about this whilst others did not. For example, one finding consistent with previous literature is that some year four pupils felt that peer assessment enabled them to feedback to one another using more comprehensible language and vernacular (Black et. al., 2003). Similarly a year three child reported how she felt more confident working with her peer rather than the class teacher (Black et. al., 2003). By contrast, other children felt uncomfortable about a peer unfairly judging them perhaps in terms of their handwriting or making unkind comments (see figure 4.21). This finding supports studies which have suggested peer assessment can limit the effectiveness of learning when students feel feedback is unwarranted or distressing (Pryor and Lubisi, 2002; Frankland, 2007; Topping, 2009; Crossouard, 2012). Therefore it seems likely that pupils have different preferences around peer feedback which may influence the extent to which it is accepted by learners (Dann, 2014). It is also possible that this may be influenced by students' characteristics and this is an avenue for further PA research to explore.

A further finding suggests that peer feedback has a limited impact on the quality of children's learning when the assessor's subject knowledge is insecure. In contrast to Claxton (1995), one child, during a class discussion (Appendix B) in year four, suggested this barrier could be overcome by a checklist in English which might remind peers about the qualities they are looking for in work. As previous research has suggested, this might scaffold peers' comments in writing (Min, 2005, 2006; Gielen et. al., 2010a, b; Boon, 2015, 2016). Nevertheless, in support of Claxton's (1995) view, a similar checklist may have been inappropriate in the open ended mathematics task as children were accessing it at their level and generating success criteria for each calculation as the task progressed.

Despite this, Helen commented in her interview (Appendix A) that during the number task, Steven had sometimes given her the answer rather than explaining it to her. It therefore seems possible that such children might need more time and guidance, beyond that provided by *Thinking Together*, in order to develop clear explanations for fellow peers in such contexts. Furthermore, children in both classes felt that sometimes they had to rush peer assessment meaning it had a shallow impact on the quality of their learning. Therefore, in agreement with Topping (2009), it would seem that children need time to develop their skills as peer assessors so ‘constructive feedback’ is provided which has a positive influence on the quality of children’s learning (p.23).

The influence of peer assessment on children’s learning outcomes

The fifth, and final, research question explored how peer assessment, as a learning process, influences the quality of pupils’ learning outcomes. Findings in this study support the work of Tanner and Jones (2002) and Lee (2006) since children’s social interactions during peer assessment allowed them to reflect upon whether they were completing a task successfully and thus engage in self-assessment. For example, peer feedback lead to the assessee making corrections or revisiting their original mathematical thoughts (Tanner and Jones, 1994, 2002; Lee, 2006). Similarly to previous findings, children in year 4 felt that assessing someone else’s work had given them ideas which might improve the quality of their individual work (Tanner and Jones, 2002; Black et. al., 2003; Lee, 2006). It seems likely that such peer interactions enabled the children to assess what was absent in their work which might have helped them to realise what they needed to do to be more successful as individuals (Black et. al., 2003).

However, an unexpected finding, which has not been previously described by researchers (e.g. Black et. al., 2003; Lee, 2006), focuses on how one peer might be inspired to self-assess when they perceive that the assessor’s feedback is untrustworthy or inaccurate. For example, one year four pupil would only change work if she too could find the mistake highlighted by her assessor. In another example (see transcript 18), Bella incorrectly told Lucy that she had already given the response

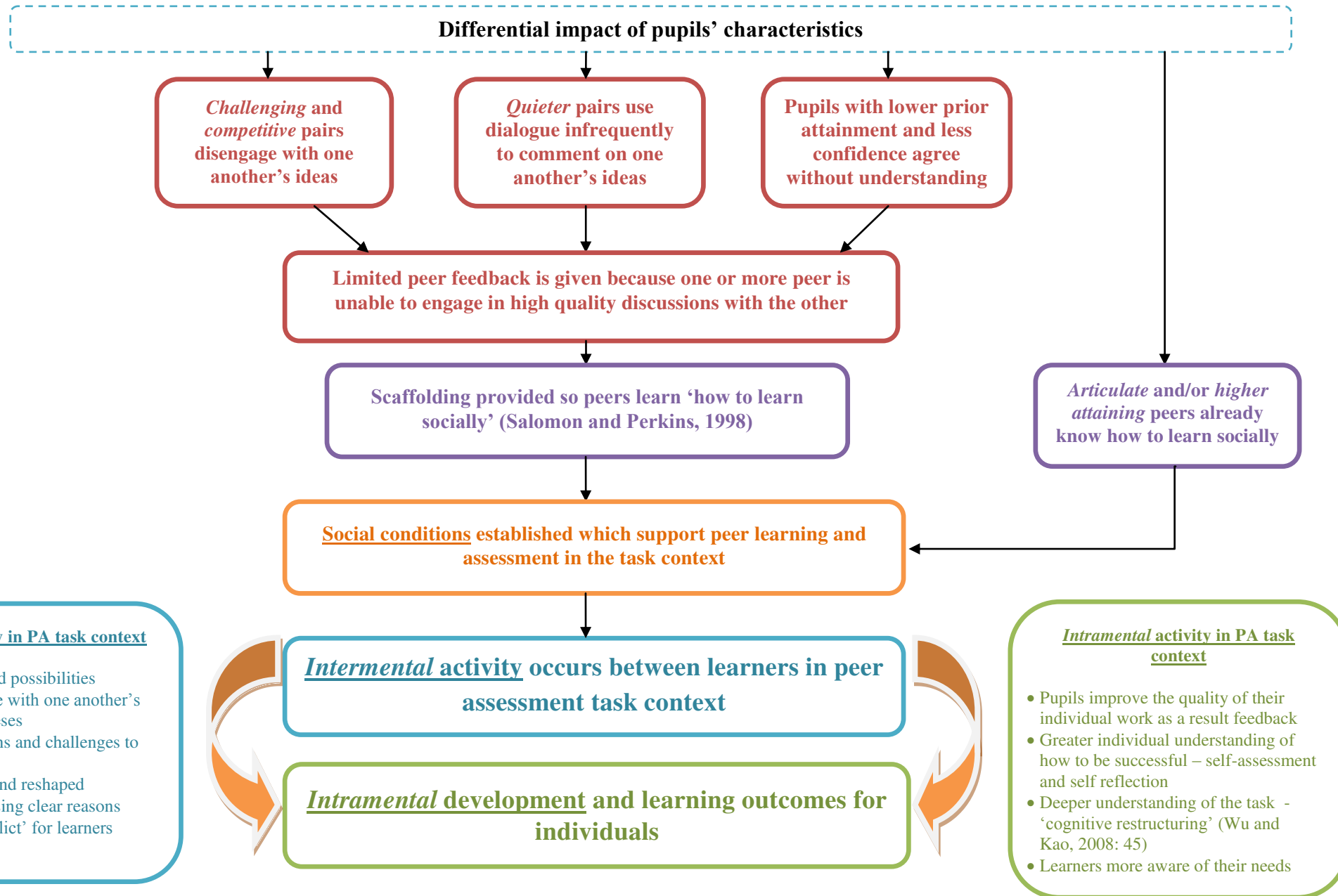
that $80+70=150$. This was corrected by Lucy who explained that she had simply done the calculation the other way round. This led to Bella realising this ('yeah... you swapped them') which she may not have done without such peer interaction (Black et. al., 2003; Lee, 2006). This finding supports Kollar and Fischer's (2010: 345) suggestion that, when peer assessment is more socially 'interactive', as it has been in this study, learners may need 'to negotiate about how to approach the given task'. In such contexts, it would also seem that the role of *assessor* and *assessee* (Topping, 2009; Kollar and Fischer, 2010) become blurred as both pupils take on each role at different times in the conversation depending on the responses given.

It was also interesting to note how peer feedback influenced learning outcomes in the PA task contexts. In the literature reviewed in chapter two, several studies pointed to the positive influence of peer assessment on pupils' learning but did not explicitly state how these outcomes emerged (e.g. Olson, 1990; Catterall, 1995). An important finding from this study, not mentioned by previous research, was how high quality questioning from children, as a form of feedback, led to rapid gains in learning for peers. Nevertheless, questioning, as an important AfL technique, has been mentioned in previous research but perhaps more in relation to those asked by teachers (e.g. Sadler, 1989; Black and Wiliam, 1998; Black et. al., 2003). In this study, children's questions focused on spotting and explaining number patterns and moving learning onto more challenging possibilities. Arguably the quality of these questions match, or even exceed, those that may have been asked by qualified teachers in a similar situation. Thus, this finding would seem to support the view of Topping (2009) who claims that 'peer assessment can result in improvements in the... quality of learning, which is at least as good as gains from teacher assessment' (p.22). Having considered how the findings relate to the wider literature, I now turn my attention to identifying the theories and concepts which may explain which factors mediate PA processes and outcomes for learners.

Conceptual development: Towards a theory of peer assessment as a differentiated and discursive practice

The findings discussed in the previous section have implications for theorising ways in which peer assessment influences the quality of younger children's learning. In accordance with these findings, figure 5.1 on page 149 represents interactive peer assessment as a differentiated and discursive practice and this section explores the theoretical aspects of this in more depth in light of the conceptual puzzle unravelled in chapter two. In this section, I therefore also make analytical generalisations to wider psychological and educational theories (Kozulin and Presseisen, 1995; Ghassemzadeh, 2005; Mercer, 2000; Yin, 2009, 2013).

Figure 5.1: Towards a model of peer assessment as differentiated and discursive practice



Social conditions established for peer assessment

The model above suggests that children's underlying characteristics may influence the extent to which they are able to collaborate in contexts of peer assessment. It seems possible that a wide range of pupil characteristics, including competitiveness, articulateness and shyness, shape the kinds of dialogue that emerge in the PA task context. This, in turn, may determine the extent to which the necessary social conditions are established for interactive versions of peer assessment to occur. Such conditions might involve pupils collaborating effectively and exploring and critiquing one another's ideas which results in *intermental* activity between learners (Vygotsky, 1978; Cooper and McIntyre, 1996; Mercer, 2000).

Some children may be able to collaborate successfully (e.g. those who are articulate and higher achieving with better social skills) whilst others might find this particularly challenging when faced with a peer assessment task which requires social interaction and discussion. Pupils' learning in the PA task contexts was arguably weaker when they were unable to use talk as a tool to explore one another's ideas. For example, Steven and Helen's discussions around number, prior to *Thinking Together*, rarely involved the pupils consulting or evaluating one another's ideas. Instead, their dialogue was characterised by competition and disputes meaning that limited feedback was exchanged between peers (Shmitz and Winskel, 2008). This, in turn, weakened the learning outcomes from PA as their discussion culminated in disputes irrelevant to the number task. Therefore, there was little *intermental* activity between such learners as the social conditions necessary for effective peer assessment were yet to be established (Salomon and Perkins, 1998; Van Gennip et. al., 2009, 2010).

The quality of discussion between peers therefore influences the kinds of feedback given and how useful these are for learning. Given that some children in the study, like Steven and Helen, found it particularly challenging to collaborate, without guidance, the model above incorporates several modes of social learning (in purple), outlined by Salmon and Perkins (1998), which may be relevant when considering the 'social conditions' necessary for peer assessment to succeed. These social modes include 'learning to be a social learner' and 'learning social content' (pp.5-6). The former mode involves children using one another as a resource and realising the interdependent nature of social learning where a symbiotic relationship may exist between them. This might mean they both gain something from

collaborating in the social context of PA (Salomon and Perkins, 1998). This was particularly the case when, as mentioned earlier on, the role of *assessor* and *assessee* became blurred in the task context as, at different points in the dialogue, both peers were learning from one another and feedback was bi-directional.

However, for other pupils like Steven and Helen, this could not have happened without ‘learning social content’ (Salomon and Perkins, 1998: 6) through the *Thinking Together* talk intervention. This mode involves children learning how to resolve disagreements, reach agreement and communicate positively. This was certainly something children in the study had learned to do as a result of the talk lessons focusing on the same kinds of principles underpinning this mode (Salomon and Perkins, 1998; Mercer, 2000; Mercer et. al., 2004; Baines et. al., 2009; Galton and Hargreaves, 2009; Baines et. al., 2014). The lessons enabled high quality dialogue to be used by most pupils which helped to establish a more positive climate for socially interactive peer assessments which are represented in orange on the model.

In a different way, scaffolding was sometimes provided by a more articulate pupil who was able to guide a shyer pupil to learn socially through the use of effective talk and dialogue (Salomon and Perkins, 1998). As mentioned earlier on, quieter yet able pupils did not always use *exploratory talk*, even following *Thinking Together*, suggesting that there might be other factors, hitherto underexplored, which could also help to establish the necessary social conditions for intermental activity to occur within PA task contexts (Salomon and Perkins, 1998; Mercer, 2000). This asymmetrical arrangement meant that the more confident and articulate pupil was able to scaffold discussions with her quieter, yet equally capable, peer. Interestingly, the more reticent Lucy spoke more and reasoned at a higher level than in discussions with her equally quiet peer. Arguably, these modes are therefore an important aspect of the conceptual model above since they enhance our current understanding of the social ‘conditions’ (Salmon and Perkins, 1998: 20) that need to be established, at least for some pupils, prior to their participation in a social activity such as peer assessment (Salomon and Perkins, 1998).

Connections between intermental (peer assessment) and intramental activity (individual outcomes) in the peer assessment task context

Once these social conditions had been established, most pupils were able to work collaboratively and engage in peer assessment (Vygotsky, 1978; Mercer, 2000). The activity occurring in such contexts, and represented in the blue box in the model in figure 5.1 (p.147), can be described as ‘intermental’ (Vygotsky, 1978) and provides support for several theories which emphasise the important role that the social context plays in learning. For instance, the findings first support the work of Piaget who argued that ‘social factors’ influence ‘the construction of knowledge’ (DeVries, 2000: 190). In particular, the findings from this study align with Piaget’s concept of ‘sociocognitive conflict’ (Skoumios, 2009) as the verbal feedback given between peers, which is arguably a part of *intermental* activity, encouraged some children to rethink and alter their ideas and thoughts (see transcript 3, 18 and 19). Arguably this ‘sociocognitive conflict’ lead to ‘cognitive restructuring’ for such learners who were exposed to alternative perspectives provided by their partners (Wu and Kao, 2008: 45). Indeed, the social interaction enabled pupils like Bella and Michael, to acknowledge alternative and more suitable approaches to take in relation to the open ended number task (Skoumios, 2009). Furthermore, this concept may help to underpin findings which show how the role of *assessor* and *assessee* can become blurred in more socially interactive PA task contexts where pupils might negotiate feedback given and revise ideas. For example, as shown in the previous chapter, the *assessee* may critically evaluate the verbal feedback they have been given encouraging the *assessor* to incorporate new ideas into their schema and accept different perspectives (Skoumios, 2009).

Other findings, from this study and represented in the model above, support the ideas raised by both Piaget and Vygotsky around the important role the social context plays in learning (Vygotsky, 1962, 1978; DeVries, 1997; 2000; Matusov and Hayes, 2000). Findings suggest that children’s discussions, within the PA task context, enabled them to understand more as individuals which is represented in the green boxes on the model as intramental activity and development (Vygotsky, 1962, 1978; DeVries, 1997; 2000; Matusov and Hayes, 2000; Adams, 2006; Jordan et. al., 2008; Mercer and Howe, 2012). This might have been because peer assessment exposed them to successful examples of work which increased their self-awareness around what they needed to do to improve the quality of their writing (Black et.

al., 2003). In a different way, verbal peer comments prompted children to evaluate their individual work particularly when one peer perceived feedback to be unreliable or misguided. Helpful questioning, between peers, also ensured that richer discussions happened which optimised the quality of pupils' individual learning.

Such findings align with the thinking of Piaget who suggested that a link exists between interactions within the social context and individual development and reasoning (DeVries, 1997; 2000; Matusov and Hayes, 2000). Similarly, they support Vygotsky's (1962, 1978) theories which appear to place even more emphasis than Piaget on the important and mediating effect language and interaction have on children's development (Kozulin and Presseisen, 1995; Ghassemzadeh, 2005). For example, Vygotsky argued that *intermental* activity, within the social context, mediates human development on an *intramental* level. In this study, children's *intermental* activity, including discussions, guidance and verbal feedback in the peer assessment task context, enabled them to function intramentally on an individual level, for example, by self-assessing or developing individual thinking (Vygotsky, 1978). Such connections are represented in the model by arrows linking intermental activity (in blue) with intramental activity and development (in green).

Vygotsky's (1978) concept of the *zone of proximal development* (ZPD) may also explain, to some extent, how learning occurs as a result of peer assessment but only in certain PA task contexts. For example, the more articulate and confident Bella, with higher prior attainment in mathematics, used talk and language to scaffold the learning of her less confident peer, Daisy, throughout the first peer assessment task (see transcript 2). Such a finding seems to support Vygotsky's concept of the ZPD where a more knowledgeable peer scaffolds the learning of someone less skilled. In this case the 'novice', Daisy, was guided by Bella enabling her to function at a slightly more advanced cognitive level. Interestingly, this concept also shares similarities with a mode of social learning proposed by Salomon and Perkins (1998): the '*active social mediation of individual learning*' (p.3).

However, both this mode and the ZPD involve someone with more expertise, such as a teacher or an able student, supporting someone less skilled at the task in question. Consequently, there tend to be learning gains for the novice but not for the expert as I found with Bella and Daisy's first discussion (transcript 2). Perhaps such concepts support both the

‘acquisition’ and ‘participation metaphor’ of learning since one learner may acquire new individual knowledge or understanding yet this is because they have actively participated in social interactions within their social context (Sfard, 1998: 5). Nevertheless, these concepts may only partially explain the learning effects of peer assessment as most children worked with someone with similar prior attainment during the PA tasks (Topping, 2009). Nevertheless, such asymmetrical activity would fit in with intermental activity in the model even if the learning gains, and intramental development, are greater for one pupil than another.

Despite this it seems likely that two further concepts might have greater explanatory power when considering how peer assessment affects the quality of pupils’ learning when arranged more symmetrically. The first is Mercer’s (2000) concept of the *Intermental Development Zone* (IDZ). As mentioned earlier on in chapter two, the IDZ differs from the ZPD since there is no requirement that a more knowledgeable peer will scaffold the learning of a novice (Vygotsky, 1978; Mercer, 2000; Fernández-Cardenas et. al., 2001). Instead, scaffolding is provided by the quality of dialogue that exists between peers (Mercer, 2000; Fernández-Cardenas et. al., 2001).

The second and related concept, which has parallels with the IDZ, is Salomon and Perkins (1998) second mode of social learning: ‘*Social mediation as participatory knowledge construction*’ (p.4). This mode concentrates on how individuals, in a social context, use high quality discourse to ‘construct’ knowledge and learn together through the ‘socially shared vehicles of thought’ (Salomon and Perkins, 1998: 4). In contrast to the ZPD, and Salomon and Perkins’ first social mode, both of these concepts involve all social participants, rather than just a novice, learning within a particular social context (Salomon and Perkins, 1998; Mercer, 2000).

Both these ideas are important when proposing a model of peer assessment as a discursive practice because they suggest that pupils’ learning outcomes may be greatly enhanced when they are able to use talk as an effective tool for learning in order to engage in *intermental* activity (Vygotsky, 1978; Mercer, 2000). For these pupils, it would seem that an IDZ was created where they were able to use *exploratory talk*, as a tool, to hypothesise, reason, question and critique one another’s mathematical ideas meaning that richer peer feedback

was given (Mercer, 2000). This was even the case for particularly challenging learners, such as Steven, who following *Thinking Together* (Dawes et. al., 2000) and ‘learning social content’ (Salomon and Perkins, 1998: 6), took the time to reshape his explanations ensuring his partner, Helen, had understood a possible solution to the number task. This meant both pupils were collaborating to ‘construct’ knowledge (Salomon and Perkins, 1998: 4). Such *intermental activity* is again represented in the blue boxes on the model. Having proposed a model of peer assessment as a differentiated and discursive practice, and underpinned by several theories and concepts which emphasise the important role the social context plays in learning (e.g. Vygotsky, 1978; Salomon and Perkins, 1998; Mercer, 2000), I now turn attention to reviewing the research design and process.

Review of the research design and process: strengths and limitations

Strengths of the research design

The research design adopted in my study has enabled me to make an original contribution to the field of formative peer assessment research in a number of important ways. First unlike previous studies, informants in this study came from a year three and four class in two separate primary schools in the UK whereas previous research has only focused on those in upper primary, secondary schools or higher education (e.g. Yarrow and Topping, 2001; Topping, 2010; Boon, 2015, 2016). Importantly this study has also used methods in order to elicit the voice of pupils in these year groups and draw out their views and perspectives on effective PA processes and outcomes and the factors which mediate these such as effective use of classroom talk (represented in figure 5.1). These methods included mind maps, audio recordings of whole class discussions and interviews which have enabled pupil voice to be elicited in two authentic classroom settings (Topping, 2010).

Furthermore, my review of existing literature highlighted that many existing PA studies use quasi-experimental designs to explore peer assessment where there is a pre-test-post-test comparison between an experimental and control group. Arguably such studies neglect both the teacher and pupils’ perspectives and have tended to measure the impact of an intervention rather than exploring, in depth, the processes leading to quantitative or qualitative outcomes. By contrast, this study adopted a case study action research approach aiming to explore peer

assessment, in much greater depth, through rich and ‘thick’ qualitative description of a smaller number of children (Ponterotto, 2006). Although the number of pairs of children studied was small, and generalisation at least in the statistical sense is not possible, this smaller scale study has enabled me to examine PA in depth and draw conclusions about how the characteristics of the pupils studied affect peer assessment, something which previous research has neglected altogether (Cooper and McIntyre, 1996; Black, 2004). This ‘thick description’ (Ponterotto, 2006) was complemented by quantitative data analysis evidencing the frequency of different words and phrases associated with more effective kinds of classroom talk (Mercer, 1995, 2000; Mercer et. al., 2004; Mercer and Sams, 2006).

The quantitative data in tables and graphs complemented and contextualised this qualitative data and helped to exemplify where the talk intervention had had the greatest impact and importantly for which groups of pupils. Previous studies (e.g. Mercer et. al., 2004) have evaluated the impact of the talk intervention on children as a whole group (Black, 2004). By choosing to quantitatively analyse the transcript data for each pair, who had different characteristics, the differential impact of the intervention, on children’s use of PA as a tool for influencing one another’s learning, became clearer. As mentioned earlier on, this data suggests that the intervention perhaps had a more striking impact on the learning of those children who, prior to it, had demonstrated the most challenging behaviour in the PA task context. By contrast, for quieter pupils the intervention appeared to have less impact and the action research strategy gave me the flexibility (Lewin, 1946; Stenhouse, 1975; Hopkins, 2008) to adapt the intervention and explore how matching pupils in different ways might also affect their use of more effective kinds of talk in PA task contexts.

Importantly in this study, I also chose to quantitatively analyse the frequency of words and phrases, associated with exploratory talk, which the previous *Thinking Together* studies overlooked (e.g. Mercer et. al., 2004; Mercer and Sams, 2006). The inclusion of words such as ‘think’ rather than just ‘I think’ and modal verbs such as ‘might’ and ‘could’ provided additional evidence to show where children were hypothesising, reasoning and proposing possibilities around the number given to them (Herrlitz-Biró et. al, 2013). The inclusion of a wider range of words and phrases, associated with *exploratory talk*, provided an important, additional layer of analysis (Herrlitz-Biró et. al, 2013). Without this data, important insights may have been lost particularly when considering how the talk intervention changed the way

in which articulate and higher attaining pupils use PA to improve their own and one another's learning following the talk intervention (see RQ3).

Finally, as I made the context and details of my intervention clear earlier on in chapter 3, readers might be able to make naturalistic generalisations from my study (Stake, 1978). For example, teachers working in similar settings, such as primary and elementary schools, might be able to repeat some of the approaches presented in detail in this study in their contexts to assess whether my findings have wider relevance (Stake, 1978; Barlett and Burton, 2006). This might also shed further light on a wider range of pupil characteristics which need to be taken into account when investigating peer assessment which were not studied here. Although many aspects of the research design enabled me to gain richer insights into effective PA practices, there are nonetheless aspects of it I would change if I was to do the research again.

Problems and limitations with research process

First, I would use more advanced digital voice recorders which do not pick up background noise so all of the children's discussions could have been recorded in the authentic classroom setting. This natural setting, where around thirty children may have been talking at once, meant that it was not possible to record discussions without background noise affecting the quality of the recordings. Therefore, I had to record the talk of participants in an empty classroom which was quieter but perhaps less genuine than PA in its ordinary classroom context. It is possible that PA may have become artificial and this may have affected some of the data obtained. For example, as discussed earlier on in this chapter, I had to record one pair's discussion during their games lesson when their classmates were playing rounders outside. The children were encouraging one another to speed up so they could get outside. This may have affected the language the children used in such a context as they opted to use a greater frequency of modal verbs and fewer lengthier phrases including 'I think' and 'because' to hypothesise and reason.

A further change would be to record children's classroom discussions for a similar length of time so fairer comparisons could be made between learners and pairs around the intervention's impact (Herrlitz-Biró et. al, 2013). For instance, there were slight differences

in the length of time pupils spoke for which may or may not have influenced the frequency of words and phrases they used (Herrlitz-Biró et. al, 2013). In addition to this, and in a similar way to previous studies (e.g. Mercer et. al., 2004; Mercer and Sams, 2006), I only counted the number of words and phrases for each group/pair rather than individual children. However, the findings might have been further strengthened if I had also counted the words and phrases for individuals too. This might show within a pair whether the intervention had had a greater impact on one child over another. It may also show, to a greater extent, whether or not individual as well as collective reasoning was happening in the PA task context. Furthermore, counts of features, such as words and phrases associated with *exploratory talk*, have not been corrected for the total number of words produced in each peer discussion. Therefore, counts of such features cannot be compared across the different pairs of children.

With the benefit of hindsight, it would also have been useful to explore other characteristics of pupils beyond those studied (e.g. shy, articulate and higher attaining). With further time, it might have also been interesting to explore how pupils' mindsets around learning affect the kind of feedback given during peer assessment and how this is responded to and used by learners. Furthermore, it might have been beneficial to have a more objective way of identifying the characteristics of pupils. In this study, I assumed from my perspective, as a teacher, that a child is 'shy' or 'articulate' from the interactions I had observed and had with these children in the classroom setting (Brown and McIntyre, 1993; Cooper and McIntyre, 1996). However, this is my ontological perspective and such traits may be context-specific and viewed differently from person to person (Scott and Morrison, 2006; Scotland, 2012). Perhaps it might also have been useful to gain the view of the child and their peers around their characteristics and personality and possibly those of other staff and the children's parents or guardians.

A child, who in this study has shown shyness or articulateness, might be much more or less confident in a contrasting situation or context. Furthermore, learners have many traits and perhaps labels such as shy, articulate and higher attaining do not adequately describe or incorporate these in all social contexts. Furthermore, as the study progressed, the characteristics of such pupils changed quite significantly in the PA task context. For example, the boy who had presented challenging behaviour became much more cooperative, thoughtful and considerate following *Thinking Together*. Likewise, the girl who was shy, spoke at great

length during a further discussion with a more articulate and confident peer. Therefore if I was to do the study again, I would need to qualify, in greater depth, what is meant by each characteristic and emphasise the changing nature of these at different points in the PA process. In light of this, an avenue for further research might be to explore how peer assessment changes pupils' characteristics in the classroom as to date there has only been one study which implicitly explores how PA changes aspects of the social context (Van Gennip et. al., 2010).

Furthermore, the pairs of pupils whose discussions are analysed here were members of one or other of the two classes taught by me. It is not known whether, or to what extent, their work in pairs would have been influenced by their relationship with me in the whole class contexts. In particular, their understanding of the purpose and methods of the *Thinking Together* approach would have been dependent on my introduction to this approach from which they would have originally learned about it. More generally, any attempt to apply my findings to the work of other teachers in other contexts might best await further explorations of such wider generalisation of them with other teachers and in the contexts of their whole class teaching.

Finally, whilst the detailed analyses of the discussions between five pairs of pupils has been the main source of the valuable and original results of the research, it should be noted that other research studies have analysed work in larger groups, ranging in numbers from three to whole class discussions. Further research might be needed to explore whether the approach adopted here, when replicated with larger groups, would lead to modification of the findings reported here. Having critically evaluated the strengths and limitations of the research design, process and findings, in terms of generating insights into effective PA processes and outcomes, I now turn my attention to recommendations for classroom practice and policy.

Recommendations for classroom practice and policy

The present study has a number of important implications for schools and teachers interested in developing effective peer assessment practices. First, as mentioned in figure 5.1, it seems important to treat more socially interactive peer assessment as a differentiated and discursive practice which is designed to meet the varying needs of learners based on their individual

characteristics even if these change as a result of intervention or even in different contexts (Brown and McIntyre, 1993; Cooper and McIntyre, 1996). Children's characteristics appeared to influence the way they communicated with one another in the PA task contexts and the extent to which they were able to feedback to one another successfully. Some pupils could do this effectively whilst others could not (figure 5.1). Thus, an implication is that certain children will need guidance in order to communicate in a socially interactive peer assessment task context (Mercer, 2000; Mercer et. al., 2004; Baines et. al., 2007, 2009; Galton and Hargreaves, 2009; Baines et. al., 2014). This ensures they learn 'social content' (Salomon and Perkins, 1998: 6) so that social conditions are established within the classroom that are conducive to effective learning in the collaborative PA task context (Van Gennip et. al., 2009, 2010).

This study may also provide some evidence to support the argument for a change in the way we pair up students to give feedback to one another during peer assessment. Until now, this has been based on ability alone (Topping, 2009). However, my study offers some evidence to suggest that ability might not be the only pupil characteristic that teachers should consider. Indeed, higher attaining students in this study were not always able to give high quality verbal feedback in the task context particularly when they were both shy. Perhaps then other factors, such as pupils' levels of articulateness, might also be important for teachers to consider when pairing up students to feedback to one another in task contexts where more socially interactive peer assessment is required (Brown and McIntyre, 1993; Cooper and McIntyre, 1996; Kollar and Fischer, 2010). It seems important to ensure that at least one peer is able to scaffold high quality discussions with the other in order for learning gains to be optimised.

The findings also have important implications for developing effective formative assessment practices which involve consulting pupils (McIntyre et. al., 2005; Pedder and McIntyre, 2006). This study valued pupil voice and used mind maps, informant style interviews and discussions to enable pupils to share their views on effective peer assessment processes (see RQ4). In turn, this showed that more effective peer assessment processes and practices might be developed by giving pupils more time to constructively peer assess, having more children peer assess a piece of work so they are exposed to abundant verbal feedback and providing them with prompts when giving feedback. Without eliciting pupil voice, such insights may

not have been gained and I have been able to use these to advance my own professional practice in this area (McIntyre et. al., 2005; Pedder and McIntyre, 2006).

A further implication emerging from my findings is that, once children have been guided to communicate effectively in open ended peer assessment task contexts, teachers and schools should hand over greater responsibility for formative assessment to them (Falchikov, 1995, 2005; Falchikov and Goldfinch, 2000; Topping, 2009, 2010). Most of the children in this study were able to use high quality questioning as a vehicle to accelerate their peer's learning once they had been guided to use talk as an effective learning tool (Vygotsky, 1978; Mercer, 2000). This suggests that verbal peer feedback may have the potential to be as effective as teacher feedback and classroom discussions might be orchestrated in a way which capitalises on the potential of small group discussion which actively involves all students in the process of giving and receiving verbal feedback (Mercer, 2000; Topping, 2009). Perhaps such a change though would require a cultural shift in some classrooms from teachers and teaching to learners and learning (McIntyre, 2002; James and Pedder, 2006).

Finally, this study has shown that peer assessment is a complex, social process which differs from pupil to pupil based on their needs, characteristics and dispositions (Cooper and McIntyre, 1996). Given this complexity, it seems likely that high quality CPD is needed in schools if teachers, support staff and learners are to use peer assessment in ways which optimise the quality of students' learning in their schools and communities. If CPD is absent, it seems unlikely that peer assessment's learning potential will be fully realised or that other practitioner case study research will be carried out which extends our understanding of this area from the perspective of practitioners and pupils. Having considered the implications of my findings for classroom practice, I now turn my attention to opportunities which exist for further research around peer assessment with younger learners.

Recommendations for further research

First, as mentioned previously, it is important for practitioners and researchers to investigate whether or not the findings from this study, and the intervention used, have wider relevance in order for 'naturalistic generalisations' to be made (Stake, 1978). For example, teachers could repeat the strategies, used in this study, and examine how they can be adapted to meet

the needs of different age groups or children with characteristics that have not been studied here (Stake, 1978; Barlett and Burton, 2006). Such research may further develop the conceptual model of peer assessment as a differentiated and discursive practice linked to pupil characteristics (see figure 5.1 on page 149). This research could usefully explore other characteristics, not mentioned in this study, which may also affect the quality of students' learning in contexts of PA.

Second, further research might usefully explore how children use talk as a tool to peer assess one another's learning on a wider range of open ended mathematical tasks. In this study, a specific kind of open ended number task was chosen where children had to generate questions for a number, e.g. $25 = 5 \times 5$; $100 = 10 \times 10$. However, it would be interesting for further research to explore the success of peer assessment in other open ended mathematical task contexts and the extent to which *Thinking Together* is a useful intervention in developing children's use of effective talk in these contexts. These contexts might include children commenting on one another's successes at completing logic puzzles, such as Sudoku, or magic squares where they reason about which numbers are missing and why. In addition, a further task for research to explore is how the kind of activity (e.g. closed or open ended) used in the PA task context influences the quality of talk children use and how this, in turn, influences the feedback given and the depth of pupils' understanding of key concepts and ideas.

Third, this research only explored the success of *Thinking Together* as an intervention for peer assessment. However, there are other interventions, such as the SPRinG project (e.g. Baines et. al., 2009, 2014), which may also be beneficial for peer assessment in different ways. Further research might explore the success of these interventions in terms of shaping effective PA processes. In further studies, it might also be possible to examine how successful talk interventions such as *Talk Box* are in developing children's use of effective talk in contexts of peer assessment in KS1 (Dawes and Sams, 2004a). It is possible that the intervention mentioned in this study would need adapting to meet the needs of younger learners and further research could examine this. Likewise, it would be interesting to explore the success of the *Thinking Together* approach in developing pupils' use of effective talk in PA task contexts in upper primary (years five and six) and early secondary too.

Finally, research might further explore how pupils feel about peer assessment. For instance, I found that pupils had different views on being assessed by a peer and this influenced how they felt about the process. Some felt secure about this whilst others felt uncomfortable. Future studies might examine whether a link exists between pupils' characteristics and their feelings about engaging in formative assessment practices which actively involve students. Having identified opportunities for further research, in the next section I propose how my thesis has made an original contribution to knowledge.

Summary: contribution to knowledge

As well as providing several recommendations for further research into peer assessment, this study has contributed to our current understanding of the aspects and processes of peer assessment which are perhaps most causally related to pupils' learning in the primary school context. Indeed this is the first study to explore how the social context of peer assessment, and the social processes associated with it such as language and talk, affect the quality of younger children's learning.

The review of literature highlighted several gaps in terms of understanding how social processes affect children's learning outcomes. In particular, the limited research conducted on the social context of peer assessment (e.g. Tanner and Jones, 1994; Van Gennip et. al., 2009, 2010) did not address the key issue that children might find it challenging to collaborate in contexts of PA without guidance or support. As previously suggested, and shown by my research, this might influence the kinds of talk used in the PA task contexts.

In particular this research has suggested, for the first time, that students' characteristics may influence the kinds of talk that they use in peer assessment task contexts when social interaction is permitted. In turn, these kinds of talk influence the extent to which these children are able to collaborate, reason and give high quality feedback. For example, pupils in my study with lower prior attainment and particular behavioral difficulties tried to assert their authority in the peer assessment task using a kind of talk identified by Mercer (1995, 2000) as *disputational*. By contrast, motivated, articulate and higher attaining students used dialogue which most closely resembles the features of *exploratory talk* where they hypothesised,

reasoned and speculated leading to high quality feedback and interaction. This finding complements existing knowledge as to date research has suggested that children generally find it challenging to collaborate without guidance or support (e.g. Dawes et. al., 2000; Mercer, 2000; Baines et. al., 2007; Galton and Hargreaves, 2009; Baines et. al., 2009). The findings from my study dispute this claim as previous research has tended to overlook how pupils' characteristics influence the extent to which they are able to collaborate in social contexts and instead has arguably viewed children as a 'homogenous group' (Black, 2004: 36).

This is also the first study which draws on the voice of younger pupils, in two different primary school settings and year groups, to support the idea that lessons, which guide pupils to use talk as a tool for learning, are an important requirement for peer assessment to happen effectively (Mercer et. al., 1999; Mercer, 2000; Dawes et. al., 2000; Rojas-Drummond and Mercer, 2003; Mercer et. al., 2004; Rojas-Drummond and Zapata, 2004; Littleton et. al., 2005; Mercer and Sams, 2006; Black, 2006; Black, 2007). The informants consulted suggest that these lessons had given them language they could use to engage with one another's ideas and clearly explain these, give effective reasons for feedback and use questions as a tool for moving learning forwards in the peer assessment task contexts (Rojas-Drummond and Mercer, 2003; Mercer et. al., 2004). The present study's inclusion of younger pupils' voices also enhances our current understanding around the factors which they perceive to be important in shaping effective PA processes. Pupils in years three and four, suggested that peer assessment is more effective when: high quality dialogue is used between peers; they feel comfortable about accepting feedback; they have scaffolds and prompts so relevant comments about work can be made; and pupils have adequate time to engage with one another's work. Such findings may also have important practical implications for teachers when considering how to organise peer assessment effectively in primary school classrooms.

The study has also raised important questions about how peers should be matched to give feedback to one another in PA task contexts. Previous authors (e.g. Topping, 1998, 2009) have suggested that students of similar ability should give feedback to one another. However, this study has suggested that ability might not be the only suitable factor teachers should consider when matching pupils to give verbal feedback to one another when peer assessment is more socially interactive. In some cases, peer assessment's learning potential was limited

surprisingly between higher attaining pairs as neither could use talk effectively as a tool for learning even after receiving the talk lessons. Unlike previous authors (e.g. Topping, 2009), the current study therefore provides greater support for the idea that, in more interactive PA task contexts, students should be paired up in ways which enable them to use high quality discussion as a tool for learning (Vygotsky, 1978; Salomon and Perkins, 1998; Mercer, 2000; Black et. al, 2006; Black, 2007). This study highlighted how a more articulate learner was able to encourage her shy, but equally capable partner, to use talk more effectively as a tool for hypothesising and explaining reasoning in the PA task context. Thus, factors such as pupils' levels of articulateness (Cooper and McIntyre, 1996) might also be important pupil characteristics for teachers to consider when encouraging them to use high quality talk in such PA task contexts.

The present study also provides additional evidence when considering how peer assessment influences pupils' learning outcomes including their ability to self-assess. For example, unlike prior research, findings from this study suggest that students might be prompted to self-assess if they mistrust peer feedback or feel the assessor has underestimated their capabilities and given too much support. Furthermore, this study has found how AfL techniques, such as effective questioning, which are usually referred to in relation to those asked by teachers, might also be used effectively by younger peers as a tool to move learning forwards (Sadler, 1989; Black and William, 1998; Black et. al., 2003). Such questions, from a range of pupils, encouraged learners to make links between mathematical concepts using prior knowledge, spot and continue number patterns and move learning onto more challenging possibilities. This study confirms Topping's (2009) view that peer feedback can be as effective as teacher feedback but contributes additional evidence too by suggesting that this might also be the case for younger learners particularly when they are presented with open ended challenges (Kollar and Fischer, 2010; Topping, 2010).

In addition, the case study interventionist strategy adopted in this research (Lewin, 1946; Hopkins, 2008; Yin, 2009, 2013) meant that I, as a classroom practitioner, could examine peer assessment in some depth with regard to younger learners. This detailed study showed peer assessment to be a complex learning process which may differ between learners due to their characteristics, attitudes and dispositions (Cooper and McIntyre, 1996). Therefore, peer assessment appears to be a complex and diverse classroom activity which may need to be

differentiated to meet the needs of different groups of learners, something which previous PA research has tended to overlook perhaps because of its focus on older learners in selective settings such as universities (Topping, 2010).

Taken together, the findings from this study, relating to the social context of peer assessment, have helped to shape a conceptual model for understanding PA (figure 5.1 on page 149) as a differentiated and discursive practice underpinned by concepts and theories which emphasise the important role the social context plays in allowing interpersonal (intermental) and individual (intramental) learning to happen (e.g. Vygotsky, 1978; Salomon and Perkins, 1998). This is the first study to propose a model of peer assessment for younger learners as a more interactive activity since the vast majority of previous research has either focused on PA outcomes (e.g. Olson, 1990; Catterall, 1995) or has neglected the role verbal feedback plays (e.g. Van Gennip et. al., 2010).

As previously mentioned, this model suggests that a child's underlying characteristics (e.g. shyness and articulateness) influence the extent to which they are able to collaborate in the PA task context and establish conducive social conditions for *intermental* activity to occur between peers (Vygotsky, 1978; Salomon and Perkins, 1998; Mercer, 2000). Children who find this particularly challenging may need guidance and support in terms of 'learning social content' (Salomon and Perkins, 1998: 5-6) which, in this study, was provided by the *Thinking Together* intervention and by pairing up students, with contrasting characteristics, so one was able to scaffold high quality discussions with the other. Once conducive social conditions are established, where pupils feel secure enough to give and receive feedback (e.g. Van Gennip et. al. 2009, 2010), *intermental* activity can occur between them where they may engage in Piaget's notion of 'sociocognitive conflict' (Topping, 1998; Jordan et. al., 2008; Skoumios, 2009), alter their thinking due to discussion and negotiation, hypothesise, reason and explain (Vygotsky, 1978; Salomon and Perkins, 1998; Mercer, 2000; Mercer et. al., 1999, 2004; Wegerif et. al., 2005). In turn, this *intermental* activity results in *intramental* (individual) development and greater understanding for individuals who, in this study, were inspired to self-assess, evaluate their needs as learners and move onto more challenging work as a result of interactions in the peer assessment task context (Vygotsky, 1978; Salomon and Perkins, 1998; Mercer, 2000).

References

- Adams, P. (2006) Exploring social constructivism: theories and practicalities, *Education 3-13: International Journal of Primary, Elementary and Early Years Education*, **34** (3), 243-257.
- Adelman, C. (1993) Kurt Lewin and the Origins of Action Research, *Educational Action Research*, **1** (1), 7-24.
- Alexander, R. J. (2008) *Towards Dialogic Teaching: rethinking classroom talk* (4th edition), Dialogos.
- Allison, P. and Pomeroy, E. (2000) How shall we “know?” Epistemological concerns in research in experiential education, *The Journal of Experiential Education*, **23** (2), 91-98.
- Altrichter, H., Posch, P. and Somekh, B. (1993) *Teachers investigate their work: an introduction to the methods of action research*, Taylor and Francis Ltd.
- Babbie, E. R. (2007) *The basics of social research*, Wadsworth Publishing Co Inc; 4th edition.
- Baines, E., Blatchford, P. and Chowne, A. (2007) Improving the effectiveness of collaborative group work in primary schools: effect on Science attainment, *British Educational Research Journal*, **33** (5), 663-680.
- Baines, E. Rubie-Davies, C. and Blatchford, P. (2009) Improving pupil group work interaction and dialogue in primary classrooms: results from a year-long intervention study, *Cambridge Journal of Education*, **39** (1), 95-117.
- Baines, E., Blatchford, P. and Webster, R. (2014) The challenges of implementing group work in primary school classrooms and including pupils with Special Educational Needs, *Education 3-13: International Journal of Primary, Elementary and Early Years Education*, DOI: [10.1080/03004279.2015.961689](https://doi.org/10.1080/03004279.2015.961689).
- Bartlett, S. and Burton, D. (2006) Practitioner research or descriptions of classroom practice? A discussion of teachers investigating their classrooms, *Educational Action Research*, Vol. 14, No. 3, pp. 395-405.
- BERA (2011). *Ethical Guidelines for Educational Research*, Available at www.bera.ac.uk/publications/guidelines/.
- Berg, E. C. (1999) The Effects of Trained Peer Response on ESL Students’ Revision Types and Writing Quality, *Journal of Second Language Writing*, **8** (3), 215-241.
- Black, L. (2004) Differential participation in whole-class discussions and the construction of marginalised identities, *Journal of Educational Enquiry*, **5**(1), 34-54.
- Black, P., and Wiliam, D. (1998). Assessment and classroom learning, *Assessment in Education*, **5** (1), 7-74.
- Black, P., Harrison, C. Lee, C. Marshall, B. and Wiliam, D. (2003) *Assessment for Learning: putting it into practice*. Open University Press: Maidenhead.
- Black, P., McCormick, R., James, M. and Pedder, D. (2006): Learning How to Learn and Assessment for Learning: a theoretical inquiry, *Research Papers in Education*, **21** (2), 119-132.
- Black, P. (2007). Full marks for feedback, *Make the Grade (Journal of the Institute of Educational Assessors)*, **2**, 18-21.
- Bloxham, S. and West, A. (2004). Understanding the rules of the game: marking peer assessment as a medium for developing students’ conceptions of assessment, *Assessment and Evaluation Higher Education*, **29** (6), 721-733.

- Boon, S. I. (2015). The role of training in improving peer assessment skills amongst year six pupils in primary school writing: an action research enquiry, *Education 3-13: International Journal of Primary, Elementary and Early Years Education*, **43** (6), 664-680.
- Boon, S. I. (2016) Increasing the uptake of peer feedback in primary school writing: findings from an action research enquiry, *Education 3-13: International Journal of Primary, Elementary and Early Years Education*, **44** (2), 212-225.
- Boud, D. (2000) Sustainable Assessment: Rethinking assessment for the learning society, *Studies in Continuing Education*, **22** (2), 151-167.
- Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology, *Qualitative Research in Psychology*, **3** (2), 77-101.
- Brown, S. and McIntyre, D. (1993) *Making Sense of Teaching*, Buckingham: Open University Press.
- Bryant, J. and Bates, A. (2010): The power of student resistance in action research: teacher educators respond to classroom challenges, *Educational Action Research*, **18** (3), 305-318.
- Budd, J.W. (2004). Mind maps as classroom exercises, *Journal of Economic Education*, **35** (1), 35-46.
- Burgess, H., Sieminski, S. and Arthur, L. (2006) *Achieving Your Doctorate in Education*, London: Sage. Chapter 6, Methodological Considerations pp 52-63.
- Burgess-Allen, J. and Owen-Smith, V. (2010) Using mind mapping techniques for rapid qualitative data analysis in public participation processes, *Health Expectations*, **13**, 406-415.
- Butler, R. (1987). Task-Involving and Ego-Involving Properties of Evaluation; Effects of Different Feedback Conditions on Motivational Perceptions, Interest, and Performance, *Journal of Educational Psychology*, **79** (4), 474-482.
- Butler, R. (1988). Enhancing and undermining intrinsic motivation: The effects of task-involving and ego-involving evaluation on interest and performance. *British Journal of Educational Psychology*, **58** (1), 1-14.
- Butler-Kisber, L. and Poldma, T. (2009) The power of visual approaches in qualitative inquiry: The use of collage making and concept mapping in experiential research, *Proceedings of the EKSIG conference: Experiential knowledge, method and methodology*. London: June.
- Cain, T. and Domaille, K. (2008) What sort of knowledge is generated by action research?, *International Journal of Research and Method in Education*, **31** (1), 89-94.
- Catterall, M. (1995). Peer learning research in marketing. in S. Griffiths, K. Houston, and A. Lazenblatt (Eds.), *Enhancing student learning through peer tutoring in higher education: Section 3—Implementing* (Vol. 1, pp. 54-62). Coleraine, Northern Ireland: University of Ulster.
- Claxton, G. (1995) 'What Kind of Learning Does Self-assessment Drive? Developing a 'nose' for quality: comments on Klenowski (1995)', *Assessment in Education: Principles, Policy & Practice*, **2** (3), 339-343
- Cohen, L., Manion, L. and Morrison, K. (2008) *Research Methods in Education*, Oxen: Routledge.
- Cooper, P., & McIntyre, D. (1996). The importance of power-sharing in classroom learning, in Hughes, M. (ed.) *Teaching and Learning in Changing Times*, Oxford: Blackwell.
- Crossouard, B. (2012). Absent presences: the recognition of social class and gender dimensions within peer assessment interactions, *British Educational Research Journal*, **38** (5), 731-748.

- Darling-Hammond, L. (2010) *Performance Counts: Assessment Systems that Support High-Quality Learning*. Washington, DC: Council of Chief State School Officers.
- Dana, N. F., & Yendol-Hoppey, D. (2014). *The reflective educator's guide to classroom research: Learning to teach and teaching to learn through practitioner inquiry*, 3rd Edition. Thousand Oaks, California: Corwin Press.
- Dann, R. (2014) Assessment as learning: blurring the boundaries of assessment and learning for theory, policy and practice, *Assessment in Education: Principles, Policy & Practice*, **21** (2), 149-166.
- Davies, P. (2006). Peer assessment: judging the quality of students' work by comments rather than marks, *Innovations in Education and Teaching International*, **43** (1), 69–82.
- Dawes, L., Mercer, N. and Wegerif, R. (2000) *Thinking together: a programme of activities for developing speaking, listening and thinking skills for children aged 8-11*. Birmingham: Imaginative Minds Ltd.
- Dawes, L., and Sams, C. (2004a) *Talkbox: speaking and listening activities for learning at Key Stage 1 (ages 6-8)*. London: David Fulton.
- Dawes, L. and Sams, C. (2004b) Developing the capacity to collaborate, in Littleton, K., Miell, D., and Faulkner, D. (eds.) *Learning to Collaborate: Collaborating to Learn 2004*, Nova Science Pub. Inc.
- DeVries, R. (1997) Piaget's Social Theory, *Educational Researcher*, **26** (2), 4-17.
- DeVries, R. (2000) Vygotsky, Piaget, and education: a reciprocal assimilation of theories and educational practices, *New Ideas In Psychology*, **18** (2-3), 187-213.
- Dickens, L. and Watkins, K. (1999) Action Research: Rethinking Lewin, *Management Learning*, **30** (2), 127-140.
- Dowling, M. (2006), Approaches to reflexivity in qualitative research, *Nurse Researcher*, **13** (3), 7-21.
- Drummond, M. J. (2003) *Assessing Children's Learning*, (second edition), London: David Fulton.
- Dweck, C.S. (1986). Motivational processes affecting learning, *American Psychologist*, **41** (10), 1040-1048.
- Edwards, D. and Mercer, M. (1987) *Common Knowledge*. London: Methuen/Routledge.
- Einarsdóttir, J. (2007) Research with children: methodological and ethical challenges, *European Early Childhood Education Research Journal*, **15** (2), 197 -211.
- Falchikov, N. (1995). Peer Feedback Marking: Developing Peer Assessment, *Innovations in Education and Training International*, **32** (2), 175-187.
- Falchikov, N. and Goldfinch, J. (2000). Student Peer Assessment in Higher Education: A Meta- Analysis Comparing Peer and Teacher Marks, *Review of Educational Research*, **70** (3), 287-322.
- Falchikov, N. (2005) *Improving Assessment through Student Involvement: Practical Solutions for Aiding Learning in Higher and Further Education*, Routledge.
- Feldman, A. (2007) Validity and quality in action research. *Educational Action Research* **15** (1), 21–32.
- Fernández -Cardenas, F.M., Wegerif,R., Mercer, N. and Rojas-Drummond, S. (2001) Re-conceptualizing "Scaffolding" and the Zone of Proximal Development in the context of symmetrical collaborative learning. *Journal of Classroom Interaction*, **36/37** (2/1), 40-54.
- Flewitt, R. (2005) Conducting research with young children: some ethical considerations, *Early Child Development and Care*, **175** (6), 553- 565.

- Frankland, S. (2007) Peer Assessment amongst Students in a Problem-Based Learning Format, in Frankland, S. (ed.) *Enhancing Teaching and Learning through Assessment: Deriving an Appropriate Model*, Netherlands: Springer Galton, M.
- Galton, M. and Hargreaves, L. (2009): Group work: still a neglected art?, *Cambridge Journal of Education*, **39** (1), 1-6.
- Ghassemzadeh, H. (2005) Vygotsky's meditational psychology: A new conceptualization of culture, signification and metaphor, *Language Sciences*, **27**, 281-300.
- Gielen, S., Tops, L., Dochy, F., Onghena, P. and Smeets, S. (2010a). A comparative study of peer and teacher feedback and of various peer feedback forms in a secondary school writing curriculum, *British Educational Research Journal*, **36** (1), 143-162.
- Gielen, S., Peeters, E., Dochy, F., Onghena, P. and Struyven, K. (2010b) Improving the effectiveness of peer feedback for learning, *Learning and Instruction*, **20** (4), 304-315.
- Gipps, C. (1994). *Beyond Testing: Towards a Theory of Educational Assessment*, Routledge.
- Gipps, C. (1999). Socio-Cultural Aspects of Assessment, *Review of Research in Education*, **24** (1), 355-392.
- Gipps, C. (2011) *Beyond Testing: Towards a Theory of Educational Assessment*, (Routledge, Education Class ed) [Paperback].
- Golafshani, N. (2003) Understanding Reliability and Validity in Qualitative Research, *The Qualitative Report*, **8** (4), 597-607.
- Goodnough, K. (2010) The role of action research in transforming teacher identity: modes of belonging and ecological perspectives, *Educational Action Research*, **18** (2), 167-182.
- Grant, H. and Dweck, C. S. (2003) Clarifying Achievement Goals and Their Impact, *Journal of Personality and Social Psychology*, **85** (3), 541-553.
- Grice, H. P. (1975) 'Logic and conversation'. In P. Cole and J. Morgan (eds) *Studies in Syntax and Semantics III: Speech Acts*, New York: Academic Press, 183-98.
- Hansen, J. & Liu, J. (2005) Guiding Principles for Effective Peer Response. *ELT Journal*, **59** (1), 31-38.
- Hari, R. and Kujala, M. V. (2009). Brain Basis of Human Social Interaction: From Concepts to Brain Imaging, *Physiology Reviews*, **89** (2), 453-479.
- Harris, L. (2007). Employing formative assessment in the classroom, *Improving Schools*, **10** (3), 249-260.
- Harris, L. R., & Brown, G. T. L. (2013). Opportunities and obstacles to consider when using peer- and self-assessment to improve student learning: Case studies into teachers' implementation. *Teaching and Teacher Education*, **36**, 101-111.
- Heikkinen, H. L. T., Huttunen, R. Syrjälä, L. and Pesonen, J. (2012): Action research and narrative inquiry: five principles for validation revisited, *Educational Action Research*, **20** (1), 5-21.
- Herrlitz-Biró, L., Elbers, E. and de Haan, M. (2013) Key words and the analysis of exploratory talk, *European Journal of Psychology of Education*, **28** (4), 1397-1415
- Hopkins, D. (2008) *A Teacher's Guide to Classroom Research*, 4th edition, Open University Press: Berkshire.
- Humphrey, C. (2013) A Paradigmatic Map of Professional Education Research, *Social Work Education: The International Journal*, **32** (1), 3-16.
- James, M. (2006) Assessment, Teaching and Theories of Learning, In: J. Gardner (ed.) *Assessment and Learning*, pp. 47-60. London: Sage.
- James, M. and Pedder, D. (2006) Professional Learning as a Condition for Assessment for Learning. In: J. Gardner (ed.) *Assessment and Learning*, pp. 27-43. London: Sage.

- Jick, T. D. (1979) Mixing Qualitative and Quantitative Methods: Triangulation in Action, *Administrative Science Quarterly*, **24** (4), 602-611.
- Johnson, R. B. & Onwuegbuzie, A. (2004) Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, **33** (7), 14-26.
- Kamins, M. L. and Dweck, C. S. (1999) Person versus process praise and criticism: Implications for contingent self-worth and coping. *Developmental Psychology*, **35** (3), 835-847.
- Kollar, I. and Fischer, F. (2010). Peer assessment as collaborative learning: A cognitive perspective, *Learning and Instruction*, **20** (4), 344-348.
- Kozulin, A. and Presseisen, B. Z. (1995) Mediated Learning Experience and Psychological Tools: Vygotsky's and Feuerstein's Perspectives in a Study of Student Learning, *Educational Psychologist*, **30** (2), 67-75.
- Kvale, S. (1996) *Interviews*. London: Sage.
- Lee, C. (2006). *Language for Learning Mathematics: Assessment for Learning in Practice*, Open University Press: Maidenhead.
- Lewin, K. (1946) Action research and minority problems, *Journal of Social Issues*, **2** (4), 34-46.
- Littleton, K., Mercer, N., Dawes, L., Wegerif, R., Rowe, D., and Sams, C. (2005) Talking and Thinking Together at Key Stage 1. *Early Years: An International Journal of Research and Development*. **25** (2), 167-182.
- Mahon, A., C. Glendinning, K. Clarke and G. Craig (1996) Researching Children: Methods and Ethics, *Children & Society*, **10** (2), 145-154.
- Malin, M. (2003) Competing Interests between Researcher, Teacher and Student in the Ethics of Classroom Ethnography, *International Journal of Research & Method in Education*, **26** (1), 21-31.
- Marshall, M. N. (1996), Sampling for qualitative research, *Family Practice*, **13** (6), 522-525.
- Matusov, E and Hayes, R. (2000). Sociocultural critique of Piaget and Vygotsky, *New Ideas in Psychology*, **18** (2-3), 215-239.
- McIntyre, D., and MacLeod, G. (1979). Characteristics and Uses of Systematic Classroom Observation. In R. McAleese & D. Hamilton (Eds.), *Understanding Classroom Life*: NFER.
- McIntyre, D. (2002) Has Classroom Teaching Served its Day?, in Moon, B., Mayes, A. S. and Hutchinson, S. (eds.) *Teaching, Learning and the Curriculum in Secondary Schools: A Reader*, London: Routledge Falmer.
- McIntyre, D., Pedder, D., and Rudduck, J. (2005) Pupil voice: comfortable and uncomfortable learnings for teachers, *Research Papers in Education*, **20** (2), 149-168.
- Meier, P.S. (2007) Mind Maps a tool for eliciting and representing knowledge held by diverse respondents, *Social Research Update*, Autumn edition.
- Mercer, N. (1995). *The Guided Construction of Knowledge: Talk amongst teachers and learners*. Clevedon: Multilingual Matters.
- Mercer, N. (2000). *Words and Minds: How We Use Language to Think Together*. London: Routledge.
- Mercer, N., Wegerif, R. and Dawes, L. (1999). Children's Talk and the Development of Reasoning in the Classroom, *British Educational Research Journal*, **25** (1), 95-111.

- Mercer, N., Dawes, R., Wegerif, R., & Sams, C. (2004) Reasoning as a scientist: ways of helping children to use language to learn science. *British Educational Research Journal*, **30** (3), 367-385.
- Mercer, N. and Sams, C. (2006) Teaching children how to use language to solve maths problems, *Language and Education*, **20** (6), 507-528.
- Mercer, N., Dawes, L. and Staarman, J. K. (2009). Dialogic teaching in the primary science classroom, *Language and Education*, **23** (4), 353-369.
- Mercer, N. (2010) The analysis of classroom talk: Methods and methodologies, *British Journal of Educational Psychology*, **80**, 1-14.
- Mercer, N. and Howe, C. (2012) Explaining the dialogic processes of teaching and learning: The value and potential of sociocultural theory, *Learning, Culture and Social Interaction*, **1**, 12-21.
- Miller, P. J. (2003). The Effect of Scoring Criteria Specificity on Peer and Self-assessment, *Assessment and Evaluation in Higher Education*, **28** (4), 383-394.
- Min, H. T. (2005). Training students to become successful peer reviewers. *System*, **33** (2), 293–308.
- Min, H. (2006). The effects of trained peer review on EFL students' revision types and writing quality, *Journal of Second Language Writing*, **15** (2), 118–141.
- Mok, I. A. C. and Clarke, D. J. (2014) The Contemporary Importance of Triangulation in a Post-Positivist World: Examples from the Learner's Perspective Study in Bikner-Ahsbabs, A. Knipping, C. and Presmeg, N. C. (eds.) *Approaches to Qualitative Research in Mathematics Education: Examples of Methodology and Methods*, London: Springer.
- Ofsted (2012) *Moving English forward: Action to Raise Standards in English*, Reference no: 110118, Retrieved from <http://www.ofsted.gov.uk/sites/default/files/documents/surveys-and-good-practice/m/Moving%20English%20forward.pdf>.
- Oliver-Hoyo, M. and Allen, D. (2006) The Use of Triangulation Methods in Qualitative Educational Research, *Journal of College Science Teaching*, **35** (4), 42-47.
- Olson, V. L. B. (1990). The Revising Processes of Sixth-Grade Writers With and Without Peer Feedback , *Journal of Educational Research*, **84** (1), 22-29.
- Onwuegbuzie, A. J. and Leech, N. L. (2007) Sampling Designs in Qualitative Research: Making the Sampling Process More Public, *The Qualitative Report*, **12** (2), 238-254.
- Orsmond, P., Merry, S. and Reiling, K. (2002). The Use of Exemplars and Formative Feedback when Using Student Derived Marking Criteria in Peer and Self-assessment, *Assessment and Evaluation in Higher Education*, **27** (4), 309-323.
- Patton, M. Q. (2002) *Qualitative Research and Evaluation Methods*, 3rd edition, Thousand Oaks: Sage.
- Pedder, D. and McIntyre, D. (2006) Pupil consultation: the importance of social capital, *Educational Review*, **58** (2), 145-157.
- Ponterotto, J. G. (2006). Brief Note on the Origins, Evolution, and Meaning of the Qualitative Research Concept "Thick Description", *The Qualitative Report*, **11** (3), 538-549.
- Powney, J. and Watts, M. (1987) *Interviewing in Educational Research*. London: Routledge and Kegan Paul.
- Pryor, J. & Lubisi, C. (2002) Reconceptualising educational assessment in South Africa—testing times for teachers, *International Journal for Educational Development*, **22** (6), 673–686.
- Robson, C. (2011) *Real World Research*, 3rd edition, Wiley.

- Rojas-Drummond, S. and Mercer, N. (2004) Scaffolding the development of effective collaboration and learning, *International Journal of Educational Research*, **39**, 99-111.
- Rojas-Drummond, S. and Zapata, M. P. (2004). Exploratory Talk, Argumentation and Reasoning in Mexican Primary School Children, *Language and Education*, **18** (6), 539-557.
- Sadler, R. (1989). Formative assessment and the design of instructional systems. *Instructional Science*, **18** (1), 119-144.
- Saldaña, J. (2013) *The Coding Manual for Qualitative Researchers*, 2nd edition, London: SAGE.
- Salomon, G. & Perkins, D. N. (1998). Individual and social aspects of learning. *Review of Research in Education*, **23**, 1-24.
- Schmitz, M. J. and Winskel, H. (2008) Towards effective partnerships in a collaborative problem-solving task, *British Journal of Educational Psychology*, **78**, 581-596.
- Scotland, J. (2012) Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms, *English Language Teaching*, **5** (9), 9-16.
- Scott, D. and Morrison, M. (2006) *Key Ideas in Educational Research*, London: Continuum.
- Scott, D. and Usher, R. (2002) *Understanding Educational Research*, London: Routledge.
- Scott, D. (2007): Resolving the quantitative–qualitative dilemma: a critical realist approach, *International Journal of Research and Method in Education*, **30** (1), 3-17.
- Sebba, J., Deakin Crick, R., Yu, G., Lawson, H., Harlen, W. (2008) Systematic review of research evidence of the impact on students in secondary schools of self and peer assessment. Report. In: Research Evidence in Education Library. London: EPPI-Centre, Social Science Research Unit, Institute of Education.
- Sfard, A. (1998) On Two Metaphors for Learning and the Dangers of Choosing Just One, *Educational Researcher*, **27** (2), 4-13.
- Sikes, P. (2006) On dodgy ground? Problematics and ethics in educational research, *International Journal of Research & Method in Education*, **29** (1), 105-117.
- Silverman, D. (2015) *Interpreting Qualitative Data*, 5th edition, London: SAGE
- Skoumios, M. (2009) The Effect of Sociocognitive Conflict on Students' Dialogic Argumentation about Floating and Sinking, *International Journal of Environmental & Science Education*, **4** (4), 381-399.
- Sluijsmans, D. M. A., Brand-Gruwel, S., van Merriënboer, J. J. G. (2002). Peer Assessment Training in Teacher Education: effects on performance and perceptions, *Assessment and Evaluation in Higher Education*, **27** (5), 443-454.
- Smeyers, P. (2001). Qualitative versus quantitative research design: A plea for paradigmatic tolerance in educational research, *Journal of Philosophy of Education*, **35** (3), 477-495.
- Smith, H, Cooper, A. and Lancaster, L. (2002) Improving the Quality of Undergraduate Peer Assessment: A Case for Student and Staff Development, *Innovations in Education and Teaching International*, **39** (1), 71-81.
- Stake, R. E. (1978) The Case Study Method in Social Inquiry, *Educational Researcher*, **7** (2), 5-8.
- Stenhouse, L. (1975) *An Introduction to Curriculum Research and Development*. London: Heinemann.
- Stiggins, R. (2005). From Formative Assessment to Assessment FOR Learning: A Path to Success in Standards-Based Schools, *Phi Delta Kappan*, **87** (4), 324-328.

- Strijbos, J. and Sluijsmans, D. (2010). Unravelling peer assessment: Methodological, functional, and conceptual developments, *Learning and Instruction*, **20** (4), 265-269.
- Susman, G. I. and Evered, R. D. (1978) An Assessment of the Scientific Merits of Action Research, *Administrative Science Quarterly*, **23** (4), 582-603.
- Suzuki, L. A., Ahluwalia, M. K., Arora, A. K. and Mattis, J. S. (2007) The Pond You Fish In Determines the Fish You Catch : Exploring Strategies for Qualitative Data Collection, *The Counseling Psychologist*, **35** (2), 295-327.
- Swaffield, S. (2011) Getting to the heart of authentic Assessment for Learning, *Assessment in Education: Principles, Policy & Practice*, **18** (4), 433-449.
- Swann, J. (2001). Recording and transcribing talk in educational settings. In: Candlin, Christopher and Mercer, Neil eds. *English Language Teaching in its Social Context*. London, UK: Routledge.
- Taber, K. (2007) *Classroom-based Research and Evidence-based Practice: A Guide for Teachers*, Sage Publications Ltd.
- Tanner, H. and Jones, S. (1994) Using Peer and Self-Assessment to Develop Modelling Skills with Students Aged 11 to 16: A Socio-Constructive View, *Educational Studies in Mathematics*, **27** (4), 413-431.
- Tanner, H. and Jones, S. (2002) Assessing children's mathematical thinking in practical modelling situations, *Teaching Mathematics and its Applications*, **21** (4), 145-159.
- Tickle, L. (2001) Opening windows, closing doors: ethical dilemmas in educational action research, *Journal of Philosophy of Education*, **35** (3), 345-60.
- Topping, K. (1998). Peer Assessment between students in colleges and universities, *Review of Educational Research*, **68** (3), 249-276.
- Topping, K. J. and Ehly, S. W. (1998). *Peer Assisted Learning*, Routledge.
- Topping, K. J. (2005) Trends in Peer Learning, *Educational Psychology*, **25** (6), 631-645.
- Topping, K. J. (2009). Peer Assessment, *Theory into Practice*, **48** (1), 20-27.
- Topping, K. J. (2010). Methodological quandaries in studying process and outcomes in peer assessment: Commentary. *Learning and Instruction*, **20** (4), 339-343.
- Torrance, H. (1993). Formative assessment: Some theoretical problems and empirical questions. *Cambridge Journal of Education*, **23** (3), 333-343.
- Tsui, A. B. M. and Ng, M. (2000). Do Secondary L2 Writers Benefit from Peer Comments? *Journal of Second Language Writing*, **9** (2), 147-170.
- Tudge, J., & Rogoff, B. (1989). Peer influences on cognitive development: Piagetian and Vygotskian perspectives. In M. Bernstein & J. Bruner (Eds.), *Interaction in human development* (pp. 17-40). Hillsdale, NJ: Erlbaum.
- Tunstall, P., & Gipps, C. (1996). Teacher feedback to young children in formative assessment: A typology. *British Educational Research Journal*, **22** (4), 389-404.
- UNICEF (1989). *United Nations Convention on the Rights of a Child*, UNICEF [online], http://www.unicef.org.uk/Documents/Publication_pdfs/UNCRC_PRESS200910web.pdf, accessed 7th August 2013.
- Van den Berg, I., Admiraal, W., and Pilot. A. (2006) Design principles and outcomes of peer assessment in higher education, *Studies in Higher Education*, **31** (3), 341-356.
- Van Gennip, N. A. E., Segers, M. S. R., Tillema, H. H. (2009). Peer assessment for learning from a social perspective: The influence of interpersonal variables and structural features, *Educational Research Review*, **4** (1), 41-54.

- Van Gennip, N. A. E., Segers, M. S. R, and Tillema, H. H. (2010). Peer assessment as a collaborative learning activity: The role of interpersonal variables and conceptions, *Learning and Instruction*, **20** (4), 280-290.
- Van Steendam, E., Rijlaarsdam, G., Sercu, L., & Van den Berg, H. (2010). The effect of instruction type and dyadic or individual emulation on the quality of higher-order peer feedback in EFL. *Learning and Instruction*, **20** (4), 316-327.
- Van Zundert, M. Sluijsmans, D. and van Merriënboer, J. (2010) Effective peer assessment processes: Research findings and future directions, *Learning and Instruction*, **20** (4), 270-279.
- Vygotsky, L. S. (1962). *Thought and language*. Cambridge, MA: MIT Press.
- Vygotsky, L. S. (1978). *Mind in Society: the development of higher psychological processes*, Cambridge, MA, Cambridge University Press.
- Walford, G. (2005) Research ethical guidelines and anonymity, *International Journal of Research & Method in Education*, **28** (1), 83-93.
- Wegerif, R., Perez, J., Rojas-Drummond, S., Mercer, N., and Velez, M. (2005) Thinking Together in the UK and Mexico: transfer of an educational innovation. *Journal of Classroom Interaction*, **40** (1), 40-48.
- Wen, M. L., Tsai, C. C. and Chang, C. Y. (2006). Attitudes towards peer assessment: a comparison of the perspectives of Pre-service and in-service teachers, *Innovations in Education and Teaching International*, **43** (1), 83-92.
- Wheeldon, J. and Faubert, J. (2009) Framing Experience: Concept Maps, Mind Maps, and Data Collection in Qualitative Research, *International Journal of Qualitative Methods*, **8** (3), 68-83.
- Wheeldon, J. (2011) Is a Picture Worth a Thousand Words? Using Mind Maps to Facilitate Participant Recall in Qualitative Research, *The Qualitative Report*, **16** (2), 509-522.
- Wheeldon, J. P and Ahlberg, M. K. (2011) *Visualising Social Science Research: Maps, Methods and Meaning*, Los Angeles, CA: Sage.
- Whitehead, J., and McNiff, J. (2006) *Action research: Living theory*. London: Sage.
- Wiliam, D. (2011). What is assessment for learning? *Studies in Educational Evaluation*, **37**, 3-14.
- Winter, R. (1982) Dilemma analysis: a contribution to methodology for action research, *Cambridge Journal of Education*, **12** (3), 161-174.
- Wu, C.-C., & Kao, H.-C. (2008) Streaming Videos in Peer Assessment to Support Training Pre-service Teachers. *Educational Technology & Society*, **11** (1), 45-55.
- Xiongyi, L.L. and Steckelberg, A. L. (2010). Assessor or assessee: How student learning improves by giving and receiving peer feedback, *British Journal of Educational Technology*, **41** (3), 525-536.
- Yarrow, F. and Topping, K. (2001). Collaborative writing: The effects of metacognitive prompting and structured peer interaction, *British Journal of Educational Psychology*, **71** (2), 261-282.
- Yin, R. K. (2009) *Case Study Research Design and Methods*, 4th edition, Thousand Oaks: Sage Publications.
- Yin, R. K. (2013). Validity and generalization in future case study evaluations, *Evaluation*, **19** (3), 321-332.
- Yu, F., Liu, Y. and Chan, T. (2005). A web-based learning system for question posing and peer assessment, *Innovations in Education and Teaching International*, **42** (4), 337-348.

Zeni, J. (1998): A guide to ethical issues and action research, *Educational Action Research*, **6** (1), 9-19.

Appendices

Appendix A: Example of an interview recorded with a year 3 child

Example of the interview with Helen, in year 3, around *Thinking Together*, ground rules and peer assessment.

Interview with a **lower achieving girl eligible for the pupil premium** around peer assessment in Year 3

TEACHER: So, interview four, okay, so Helen, can you tell me what you were doing in thinking together before the holiday?

HELEN: Well, we were like doing this and we had to like tick the words which you know how to spell and you have to like look for a dictionary to see like...and what they mean and stuff.
(description of activities)

TEACHER: Okay, did you do anything else? Do you remember doing anything else?

HELEN: Oh, we did this chart where...you had to say, like, if these words go in angry or sad or happy, these columns and if they went into...mine went in angry, then I'll put mine in angry, my word, which meant anger. **(description of activities)**

TEACHER: Okay and did you come up with any rules in your group you thought were important?

HELEN: Well, yeah. **Like, speak together nicely** and don't, like, and shout at people. Don't fight or anything like that. **(recall of one ground rule)**

TEACHER: Okay and what was happening in your group at the start (Overlapping Conversation)

HELEN: Well, Steven was the...well, he was a bit like [inaudible] and stuff. **He was like telling me off and doing things like when we were doing the chart, I thought it might go...this word might maybe go in our [inaudible] and he thought it goes in sad and stuff. Then he started having a go at me because I felt angry.** **(poor relationships prior to Thinking Together)**

TEACHER: Okay. And what happened over the week when you did thinking together? What happened in your group?

HELEN: **The next time we did it, we actually...like, we got a long a bit better and we learned to be like [inaudible] the ground rules and stuff.** **(better relationships evident during Thinking Together)**

TEACHER: Okay, can you tell me a bit more about the ground rules?

HELEN: It was like...when you'd be rude or something, you get a point off your...you get some time off your playtime. So there's one like...**watch the person who's talking, make sure you listen carefully to the person who is speaking and challenge politely. (recalling ground rules)**

TEACHER: Okay, brilliant. Do you remember at each other's work when you did that number work for me? When you had a number and you had to **find and look** at it, didn't you? And come up with the questions for that number. What happened when you first did that with Steven? So it was quite a long time ago, isn't it?

HELEN: It was good. **We just didn't really agree and I tried to like, get along to work with him. I'm trying to make us work together but he just couldn't get the hang of it, really. (Steven did not understand how to collaborate initially; Helen was aware of this)**

TEACHER: Okay, and what happened the next time you did that, say, in activity?

HELEN: **Because we did** the same activity. **We were sort of working together a bit more and he was helping me maybe a bit more. (more collaboration following Thinking Together)**

TEACHER: Okay, and what do you think might have helped you to work together better the second time?

HELEN: Well, **we learned because you told us that maybe get along a bit better.** Or [inaudible] go when we were doing **the thing with** James. And then **we probably just learned to do, like, to be kind and stuff to each other. (learning about social learning)**

TEACHER: So, you learned to be kind. Did you use any of the **ground rules** when you were talking to each other?

HELEN: **Yeah. We listened to the...somebody speaking.** We were sort of...because when we were doing it together, well, **Steven was saying this and I was saying that at the same time.** And then he...**when I said it first and he listened and he didn't speak when I was speaking and when he spoke, I didn't speak when he was speaking. (better listening skills developed)**

Appendix B: Examples of one of three class discussions in year 4 focusing on which ground rules children could use during peer assessment and how these might be useful

- Teacher: Okay. Right. Can you each remind each other about some of the ground rules from Thinking Together and can you talk to your partner for a minute, okay. Let's get going. (Children talking simultaneously). Right. Brilliant. Thank you Jenny. Okay, Jenny [inaudible] thank you Osmond. Okay. Fantastic. Right. Jaydon, can you remind me of a ground rule?
- Pupil: Make sure everyone gets a turn.
- Teacher: Fantastic. Thank you.
- Pupil: Share your ideas.
- Teacher: Brilliant. James?
- Pupil: Talk about relevant questions.
- Teacher: Relevant questions are very important, aren't they? Anything else Kira?
- Pupil: If someone is not listening, you could like ask them questions like "Why".
- Teacher: Brilliant. Okay. Fantastic. Anything else?
- Pupil: Listen to the person who is talking.
- Teacher: Thank you. Chris?
- Pupil: Challenge people.
- Teacher: Yeah, okay. Why it might be important to challenge people? Okay, Osmond?
- Pupil: You can't always agree on the same things (Overlapping Conversation)
- Teacher: That's right.
- Pupil: It is not [inaudible]
- Teacher: Good. Okay. Brilliant. What type of talk might we be using if we are disagreeing with people, in fact, challenging them and that sort of thing?
- Pupil: Exploratory talk.
- Teacher: Brilliant. Exploratory talk. Right. Fantastic. Now what I would like you to do, okay, so talk to your partner again about which of these ground rules you think might be important for when you are doing peer assessments, so when you're looking at somebody else's work, giving them some feedback on it. And also

when they're telling you about your work and what you've done, that perhaps is really good. And also, what else might they be telling you, not just what's good about it but anything else?

Pupil: What you have to improve on.

Teacher: Yeah, brilliant. What you have to improve on. So can you spend a minute telling each other which rules you think are important. (Children talking simultaneously) Okay. House point for Jenny, well done for stopping straightaway. House point for Osmond. Fantastic, right. Okay, I'm going to go around then. So, Violet, can you tell me one ground rule and why you think it might be important for peer assessment?

Pupil: Make sure that you have a read on that thing because if you don't agree, you might get into different kind of things and just make things worse.

Teacher: Okay. So how might it made things worse if you don't agree? Does everybody agree with that? Does everybody think that's...?

Pupil: Yeah.

Teacher: Right. Does anybody not agree with that? Remember it's okay to disagree. Why do you disagree with that?

Pupil: Because I think he hasn't, hadn't said the right thing. I think she meant to say something else.

Teacher: Okay. And what else do you think she might have meant to say? Okay, we'll perhaps come back to that in a moment. Anything else? Lucky, can you tell me something?

Pupil: Respect other people's ideas and [inaudible]

Teacher: Good. So why is it important to respect other people's ideas during peer assessment? Sally?

Pupil: Because they might not [inaudible] bring them down.

Teacher: Okay. Anything else? Yeah.

Pupil: It would be really hard if you couldn't see someone. You didn't know what to say to someone who's... to people what their work is good or not because their...because if it's like really small, you can't really like see it so it's hard to tell them what like...what it is. Yeah.

Teacher: So if you can't read it, it's difficult to sort of know what it says and tell them something about it. Okay. Let's just think about that. Why is it important to respect other people's work? Can you think of anything?

Pupil: Because if you don't respect, they might feel a bit like really not as clever as the other person because they're saying, like, that's a silly idea.

Teacher: That's right, isn't it? Okay.

Pupil: And you can knock their confidence.

Teacher: Brilliant. Okay. That's a really good idea, isn't it? Anything else. Any other ground rules that might be important? And come on, you can do this, let's have a go. Go on then Ellie, can you give me one?

Pupil: If some...um, let everybody have a turn to speak. Because if they don't, they feel left out and then...after then, after they feel left out, they don't want to, you know, make friends because they think are being [inaudible]

Teacher: Yeah. Okay. Good. Anything else, Kira?

Pupil: Um, you must listen to the person who's talking because if you don't, and they're saying the right thing, you'll probably write the wrong thing down.

Teacher: Okay. So you might give them the wrong comments. Okay, that's very good. Thank you for that. Alice, anything else?

Pupil: Give reasons for your ideas completely.

Teacher: Okay. Fantastic. I'm really glad you said that. Why might it be important to give reasons for your ideas?

Pupil: Because like...if you, um, like you say and you said, "That work was really good," you've got to give an idea because then they don't know what, the person who did the work, doesn't know what they've done to make it really that good.

Teacher: Fantastic. Okay. Also, what is it...what else is really important to give, if you've said it's really good. What else must you do as well?

Pupil: A challenge.

Teacher: You could challenge them, couldn't you? How could you challenge them if you thought something maybe about their work? Osmond can you think of anything?

Pupil: Ask them a couple of questions, like, what you think about your work?

Teacher: Brilliant. Okay. So get them to say what they think about it and what they've done that's well and that sort of thing. So anything else you've forgotten from this list? Anything else you need to include, Fred?

Pupil: Share your ideas because you might have a really good one.

Teacher: Okay. And how might that help the other person then when you're looking at

their work, to share your ideas?

Pupil: They can get... Someone might um....

Teacher: I think David said something as well, just to help out a little bit. What do you say, David?

Pupil: It could give them ideas.

Teacher: It gives them ideas, doesn't it?

Pupil: Yeah.

Teacher: Okay. Brilliant. Anything else that we might have forgotten about? Yeah?

Pupil: If someone isn't like not listening or paying attention after I asked them a question, if then ...if they had told you something, you could ask like why and to get them involved.

Teacher: Okay. Brilliant. Now I think we've covered most of the ground rules there, okay, and I think we've explained really well about how they might help during peer assessment.

Appendix C: Field notes recording (a) observations and (b) professional reflections on what was happening in *italics*

Year 4 class (2014)

6.1.14-10.1.14 – Context: Children engaged in five Thinking Together lessons to develop their use of exploratory talk.

Children came up with ground rules in their groups first and then we made a list of 7 ground rules which might be useful when working together [see photograph]. During these lessons, some children (mainly the most able) have also understood the concept of ‘exploratory talk’, e.g. asking questions and giving reasons. Children have been engaged throughout the lessons although one girl’s group changed as she found it difficult to collaborate with her peers. This might suggest that groups for TT need to be put together with great care. Some children expressed (on 6.1.14) that they enjoyed the chance to work with children they wouldn’t normally work with. One child in particular appeared to be pleased that he had managed to get on with his group members and that there hadn’t been any fall outs.

13.1.14 – Context: Additional *Thinking Together* lesson on how the ground rules could be used for peer assessment

Children could list the ground rules from last week but could not always explain why they would be useful during peer assessment. It was not clear whether they were just listing these rules or actually engaging in the task of considering which rules might be important for PA. Some, but not all, children could explain why the rules would be important. For example, EB said that it would be important to give reasons so the person knew what they had done right or wrong and why.

14.1.14 – Context – whole class discussion of how ground rules could be used in contexts of PA

Children recalled ground rules in a learning skills lesson on collaborative learning. They then suggested which rules might be important during PA and why. Today it appeared that children are more confident at suggesting why the rules are important. For instance, one child suggested that it would be important to give reasons so that their peer would know how their work was good or how it could be improved. Children also suggested that it might be important to challenge their peers with a question such as ‘Why did you do that?’ etc... With prompting from myself one child could also answer the question: ‘What kind of language might you be using during peer assessment?’ This more able child suggested that it might be ‘exploratory’ therefore making some links between PA the Thinking Together lessons last week.

Reflection – - I am going to record another discussion tomorrow using the digital voice recorders which will ask the children the same question: ‘How might the ground rules be important for peer assessment?’ I will then give the children time to reflect on this through partner talk before reporting back. This is because the whole class discussion today raised some important points which could be reinforced over the next few lessons and may make the children more confident at seeing the links between Thinking Together, collaborative learning and peer assessment. These links are also coming out in children’s mind maps, e.g. During PA you can work as a team.

15.1.14 – Context – whole class discussion of how ground rules could be used in contexts of PA

Children discussed ground rules from Thinking Together. They then engaged in partner talk about which ones might be useful for peer assessment and gave some reasons.

Some children could not answer confidently whereas others, including those working towards age related expectations, could. Nevertheless children appeared to be able to see links between ground rules, exploratory talk and peer assessment. It will now be interesting to observe the extent to which these rules are being used by children in contexts of PA.

16.1.14 – Context – children peer assessed one another's work in maths and literacy and identified which ground rules had been useful when doing this

It seems that the PA task has to be carefully designed in a way which gives children the opportunity to deepen their thinking and engage in exploratory talk. Otherwise it can become a summative assessment without any areas for development.

Reflection (17.1.14) – I need to reshape PA tasks so that I first ask children which ground rules might be useful. Then they read one another's work and peer assess it. Following this, they feed back and use which ground rules are relevant. Finally, they reflect on which ground rules they have used. This process was tricky for children on Friday as they appeared to become overloaded with all the things they had to do. It has been difficult to record children so they have done it instead.

20.1.14 – Context – children peer assessed Literacy work.

There was not enough time to complete the peer assessments in the lesson as the children were busy writing and the PA may have disrupted this process. In addition, the children would not have had enough work to actually peer assess. Therefore, the three pairs took the voice recorders to the school library at 2.00pm to record their peer assessments. Not all children understood this task except the pair working beyond age related expectations. Then I reshaped my explanation and the children in the other two pairs had another go at assessing one another's work. I was not present during the peer assessments in the library as I was teaching during this time. The librarian supervised the children.

*Reflection: It was interesting to note that there was little interaction between children when they were giving feedback to one another. They seemed to accept their role as assessor and assessee without challenging this. Perhaps this is because they are simply not used to being allowed to interact during PA and this may need to be modelled to them. Alternatively children may have been happy with their peer's comments and did not feel the need to challenge these. I am also not sure at this stage how useful the peer comments are as a tool for moving pupils' learning forwards. **I will follow this up with the children and try to examine why this might have been the case through informal interviewing.***

27.1.14 – Context – children peer assessed Literacy work

Children first recalled the ground rules from Thinking Together and today appeared to be confident at suggesting which ones might be useful for peer assessment.

Towards the end of the lesson, children peer assessed work and tried to use the ground rules. The children in pairs working at or towards age related expectations appeared to find this challenging. In the middle ability pair children needed to be reminded about success criteria. I am not yet sure whether these children actually have a good understanding of what peer assessment is and how to do it effectively. In the pair working towards age related expectations, one child simply read out the story another had written. This was not really peer

assessment at all. The girl also appeared to dispute something the boy had said. In addition, the child appeared to be editing work due to the discussion.

The most able pair appeared to have a more fruitful discussion. One child prompted the other to give reasons. Nevertheless, these same children can suggest ground rules which may be important to use during PA and give reasons why (as evidenced by three classroom discussions with prompting from myself). It seems that the children's experiences of peer assessment are limited.

Reflection: When the children are working in pairs, their conversation appears to be stilted. I am wondering whether the children have found it hard making the transition from working in triads during Thinking Together to working in pairs during peer assessment. Perhaps the children could try working in a mixed ability triad for peer assessment too? For instance, they could consider, as a group, the strengths and developmental points for each piece of work (working +, = and – age related expectations). The six children could be split into two triads for this. This would mean abandoning the idea of same ability pairs and moving to a whole new arrangement for PA based on the Thinking Together principles. How might the children feel about this?

29.1.14 – Context – discussing PA with children

When asked, some children felt that it might be better to work in triads because they could put all their ideas “together to make one big idea”. Other children indicated that they felt their conversation may have been stilted because they were nervous about the voice recorders being there. In one pair, they had overcome these nerves by placing the voice recorder under the “beanbag” so they forgot it was there.

Tomorrow I will give children a whole lesson for peer assessment in Literacy and then ask them to work in triads and evaluate the quality of one another's work. The children will be given success criteria for this to focus their discussion on relevant points. They will describe ‘what went well’ on one side and then ‘even better if’ on the other. This may need to be modelled to them beforehand.

30.1.14 – Context – working in threes

Mixed ability group consisting of children significantly exceeding, working towards and around age relates expectations for Literacy. Children at first were not engaging with success criteria. Children appeared to be passive at first listening to the story endings as they were read out. Then the more confident child referred to the success criteria. She referred to rhetorical questions and how the character was feeling. Other children were writing things down at this stage. Children indicated they were not sure about this new arrangement for peer assessment. For example, they stated “Do we swap books?” Children were still passive until they were asked what they thought. One child said that he thought his peer should “put a bit of speech in it”.

Year 3 class (2015)

Field notes / reflective notes

5.5.15 – Mathematical context: Children commenting on their peer's questions. The task was to explore which questions would arrive at an answer of 25. Children completed this task in their lunch hour so the classroom was less noisy than usual.

Three pairs of year three children attempted this task including:

- **1** - A higher achieving boy and girl
- **2** - A lower achieving girl and high achieving girl also eligible for the pupil premium (mixed ability pairing) who are friends within the class group
- **3** - A pair of middle-higher achieving girls who are good friends

Initially children were distracted by the presence of digital voice recorders. They kept holding them close to their mouths and appeared to be worried about what to say. I told the children to try to relax and forget they were there. I had to reinforce this several times due to the novelty of the recorders. Initially there was little interaction between peers. They both attempted the task separately and did not comment on one another's ideas. I consequently stopped the children to explain the task again. Conversation at this point appeared to be stilted.

In **pair 1**, the children's discussion was mathematically richer. Both seemed more confident about the purpose of the task and got into some debate about the mathematics involved. '75; I think that's right'. Both the children then came to the same conclusion about why it was right ($100 - 75 = 25$) and could reason why this was the case.

In **pair 2**, both girls were 'giggling' and one higher achieving girl confidently told the other less confident peer what to do. She also scaffolded the learning of her peer by pointing her in the correct direction and saying 'Try and do another sum. $21 + \dots = 25$ '. Her less confident partner was still unsure of number bonds to 25. The other girl then **held up 4 fingers** which enabled her to answer correctly. However, this may have inhibited deeper learning and independence as she was simply given the right answer. Interestingly, one girl was asking 'How do we know this is correct?' and this was encouraging the other child to explain her thinking, e.g. $32 - 75 = 25$. "It's wrong because that doesn't get you 25'. However, she couldn't explain why it was wrong. **Peer tutoring was taking place here to a degree. However, less confident girl was prompted to give some answers by her more confident partner (e.g. not being sure about $27 - 2 = 25$).**

Interestingly there was little interaction in **pair 3** as both these girls are normally quite reticent in class. They were quite unsure about what to actually do. Recording was deleted accidentally by the girls.

Reflection: good scaffolding in mixed ability pairs. Explanations could be mathematically clearer though. Children are critiquing ideas and engaging with these perhaps due to the open ended nature of the task. Does the task influence the quality of dialogue?

6.5.15 – Mathematical context: Children commenting on their peer’s questions. The task was to explore which questions would arrive at an answer of 25. Children completed this task in the afternoon session in a different classroom that wasn’t being used at the time. This ensured that the noise level did not affect the quality of the audio recordings.

Two pairs of year three children attempted this task including:

- **1** – A pair of higher achieving boys (one eligible for pupil premium who can become disengaged easily)
- **2** – A lower achieving girl and boy (eligible for pupil premium who also has social, emotional and behavioural difficulties and has been recently identified as being moderately dyslexic)

In pair 1, both children attempted the task and there was **some interaction** between the peers. However, one pupil simply agreed with the other saying “**Yeah**”. The other appeared to be more confident and drove the direction of discussions with little response from his peer who can become disengaged easily.

In pair 2, there was more interaction although it appeared to be more negative due to some of Steven’s tactless responses. Steven appeared to be trying to dominate discussions and when Helen spoke he criticised some of her ideas and strategies. At the same time, however, he also tried to show her why she was incorrect for certain examples. This may have actually encouraged Helen to learn something new.

Afterwards, I said that we would be learning more about working in groups. Steven said “he wouldn’t ever be able to do this” (or words to that effect).

*Reflection: Children’s characteristics (e.g. confident, shy, articulate and empathetic) seem to be shaping how they interact during the peer discussions. Their **prior attainment** does not necessarily influence the richness of discussion as shown by pair 2. Other characteristics seem to be more important. It will be interesting to give these children a similar task once they have had a chance to participate in the Thinking Together approach. Will this influence the kinds of talk they use and the quality and depth of discussions?*

12.5.15 – Children started *Thinking Together* lessons today. They worked in mixed ability groups of three and sorted different talk words into groups, e.g. words that showed loud, anger and questions and answers. Children worked well in groups except Steven and Helen’s group as arguments happened.

Reflection: Pairs for peer assessment need to be chosen carefully so children are able to get along with one another. Steven appears to have real issues when it comes to respecting other children particularly the girls.

20.5.15 – Children did a similar task to two weeks ago and were encouraged to use the ground rules. The greatest difference in talk came from the pair who had “fallen out” last time.

Observation of pairs and field notes

Steven and Helen

There appeared to be more cooperation and improved body language in this discussion particularly from Steven. Steven also felt that he had got better after working with his group. He admitted to “not being very kind to Helen” at the start of the week. There was also some evidence of this in the previous discussion amongst this pair.

20.5.15

Language such as “How about we both work them out together” followed by “Yeah” perhaps demonstrates greater collaboration following *Thinking Together*. Here Steven was helping more rather than dominating the conversation and was also trying to explain (albeit with some help from myself). Steven also whispered the answer to Helen (50) for $50+50=100$. Nevertheless, he did then go onto clearly explain that if you know $5+5=10$ then $50+50=100$. Thus, Steven helped Helen to make this link. Helen explained she felt more comfortable discussing things with her peer than teacher. Steven still felt it necessary to come to me to show me answers. This was fine but he now needs to use his peer more to check his work.

Phillip and Michael

It was necessary to intervene though to encourage children to comment on one another’s ideas. Perhaps the task needs refining as some children appeared to be overloaded by the demands placed upon them, e.g. having to come up with questions whilst commenting one another’s work.

Phillip, Michael, Lucy and Sophie

Other children found the presence of the voice recorders and myself quite distracting and this may have prevented natural conversation occurring between them.

Reflection on ground rules

After the discussions, I also asked Bella and Daisy what ground rules they’d used. Here they could both reflect on this and felt they’d given reasons, respected one another’s ideas, challenged these politely if they were wrong and listen and looked at each other. Thus, the children could make links between ground rules and PA. They were also reasoning and explaining why things were incorrect, e.g. using the conjunction ‘because’.

Some of the shy children still found it difficult to interact. There weren't any disagreements and ideas were accepted without challenge. This may have been because most of the questions were correct and relevant though so there was no need to critique. It might also have been due to some children perhaps being quieter and shy than the more outgoing and confident pupils.

Reflection: *Now encourage children to create a mind map (in mixed ability groups) to show which of the ground rules they used in their discussion. Can they give examples? How might it work in English? Which ground rules would be relevant?*

Possible interview questions

I'm now going to ask you some questions about *Thinking Together*. If you're not sure about a question then just ask.

1. What have you been doing in *Thinking Together*?
2. What used to happen before you took part in *Thinking Together*?
3. What ground rules have you used when talking to each other about your work?
4. Have you realised anything about your work from talking to each other?
5. Have you got anything else you'd like to say?

17.6.15

Reflections following interviews

*Some rich data gained from interviews but not all children were clear about giving an answer. It seems children have improved their ability to work together during peer assessment and apply some of the ground rules. They appeared to find it hard to reflect on how they had used the ground rules and their application to peer assessment. However, they could reflect on changes that had happened in the classroom and next steps. For example, children might explain their thinking more rather than 'telling' their partner the correct answer. The reasoning element of talk is perhaps weaker amongst lower achieving children and stronger for those children with better subject knowledge of maths. Some children (lower achieving and higher working with lower achieving) have been tempted to provide their peer with the correct answer which is inhibiting learning. **Greater explanations** are the next step which some children expressed as a developmental area (therefore **self assessing** and realising this was something they needed to develop!) Some children felt that they were so*

absorbed in the actual task of thinking of questions for 25 or 100 that they found it difficult to peer assess too.

8.7.15 – Follow up to assess dialogue between quieter peer and more confident peer (both higher achieving girls)

Today I took one member from the quieter pair where previously there had been little discussion between peers. I wanted to understand more about how pairing up this child with a more confident and articulate peer would influence the quality of dialogue during the peer discussions and assessments. Again the children were given a number (this time 150) and as before they had to generate questions which would lead to this answer.

The interactions seemed to be different from before. The previously quieter peer was far more vocal and engaged in discussion with her more confident peer. At times there were disagreements which lead to corrections being made. For example, peer A said ‘ $70 + 80$ is 150’. A few minutes later, she said ‘ $80 + 70$ is 150’ (or words to that effect). Her peer said that ‘you’ve done that one before’. This prompted her to say ‘No I didn’t I said $70 + 80$ ’.

The more confident and articulate girl also asked her peer ‘What’s the pattern’. The other peer was doing 300-150, 400-250, 500-350 etc... Thus, the girl had identified a question to encourage her partner to continue a number sequence. ‘That is a pattern’.

The girls also used team work to solve certain problems and appeared to have sound mathematical knowledge in order to do so. However, I did have to intervene at one point in order for the girls to work out what you take off 173 to make 150.

Reflections

The discussion was richer than before (for both girls) and this suggests that previous achievement is not the only indicator about whether or not peer discussion during peer assessment of this kind will be successful. Pairing up students based on their characteristics might also be an important

Appendix D: Parental consent letter

Dear parent/guardian,

I am writing to ask if you would allow your child to take part in a study into classroom peer assessment at [REDACTED] Primary School. The study will focus on the ways in which talk can be used during peer assessment by children to help them learn. I will carry out the study myself as part of a Doctor of Education degree at the University of Leicester which is being supervised by Professor David Pedder.

Peer assessment is used by children at [REDACTED] to enable them to assess the quality of another peer's work. This, in turn, helps them to become familiar with the things they need to include in their work to make it good. During this study, your child will be involved in the *Thinking Together* intervention. This teaches children the skills to be able to work in groups or pairs more effectively and introduces them to ways of using talk as a tool for learning. For example, children have to follow ground rules when carrying out discussions which might involve giving their opinions and reasons, supporting one another and listening carefully. I would like to understand more about how useful this intervention is for supporting children's learning during peer assessment too.

In order to gain a better understanding of this, I would like to interview your child to gain their perspective on peer assessment. These interviews will be recorded by digital voice recorders and transcribed. In addition, I would like them to create a mind map of their experiences of peer assessment which will also indicate the extent to which they feel the *Thinking Together* intervention has been useful for their learning during peer assessment. I will also be using examples of your child's work in the study and recording examples of talk and discussion that takes place. Similarly to the interviews, this talk will be transcribed. I will also observe your child whilst they are taking part in peer assessment and ask them some questions about this during the tasks that have been set. Consequently data relevant to your child will need to be used in this study.

I will securely store any data, such as mind maps and pupil work, in a folder which will be locked away in a secure filing cabinet. In addition, any data, such as transcripts recording pupils' talk, will be stored securely on my memory stick or computer which are both password protected. Individual files will also be password protected to ensure greater security of data. I will also ensure that findings remain anonymous by changing the names of pupils in my data. In a similar way, the confidentiality of pupils' identities will be protected through the use of pseudonyms. These pseudonyms will be used in any piece of work produced by your child thus meaning that their identity will remain confidential. You also have the right to withdraw your child from the study at any point should you wish to do so. If you choose to do this, then any data related to your child will not be used. In addition, as the parent/guardian of your child, you may request to see any relevant data should you wish to do so.

If you are happy to allow your child to participate in the study, please complete the permission slip below. In addition to this letter, I will also need to gain consent from your child so that they can take part in the study. I have attached a copy of this consent form with the letter. If you have any concerns or questions, please do not hesitate to contact me.

Many thanks for your continued support.

Mr S. Boon

class teacher and year 3 and 4 team leader



I would like / would not (please delete as appropriate) like my child to take part in this research focusing on classroom peer assessment.

Signed by

Name:

Relationship with child (e.g. mother/father/guardian):

.....

Appendix E: Letter to children

Peer Assessment

Dear **Child**,

I want to find out about some ways in which I might be able to improve the learning that happens during peer assessment in [REDACTED].

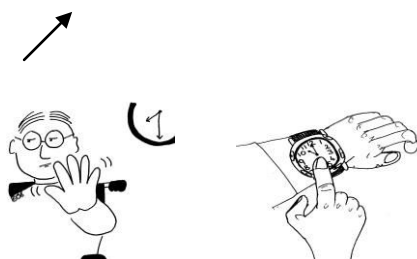
Blackcaps are going to take part in *Thinking Together* which will hopefully improve your group work skills.

I would like to know how useful you think *Thinking Together* has been when you are working with a partner during peer assessment.



I will need to ask you some questions about this and record your answers, observe you when you are working with a partner, use some of your written work, record some of your talk, and ask you to make a mind map about the learning you have done during peer assessment.

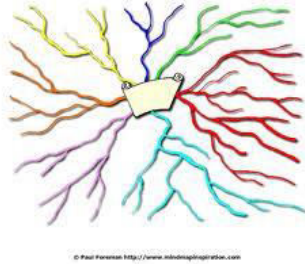
During the interview, you can ask me to stop asking these questions at any time. It should take about 20 minutes.



You can also decide whether or not you want to take part.



I would also like you to make a mind map which shows how useful you think *Thinking Together* has been for both you and your peer's learning during peer assessment.



Once I have collected all this data (information) from [REDACTED], I will be using it in my study to answer some questions about peer assessment. I will look at all the findings and think about some of the ways in which peer assessment affects children's learning in classes like yours. This might help to improve peer assessment in [REDACTED] so everyone learns more from it.

Please ask me any questions if you need to, particularly if you are worried about anything or want to find out more.

I would also appreciate it if you could sign the form below and return it to me.



Thank you for reading my letter and I hope you will enjoy the project!

Yours sincerely

Mr Boon I will be talking to Mr Boon and I understand that he will:

- Use some of my written work in his project
- Observe me whilst I am doing peer assessment and make some notes
- Record some of my talk during peer assessment tasks
- Be asking me some questions and recording my answers

Now you have read the sentences above, you need to decide if you would like to take part in this peer assessment project.

I have decided that I am going to take part in Mr Boon's peer assessment project which will look at how useful *Thinking Together* is for learning in my classroom during peer assessment:

Please put a circle round No or Yes.



No



Yes

Signed.....

Please print your name.....

Consent form/information sheet for children adapted from:
<http://www.lancaster.ac.uk/researchethics/1-4-samples.html>