"What if I get it wrong?" A psycho-social enquiry into SENCOs' experiences of learning, doing and teaching maths

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Abstract

This research applies a psycho-social approach to explore how SENCOs think about children with learning difficulties in mathematics, their feelings when performing mathematics tasks, and their own experiences of mathematics learning.

Four SENCOs from different schools were interviewed twice. These participants were interviewed using a Free Association Narrative Interviewing (FANI) method, and were asked to complete a mathematics task. The mathematics task provided an experiential element through which participants communicated more unconscious or 'unpolished' feelings.

This is a qualitative, exploratory piece of research. It comes from a psycho-social ontology, insofar as the participants are theorised in terms of psychoanalytic and societal concepts, and a psycho-social epistemology, in that knowledge of participants is gained through an interaction between a defended subject and researcher. As the researcher I understand people as psychologically defended against anxiety (Klein, 1952).

Interviews were audio recorded and transcribed and analysed using thematic analysis, while keeping in mind the 'whole' person. Thought was given to the researcher-participant relationship, to the narrative and to the 'unspoken' parts of the narrative which were interpreted

using psychoanalytic frameworks. A reflective research diary and psycho-social supervision were used in order to enhance the understanding of the subjective researcher experience of dynamics underlying the interview process.

A number of themes emerged from the data: Participants tended to attribute the causes of the children's learning difficulties to within child difficulties or to teaching or parenting; participants' negative feelings around mathematics were associated with rivalry, disempowerment and vulnerability, and shame at feeling unable to do something; the participants' experiences of learning mathematics as a child appeared to have a profound effect on participants and how they approached mathematics tasks, and uncontaining school experiences of mathematics left a lasting impression. Limitations of the research and implications for teachers, SENCOs and EPs are discussed.

Acknowledgements

To my Dad, whose sensitivity and thoughtfulness started me on this journey.

To James, whose patience and encouragement has been unrelenting.

To Charlotte, who provided wisdom, insight, and kind advice when I needed it most.

To my Mum, who long ago taught me that 2+3=5… and that knowing this was something to be proud of.

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Tables and Figures

Chapter 1. Introduction

> "Don't you know anything at all about numbers?"
>
> "Well, I don't think they're very important," snapped Milo, too embarrassed to admit the truth."
>
> (Juster, 1961, p177, quoted in Mazocco, 2007).

To introduce this research I begin by providing an overview of the context, issues and theory surrounding mathematics and Special Educational Needs (SEN). I explain the local context from which this research emerged, and I outline the reasons for undertaking this research in light of national priorities. I provide an overview of the current thinking around Special Educational Needs (SEN), mathematics learning and the emotional factors within this and I explain my world view in relation to perspectives on mathematics before making clear the position of this current research, which holds a psycho-social epistemology and ontology. I conclude this chapter by explaining the rationale for undertaking psycho-social research into mathematics learning.

1.1 Context and background

There are many perspectives and theoretical paradigms through which education professionals think about learning. The 'nature versus nurture' debate has been argued for millennia and is still a lively topic within

educational and psychological literature. Within Educational Psychology, how people think about children's learning forms the basis of much of the Educational Psychologists' (EP) work. How intelligence is conceptualised, for example, influences pedagogical approaches, and is particularly relevant to EPs, as a considerable proportion of their role involves assessment. How educational professionals think about learning is in important factor in how they think about learning difficulties. Similarly, how a child thinks about their own learning affects how they learn. Carol Dweck's (2006) work on Growth Mindsets discussed how mistakes and difficulties can be seen as learning opportunities rather than failure. Changing perspectives on how we see the learning experience can influence not only how we learn, but also how we see ourselves.

Youell (2006) discussed how the experience of learning always involves an element of anxiety. To learn, a person must first acknowledge that there is something that they do not know. This state of 'not-knowing' can be unnerving. Thinking around ones own 'not-knowing' is therefore often difficult and sensitive. Conversations that EPs have with children, their families, and professionals tend to revolve around barriers to children's learning, and need to be navigated in a sensitive and thoughtful way. How professionals talk to, talk about, and think about children with learning difficulties connects to how that child thinks about their own learning (Billington, 2006). When a child internalises what is thought and spoken about them by the people around them, they form an identity as a learner which has lifelong implications.

1.2 Background to this research

Although specific difficulties in literacy learning have been discussed at length in academic literature, difficulties with mathematics do not have such an extensive history. The 'Dyslexia Debate' (Elliot & Grigorenko, 2014) has been ongoing for decades, and although a definitive definition is still under question, the terminology of 'dyslexia' and what this encompasses has been widely accepted in non-academic circles. In contrast, specific difficulties in mathematics have been much less researched and discussed. As such, policy on learning difficulties in mathematics is still being shaped.

The idea for this research emerged from an experience I had shadowing a meeting as a new Trainee which concerned where the Local Education Authority stood on recognizing 'dyscalculia' as a separate need from mathematics related learning difficulties. Different professionals put forward their points of view based on existing literature. From this discussion it was clear that the literature could be used to support a number of different viewpoints. I was also struck by how professionals' own personal narratives informed their arguments. I wondered about the emotional factors that were driving the different professionals to argue for and against policy changes. This led me to think about how personal experiences of mathematics learning impacts professionals' perceptions of mathematics difficulties, and how they consider their identity as mathematicians and professionals. Although the people in this meeting were in professions who worked with children and teachers at a consultative level, I wondered about the implication for children when the adults they worked with daily had emotional connections with

mathematics that affected in a significant way how they thought of mathematics learning.

1.3 National Context

Since the introduction of the National Numeracy Strategy in 1999, mathematics in primary and secondary schools has been a national priority. Within an international forum, despite the UK spending more on education than the average in the participating countries, the UK was ranked 26th in mathematics of the 34 countries taking part in the 2012 Programme for International Student Assessment (PISA) of 15-year-olds (Department for Education, 2013). The qualitative information from this study revealed that pupils in the UK were generally positive about their experiences at school but were significantly less positive about learning mathematics than other subjects.

In terms of the adult population, a Department for Business, Innovation and Skills (DfBIS) Skills for Life Survey (2012) reported that 26% of adults surveyed had numeracy skills at or below the level of a nine year old (compared with 22% in 2003) and around 80% of adults had a level of numeracy below the equivalent of a C at GCSE. Gross, Hudson and Price (2009) produced a study which evaluated the cost of poor numeracy skills for the UK as a loss of £2.4 billion every year. As such, a lot of the current educational legislation and literature has focused on raising attainment for

mathematics at all stages of education. Particular emphasis has been placed on early identification and intervention for the lowest attainers.

The SEND Code of Practice (2014) stated key principles that needed to be upheld in order to support children with SEN and their families. The second of these was “the early identification of children and young people’s needs and early intervention to support them” (Department for Education, 2014, p19). The Code of Practice (2014) stated that schools should have a “clear approach to identifying and responding to SEN” (p79). The benefits of early identification are widely recognised to improve long-term outcomes for children. The purpose of identification of SEN is “to work out what action the school needs to take, not to fit a pupil into a category” (p97). Therefore identifying support needed for children who struggle in mathematics is a national priority.

1.4 Theories of Mathematics Learning Difficulties

Gersten, Clarke and Mazzocco (2007) argued that the history of learning difficulties in mathematics had been complicated due to the cultural, scientific, and political spheres of influence and the lack of communication between them. The historical context of mathematics difficulty being conceptualised as ‘dyscalculia’ goes back to 1908 (Lewandowsky & Stadelmann, 1908) when mathematics skills were first considered as “potentially separate from overall cognitive ability” (Gersten, Clarke & Mazzocco, 2007, p10). Particularly with

the recent advances in neuroscientific technology, the conceptualisation and causes of mathematics difficulties are still being developed.

Kosc (1970) defined dyscalculia in terms of a discrepancy model. This meant that a person with a diagnosis of dyscalculia needed to have relatively high Intelligence Quotient (IQ). This discrepancy model paralleled thinking about reading difficulties and dyslexia at the time (e.g Bateman, 1968). Although this has been challenged repeatedly (e.g Fletcher, Morris and Lyon, 2003) the discrepancy model continues to influence practice. Kosc (1970) also acknowledged the importance of good or bad teaching and how this impacted the acquisition of mathematics knowledge and skills and he coined the term “pseudo-dyscalculia” to name when mathematics difficulties arose from poor teaching. He noted that good mathematics instruction could help children with dyscalculia reach higher levels of mathematics attainment, and Gersten, Clarke and Mazzocco (2007, p15) wrote that “in this sense, his thinking parallels much of the contemporary thought on mathematics learning difficulties”. Kosc identified the importance of the learning experience: ‘pseudo-dyscalculia’ occurred when mathematics was badly taught, and students with ‘real dyscalculia’ improved with good teaching. “Response to Intervention” models, advocated by learning disability research (e.g Fuchs, Mock, Morgan and Young, 2003) were also an attempt to avoid children being misdiagnosed due to poor teaching.

Other research has emphasised the affective issues associated with poor mathematics performance. Anxiety and its connection with learning mathematics was first explored by Dreger and Aiken (1957). Mathematics anxiety is generally defined as “a negative emotional response in situations involving mathematical reasoning that is characterised by avoidance as well as feelings of stress and anxiety” (Suárez-Pellicioni, Núñez-Peña, & Colomé, 2015, p1). Research has shown that mathematics anxious people have lower attainment in mathematics (e.g Ashcroft & Krause, 2007; Maloney, Ansari & Fugelsang, 2011) and there are therefore indications of a link between environmental factors that cause anxiety, and poor performance in mathematics.

Other theories of mathematics learning difficulties have attributed different amounts to environmental or teaching factors. Pellegrino and Goldman (1987) and Geary (2004) highlighted underlying deficits in the central executive or working memory systems. More recently, the term dyscalculia has become a wider used terminology to describe specific mathematics learning difficulties although there has been little agreement between academics about definitions, causes or diagnostic criteria for dyscalculia. Butterworth, Varma, and Laurillard, (2011) believed dyscalculia came from a core deficit in being able to process quantities of number, and defined it as a severe disability in learning arithmetic. They created assessment tools to diagnose dyscalculia, however, they have been criticised for not stating whether difficulty in processing number was necessary or

sufficient for a diagnosis of dyscalculia and did not state a cut-off for diagnosis.

When the search term “dyscalculia” was entered into EbscoHOST in August 2015 (with the word “dyscalculia” as the subject (SU) and with limiters entered for dates (2005-2015) and peer reviewed articles) the database identified 152 articles. A variety of definitions were provided in the literature, and many of these used discrepancy criteria to enable specific research inclusion and exclusion criteria.

Szucs and Goswami’s (2013) overview of the research agreed that there was no consensus for the definition of dyscalculia. They provided their own definition as “persistently weak mathematical performance of developmental origin, relation to the weakness of some kind(s) of cognitive function(s) and/or representation(s): appearing when concurrent motivation to study mathematics and access to appropriate mathematics education is normal” (p33). They found the literature to show no agreement on the particular threshold for a dyscalculia diagnosis; no agreement on the kind of non-mathematical control variables; and no consensus on whether co-morbidity could occur. They highlighted a difficulty in diagnosis validity, noting problems in ruling out causes by environmental factors. Gillum's (2012) review of the literature also noted that there was no consensus on the definitions of dyscalculia, and he named the difficulty in stating a cut-off point between someone being considered to have ‘mathematics difficulties’ and someone having ‘dyscalculia’. Despite the problems with definitions

highlighted in the research, the DfES published a booklet on supporting pupils with dyscalculia (and dyslexia) in the National Numeracy Strategy (2001). This stated that:

"Dyscalculia is a condition that affects the ability to acquire mathematical skills. Dyscalculic learners may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers, and have problems learning number facts and procedures. Even if they produce a correct answer or use a correct method, they may do so mechanically and without confidence" (Department for Education and Skills, 2001, p2).

However, the Diagnostics and Statistics Manual (DSM 5) concluded that "the many definitions of dyslexia and dyscalculia meant those terms would not be useful as disorder names or in the diagnostic criteria" (American Psychological Association, 2013).

1.5 Socio-political perspectives on mathematics learning

De Frietas and Nolan (2008) took a "socio- political" perspective on mathematics education. They focussed less on the "situated" nature of mathematics learning, and more on the "power relations that structure learning experiences that dominate educational discourses" (2008, p1). They believed that development of research on power relations within mathematics education- with a focus on the ambiguities in mathematics learning, the political system and the asymmetries of power dynamics within mathematics classroom- was vital for development of research in mathematics education. Little existing research looks into mathematics learning with these ideas in

mind, although a small amount of literature has examined power dynamics and underlying emotions associated with mathematics learning and teaching which are discussed in the literature review. Notably, Bibby (2002) explored feelings of shame experienced by teachers who engaged in mathematics tasks. It is this sort of research, as opposed to large scale quantitative studies, that explore the “underbelly of mathematics education” (Nolan & de Frietas, 2008, p2).

1.6 Research Rationale

The aim of this research is to investigate how professionals think about children’s mathematics learning, and also their own, by examining the relationships and emotions involved in mathematics learning. I was interested in exploring mathematics learning from a perspective that considered the personal narratives of individuals. I wanted to know not only how people thought about mathematics learning in others, but how they thought about their own experience too. Furthermore, I was keen to explore these questions in terms of both the psychological, personal, and emotive, as well as the sociological, societal and political. Research from a psycho-social ontology looks at its subject from both a psychological and social perspective, and was therefore suited to this research. In terms of mathematics, this meant taking into account the cultural habits and expectations of the classroom and the wider politics which impact education systems and staff and student well-being. It also meant taking into account the internal world of learners and teachers in terms of what they brought to a situation from their own experiences which affected how they perceived the world. I was interested in

how the interaction between these internal and external factors affected how a dynamic was formed in the learning relationship.

Learning occurs within relationships, and I was keen to explore these relationships, particularly the dynamics between teachers and learners. I approached this research from a perspective where I acknowledged that nobody was objective, and every individual brings past experiences to a social situation that map onto a social context. Maclure (2003) stated that within educational research “neutrality and realism are not possible” (p80). In this research I acknowledged the researcher/participant dynamic as itself part of a subjective experience and I addressed where possible my own unconscious biases and defences, and how this influenced the dynamics of the interaction.

Chapter 2. Literature Review

The aims of the literature review were to:

- Explore the literature available before starting the research study;
- Describe previous research findings to enhance understanding and clarify the issues;
- Critically appraise relevant research;
- Justify the aims of this research study with respect to previous research.

Throughout this thesis I refer to myself in the first person, following the style of Hollway (Hollway & Jefferson, 2000) who acknowledged the researcher as a subjective presence within research.

2.1 Overview of issues under consideration in the literature review

I begin this literature review firstly by addressing literature around education professionals' views of special educational needs, mathematics learning, and then more specifically special educational needs in mathematics. I focus on the professionals with the most direct and consistent contact with young people- their teachers. I particularly focus on SENCOs as these teachers have specialist knowledge of the theoretical perspectives on SEN. Secondly, I review the available literature which looked at the experiences and narratives of mathematics learning. Finally, I review the literature which examined mathematics learning from a psycho-social or psychodynamic lens.

I begin by methodically searching through the literature and assessing literature's relevance against a set of inclusion and exclusion criteria. I summarise the purpose, conclusions, participants and methodology of the relevant literature and represented these in clear tables within this chapter. The literature deemed irrelevant and the criteria for their exclusion were represented in tables in the appendices. The literature is then discussed in detail. The literature around teacher's perceptions of mathematics learning is discussed under the following headings:

1. Research on how teachers attribute causes of mathematics learning difficulties.

2. Research on how teacher perceptions can change over time.

3. Research on teacher perceptions of mathematics learning across gender.

4. Research on teachers' perceptions of specific learning difficulties.

5. Research on cultural or religious factors affecting teacher perceptions of students' learning.

Literature on the experiences and narratives of mathematics learning are discussed as follows:

1. Research on dynamics and relationships within the mathematics classroom.

2. Research on teachers' mathematical identity.

3. Research on the emotional factors in mathematics learning.

2.2 Literature searches

Table 1. Inclusion and Exclusion Criteria for establishing relevant literature on teachers' views of learning needs in mathematics

Included	**Excluded**
Research studies.	Editorials, book reviews.
Literature that explored views of learning.	Literature that explored other issues, such as job role, wellbeing, management style etc.
Literature that explored teacher views of learning.	Literature that explored learning in specific situations such as evaluation of training, or teaching strategies.
Literature on teacher views.	Literature on student views.
Literature on teacher perceptions of mathematics learning.	Literature on teaching strategies in mathematics teaching, teacher content knowledge, or curriculum change.

2.2.1 Previous research on SENCOs' views of mathematics learning difficulties

I wanted to investigate what literature existed on teachers' and SENCOs' thinking about learning difficulties in mathematics. The role of

SENCO was created in 1994 so I searched literature from dates from 1994-present. Appendix Table 1 outlines the systematic searches for terms in the different databases. A literature search in psycINFO for search terms "SENCO" or "Special Educational Needs Coordinator" with limiters placed for peer reviewed publications between the years 1994 - 2016, produced 20 results, these results were considered against the inclusion and exclusion criteria outlined above and 2 of the articles were considered relevant. Appendix Table 2 outlines the articles and the reason for their inclusion or exclusion in the the literature review. A search in the database EbscoHOST for the same search terms revealed six additional research articles, one of these was considered relevant according to the inclusion/exclusion criteria. Appendix Table 2 outlines the reasons for the articles' inclusion or exclusion in the literature review. The three articles that are relevant to this study from the search term "SENCO" or "Special Educational Needs Coordinator" (Lindqvist, Nilholm, Wetso, & Almqvist, 2011; Paradice, 2001; Vardill & Calvert, 1996) are summarized in Table 2 on page 27 of this chapter, and discussed in more detail in the following paragraphs.

2.2.2 Previous research on SENCO and teachers' views of mathematics learning difficulties

A search on the EbscoHOST and Ethos databases using the search terms "SENCO"/"Special Educational Needs Coordinator" as well as the search term "mathematics" or "number skills" or "dyscalculia" or "mathematics" or "numeracy" did not produce any results. The search was therefore widened, and the search term "teacher" was used instead of

"SENCO". I wanted to find out what research had been done on teachers' views or perceptions of mathematics learning difficulties so I entered the search terms "teacher", "view" and "mathematics" into the databases EbscoHOST, psycINFO and Ethos, and a summary of the results can be found in the Appendix Table 3. These search terms produced 26 articles, and 4 were considered relevant against the inclusion and exclusion criteria specified in Table 1 (Bowers & Doerr, 2001; Chan & Wong, 2014; Kärkkäinen & Räty, 2010; Kul, 2012). An explanation of the inclusion or exclusion of these articles is provided in Appendix Table 4.

A search on the database psycINFO with the subject (SU) "teacher" and "perception" and "mathematics" for peer reviewed publications between 1994 and 2016 produced 190 results. This search was refined to include only articles that contained the words "teacher" in the title, and this produced 41 results. Of the 41 results, 10 were considered relevant to this research based on the inclusion/exclusion criteria (Angier & Povey, 1999; Bol & Berry, 2005; Dunn, 2003; Helwig, Anderson & Tindal, 2001; Peltenburg & van den Heuvel-Panhuizen, 2012; Polettini, 2000; Riegle-Crumb & Humphries, 2012; Robinson-Cimpian, Lubienski, Ganley, & Copur-Gencturk, 2014; Stake, 2002; Wickstrom, 2015) and a summary of this is provided in the Appendix Table 5.

All of the 17 articles that were considered relevant are summarised in Table 2, below, where the purpose, conclusions, participants and methodology of each study is outlined. A more detailed discussion of the studies is provided in section 2.3 of this literature review.

Table 2. Relevant literature on teacher and SENCO views and perceptions of mathematics learning

	Article	Purpose	Conclusions	Participants	Methodology
1	Angier, C., & Povey, H. (1999). One teacher and a class of school students: Their perception of the culture of their mathematics classroom and its construction. *Educational Review, 51(2),* 147-160.	This research looked into the culture of the mathematics classroom.	The comments from the students suggested that a reappraisal and renegotiation of what it means to be a teacher in the secondary mathematics classroom was necessary.	One teacher and a class of 13 yr old school students.	Longitudinal study.
2	Bol, L., & Berry, R. I. (2005). Secondary Mathematics Teachers' Perceptions of the Achievement Gap. *The High School Journal, 88(4),* 32-45.	This study surveyed the perceptions of secondary mathematics teachers on factors contributing to the achievement gap and ways to reduce this gap.	Participants were most likely to attribute the achievement gap to student characteristics, such as differences in motivational levels, work ethic, and family support.	379 teachers of mathematics.	Survey.

3	Bowers, J., & Doerr, H. M. (2001). An analysis of prospective teachers' dual roles in understanding the mathematics of change: Eliciting growth with technology. *Journal Of Mathematics Teacher Education*, *4*(2), 115-137.	This study analysed the interrelations between prospective and practicing teachers' learning of the mathematics of change and the development of their emerging understanding of effective mathematics teaching.	This paper demonstrated the intertwined development of subject matter, insights, and specific views of teaching.	26 pre- and in-service secondary mathematics teachers.	Experimental Data consisted of written work on assignments related to the computer activities, written reflections on their mathematics teaching sessions, and the instructors' daily teaching journals.
4	Chan, Y., & Wong, N. (2014). Worldviews, Religions, and Beliefs about Teaching and Learning: Perception of Mathematics Teachers with Different Religious Backgrounds. *Educational Studies In Mathematics*, *87*(3), 251-277.	This research unpicked the relationship between teachers' religions and their beliefs about mathematics teaching and learning.	There was a complex relationship between teachers' religious beliefs and their teaching beliefs, but both beliefs were aligned.	Three mathematics teachers from different religious backgrounds.	Semi-structured interviews.
5					

	Dunn, T. K. (2003). Challenging the Vestiges of Past Subjugation: Influences of Educational Reforms in Namibia on Teachers' Beliefs and Instructional Practices. *Radical Pedagogy, 5(2)*	This study examined the influences of a fundamental transformation of the Namibian educational system on mathematics teachers.	The findings showed that national educational reform efforts influenced the teachers' beliefs about mathematics, instructional practices, and perceptions of students. The teachers' beliefs and perceptions of students reflected their socio-cultural and socio-political orientations.	Seven secondary school teachers.	Narrative interviews, guided by Naturalistic Enquiry.
6	Kärkkäinen, R., & Räty, H. (2010). Parents' and teachers' views of the child's academic potential. *Educational Studies*, *36*(2), 229-232.	This research looked into how parents and their child's class-teachers rated their children's potential for improvement in mathematics and Finnish.	The results showed that there was a moderate correlation between the parents' and teachers' ratings. The parents rated their child's potential more optimistically than the teachers did.	97 Parents and teachers.	Rating scales.

7	Helwig, R., Anderson, L., & Tindal, G. (2001). Influence of elementary student gender on teachers' perceptions of mathematics achievement. The Journal Of Educational Research, 95(2), 93-102.	This research looked into relationship between student gender and teacher perceptions of their mathematics ability.	The research found that teachers did not consider student gender when rating the mathematics skill level of their students.	29 teachers.	Rating scales.
8	Lindqvist, G., Nilholm, C., Almqvist, L., & Wetso, G. (2011). Different agendas? The views of different occupational groups on special needs education. *European Journal Of Special Needs Education*, *26*(2), 143-157.	This paper investigated how different occupational groups explained why children have problems in school, how they believe schools should help these children and the role they believe that SENCOs should have in such work.	The occupational groups had different ideas concerning how the school should work with children in need of special support.	Preschool teachers, teacher assistants, SENCOs, special teachers, class teachers and subject teachers (N = 1297).	Questionnaires.

9	Kul, U. (2012). Turkish mathematics teachers' experiences with Geogebra activities: changes in beliefs. *Research In Mathematics Education*, *14*(3), 293-294.	This research studied the change in beliefs in Turkish mathematics teachers after a training course. The teachers held two kinds of beliefs including the child-centered view and the transmission view.	Participants were inclined to maintain or strengthen their beliefs throughout the training course in favour of the child-centred view.	6 mathematics teachers.	Pre- and post- course questionnaires.
10	Paradice, R. (2001). An investigation into the social construction of dyslexia. *Educational Psychology in Practice*, 17(3), 213-225.	This paper explored whether there were differences in the way parents, educational psychologists, and SENCOs understood the concept of dyslexia.	Results showed there were differences between the three groups but there were also areas of agreement.	8 educational psychologists, 7 parents of children labelled dyslexic, and 10 SENCOs.	Q-sort methodology.

11	Peltenburg, M., & van den Heuvel-Panhuizen, M. (2012). Teacher perceptions of the mathematical potential of students in special education in the Netherlands. *European Journal Of Special Needs Education, 27(3),* 391-407.	This research investigated perceptions of student potential in mathematics.	Most of the teachers were positive about the mathematical potential of their students. The teachers attributed unused potential to causes outside the student.	Primary school teachers in special education.	Online questionnaires.
12	Polettini, A. F. (2000). Mathematics teaching life histories in the study of teachers' perceptions of change. Teaching And Teacher Education, 16(7), 765-783.	This research investigated teachers' self-perceptions concerning their professional development and their perceptions of the kind of experiences or challenges that may have influenced that development.	Participants' thought, practice, and interest in their own development, including interest in their own learning of mathematics, seemed to be the most important internal aspects influencing change and development.	2 teachers.	2 case studies.

13	Robinson-Cimpian, J. P., Lubienski, S. T., Ganley, C. M., & Copur-Gencturk, Y. (2014). Teachers' perceptions of students' mathematics proficiency may exacerbate early gender gaps in achievement. Developmental Psychology, 50(4).	This study investigated teachers' perceptions of student mathematics ability across the genders. It then explored the extent to which the underrating of girls may explain the widening gender gap in mathematics in early elementary school.	Teachers rated boys' mathematics proficiency higher than that of girls when conditioning for behaviour, approaches to learning and as past and current test scores.	Using data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999.	Statistical analysis of longitunal data.
14	Riegle-Crumb, C., & Humphries, M. (2012). Exploring bias in math teachers' perceptions of students' ability by gender and race/ethnicity. Gender & Society, 26(2), 290-322.	This research explored whether gender stereotypes about mathematics ability shaped high school teachers' assessments of students.	The study found evidence of a consistent bias against white females, which suggested that teachers hold the belief that mathematics is easier for white males than it is for white females.	Data from the Education Longitudinal Study of 2002.	Statistical analysis of longitudinal data.

15	Stake, R. E. (2002). Teachers conceptualizing student achievement. Teachers And Teaching: Theory And Practice, 8(3), 303-312.	This research investigated recollections of conversations about teacher perceptions.	Teachers varied widely in their perceptions of student achievement, but tended to concentrate on student performance of tasks.	Secondary school teachers.	Narrative analysis.
16	Vardill, R., & Calvert, S. (2000). Gender imbalance in referrals to an educational psychology service. *Educational Psychology In Practice*, *16*(2), 213-223.	This paper explored why there was an imbalance in the numbers of boys and girls identified for referral to educational psycholgists.	Results showed an expectation that more boys than girls presented levels of difficulty sufficient to warrant referral to an educational psychologist.	21 primary school SENCOs and headteachers.	Analysis of data from two EPs' records of referral.
17	Wickstrom, M. H. (2015). Challenging a teacher's perceptions of mathematical smartness through reflections on students' thinking. *Equity & Excellence In Education, 48(4),* 589-605.	This research investigated how teacher conceptualised what it meant to be smart in mathematics.	As the teacher came to know her students at a personal level, she began to see that her perceptions changed.	One teacher.	Case study.

2.2.3 Previous research on SENCOs' and teachers' experience and narratives of mathematics learning

The literature outlined so far investigated what teachers' views and perceptions were about learning difficulties in mathematics, but did not investigate in depth *why* they held these opinions, or what their own experiences had been of mathematics learning. Literature on teachers' narratives of mathematics learning illuminated the experiences teachers had of mathematics learning themselves. The literature was considered against inclusion and exclusion criteria which is outlined in the table below.

Table 3. Inclusion and exclusion criteria for literature on SENCOs' and teachers' narratives of their own mathematics learning

Inclusion	**Exclusion**
Literature on teacher narratives.	Literature on teachers' content knowledge.
Literature on narratives of mathematics.	Literature on narratives of other times or situations.
Teacher/adult narratives.	Student/child narratives.

I carried out a search for literature on SENCOs' and teachers' narratives and experiences of mathematics. Appendix Table 6 provides an overview of the search terms, number of responses, and the relevant studies. Firstly, the search terms (SU) "mathematics" and "narrative" were entered

into psycINFO, which produced 28 results, of which five were relevant (Lipovec & Anolin, 2014; Siivonen, 2013; Moreau, Mendick & Epstein, 2010; Frost, 2010; Barnett, 1998) according to the inclusion/exclusion criteria which are outlined in Table 3 (above) and explained in more detail in Appendix Table 10. The search terms (SU) “mathematics”, “teacher” and “experience” produced 71 results of which two were relevant (Peterson & Williams, 2008; Cady, Meier & Lubinski, 2006) according to the inclusion/exclusion criteria, this is explained in more detail in Appendix Table 9. The search terms (SU) “mathematics”, “teacher” and “emotional” produced 18 results, of which three were relevant according to the inclusion/exclusion criteria (Cabellero, Blanco & Guerrero, 2011; Boylan, 2009; Bibby, 2002) which are outlined in Appendix Table 8. A search for “mathematics”, “teacher” and “emotion” produced six articles and one book (see Appendix Table 7). The book, “Becoming a mathematics teacher: identity and identifications” (Brown & McNamara, 2011), contained ideas that were discussed in the Discussion chapter of this thesis. The systematic search for previous research on SENCOs’ and teachers’ experience and narratives of mathematics learning therefore produced 10 articles that were deemed relevant to this study. These are summarised in Table 4, below, and are discussed in more detail in section 2.3.

Table 4. Relevant literature on teacher narratives and experiences of mathematics learning

	Article	Purpose	Conclusions	Participants	Methodology
1	Barnett, C. (1998). Mathematics teaching cases as a catalyst for informed strategic inquiry. Teaching And Teacher Education, 14(1), 81-93.	This research used teacher narratives about actual classroom experiences as stimuli for discussing mathematical, pedagogical, and philosophical concepts and issues.	This research found that case discussion process contributed to a climate conducive for motivating and informing strategic inquiry.	Elementary and middle school mathematics teachers.	Analysis of audio recordings of conversations and interviews over time.
2	Bibby, T. (2002). Shame: an emotional response to doing mathematics as an adult and a teacher. British Educational Research Journal, 28(5), 705-721.	This research explored the ways in which mathematics was known by primary school teachers.	The research suggested that absolutist conceptions of mathematics encourage feelings of shame.	Primary school teachers.	Interviews and experiential learning task.
3	Boylan, M. (2009). Engaging with issues of emotionality in mathematics teacher education for social justice. Journal Of Mathematics Teacher	This research investigated different experiences of learning mathematics. Participants took part in 'enactments' based on Breen (1991) and	The research explored the emotional aspects of teaching and the way in which mathematics classroom practices can be	35 prospective teachers.	Creative Action Method dramatic, interactive and experiential tools.

	Education, 12(6), 427-443.	reflected on the experience.	oppressive and alienating.		
4	Caballero, A., Blanco, L. J., & Guerrero, E. (2011). Problem solving and emotional education in initial primary teacher education. Eurasia Journal Of Mathematics, Science & Technology Education, 7(4), 281-292.	To identify, describe, and analyze the cognitive and affective dimensions that influence mathematics problem solving skills in initial primary teacher education.	The results confirm that affective factors have a major influence on participants in their mathematics teaching and learning and problem solving.	Prospective teachers.	Questionnaires.
5	Cady, J., Meier, S. L., & Lubinski, C. A. (2006). Developing mathematics teachers: The transition from preservice to experienced teacher. *The Journal of Educational Research*, *99*(5), 295-306.Heldref Publications.	This research documented the development of mathematics teachers as they make the transition from preservice to experienced teachers.	Participants' beliefs about the teaching and learning of mathematics, as well as their epistemological views, had changed.	12 preservice teachers.	Longitudinal mixed methods study. Surveys and interviews.
6	Frost, J. H. (2010). Looking through the lens of a teacher's life: The power of prototypical stories in	This research examined how teachers described influences on their instructional	This research found that teaching methods were influenced by priorities and	Secondary school teachers.	Narrative interviews.

	understanding teachers' instructional decisions in mathematics. Teaching And Teacher Education, 26(2), 225-233.	decisions in mathematics.	beliefs established earlier in life, as well as by current contexts.		
7	Lipovec, A., & Antolin, D. (2014). Slovenian pre-service teachers' prototype biography. Teaching In Higher Education, 19(2), 183-193.	This research explored teachers' school-time memories connected to mathematics education. In the second phase, the study 301 preservice teachers expressed their percentage identification with the prototype story.	The prototype showed three phases: (1) an idyllic phase in elementary education (2) teachers' lack of ethical and professional competence at secondary level, and (3) seeing teachers as strict, fear-evoking figures.	214 Slovenian pre-service Primary school teachers.	Narrative review of mathematical autobiographies.
8	Moreau, M., Mendick, H., & Epstein, D. (2010). Constructions of mathematicians in popular culture and learners' narratives: A study of mathematical and non-mathematical subjectivities.	This research explored constructions of mathematicians in popular culture and the ways learners made meanings from these.	The research found that discourses constructed mathematicians as white, heterosexual, middle-class men.	School and university students.	Mixed methods-questionnaires and focus groups.

	Cambridge Journal Of Education, 40(1), 25-38.				
9	Peterson, B. E., & Williams, S. R. (2008). Learning mathematics for teaching in the student teaching experience: Two contrasting cases. Journal Of Mathematics Teacher Education, 11(6), 459-478.	Explored the relationship between pairs of trainee teachers and their cooperating and the core themes that emerged from their conversations.	One pair focused on controlling student behaviour and the other pair focused on having students actively participating in the lesson and on mathematics from the students' point of view. These contrasting experiences suggested that student teaching can have a profound effect on prospective teachers' understanding of mathematics.	2 Pairs of teachers and trainee teachers.	Interviews and audio taped recordings of selected conversations, and a brief follow-up questionnaire from the two teachers.
10	Siivonen, P. (2013). 'A bad head for mathematics'? Constructions of educability and mathematics in adult students' narrative life	This focused on the social differences of educability constructed in adult graduates' narratives.	This found that mathematics was be constructed as a masculine prototype of intelligence, and being "good" at	Finnish general upper secondary school adult graduates.	Narrative interviews.

	histories. *Scandinavian Journal Of Educational Research, 57(5),* 507-525.		mathematics meant having intelligence and innate natural talent.		

2.3 Discussion of Literature

2.3.1 Literature on teacher views and perceptions of learning needs in mathematics.

2.3.1.1 Research on how teachers attribute causes of mathematics learning difficulties

The literature review produced little research on SENCOs' as a participant group, I have therefore broadened this discussion to relate to literature around teachers in general. Peltenberg and Heuvel-Panhuizen's (2012) research from the Netherlands investigated Special School teacher perceptions of their students' difficulties in mathematics through online questionnaires. They found that teachers attributed learning difficulties to causes external from the student themselves. This followed from previous research which showed that high expectations of teachers about their students' progress had a positive influence on how these students actually developed. The "expectancy effect" showed that teachers' ideas about students potential determined how teachers treated their students, which in turn affected how the children learned. The research showed that teacher expectations of student potential could contribute to better learning.

With findings that contrasted with the above research, Bol and Berry (2005) surveyed mainstream teachers in the United States and found these teachers attributed the achievement gap to student characteristics, including motivation and effort, although they also recognised the importance of family support. They found that teachers were more likely to attribute the

achievement gap to student characteristics if they came from a school with a higher percentage of white students, and to factors such as language ability or teaching if they came from a school with more minority groups. University staff were more likely than school staff to attribute the gap to poor teaching or curriculum than secondary teachers.

The teachers interviewed in the two studies above had different thoughts about the causes of low achievement in mathematics. The reasons behind the teacher's opinions could be due to their breadth of experience, for example, whether they had worked with students from a wider range of abilities and ethnicities, as alluded to in Bol and Berry's (2005) study. Teachers who had worked in mainstream (as in Bol & Berry, 2005) as opposed to special education (as in Peltenberg & Heuvel-Panhuizen, 2012) could have given teachers different insights into learning and the cultural or socio-political environments of the Netherlands and the USA may also have impacted these teachers' perspectives. Equally, the teachers' perspectives on learning could have come first, and determined the type of school (special/mainstream/University) that the teachers planned to work in. This research highlighted the individuality of teacher perceptions of mathematics learning, and the small amount of research which investigated this.

2.3.1.2 Research on teacher perceptions of mathematics teaching and learning, and how this can change over time

Peterson and Williams (2008) asked two pairs of mathematics teachers

and their trainees to record their conversations during mentoring sessions and also to take part in interviews over time. This research found that for one pair of teacher and trainee, most of their conversations were dominated by discussion around classroom management, not students' learning. The other pair's conversations revolved around student participation and the student point of view in learning. They found that teachers' beliefs about classroom management style were also reflected in their attitudes in the interviews and how the dynamics played out in conversations with each other, for example the teacher in the first pair who focused on behaviour management was more controlling in his conversations and less reflective in the interviews. The authors concluded that prospective teachers' experiences of teacher training can profoundly effect teachers' understanding of mathematics and teaching.

Much of the research on teachers' views of pupil learning named how teacher perceptions changed between two points in time. One individual case study of a teacher (Wickstrom, 2015) showed how complex a teacher's perception of their students' learning can be, that these perceptions can be inaccurate that, with experience a teacher's perceptions can develop. Kul (2012) also showed that teacher opinions about mathematics teaching and learning can be changed towards a more child centred view after intervention from a mathematics training. Kul (2012) based his research around a distinction between beliefs held by most mathematics teachers which fall either under a 'transmission view' (that teachers explain a concept and the student selects a method to solve problems) or a 'child centred view' (which expects and encourages children to make sense of problems though self discovery). This research evaluated teachers' views pre- and post- a training course which

consisted of computer based mathematics activities. However, the use of questionnaires limited the depth of the data analysed in the study, and the brevity of the article meant that it revealed only that the teachers' view changed over time, not in depth about what the teachers' values or attitudes actually were.

Cady, Meier and Lubinski (2006) surveyed 12 American preservice teachers and found their epistemic assumptions changed over time and with experience. At the first point of interviewing, the preservice teachers tended to believe that the truth was absolute, and held 'traditional' models of mathematics teaching and learning, in that they saw mathematics skills as measureable by examinations, and focussed on behaviour management and control as the key aspects of teaching. However, they found that once preservice teachers gained experience in classrooms they changed their views towards a conception of mathematics learning as being more uncertain or relative. The study found that teachers with an external locus of authority reverted to more traditional models of thinking about mathematics teaching once the training intervention was over and that if preservice teachers viewed knowledge as absolute, or did not listen to the voice of others, they found it difficult to evaluate students' mathematical thinking.

2.3.1.3 Research on teacher/SENCO perceptions of mathematics learning across the genders

Moreau, Mendick and Epstein (2010) drew on popular culture to conclude that mathematics in popular culture discourse was construed as a white, heterosexual, middle class male pursuit, and as 'other'. A series of 27 focus groups revealed that learners were aware of these stereotypes and saw them as clichéd, but in many ways the participants also maintained similar stereotypes. Within the education world, Vardill and Calvert (1996) demonstrated that there was a discrepancy between the number of boys and girls referred for EP intervention, which indicated that SENCOs were perceiving the learning needs of boys as requiring more specialist support than girls. The article quoted Bibby, Lamb, Leyden & Wood's (1996) paper that hypothesised that SENCOs were more likely to refer boys because their difficulties were more often accompanied by disruptive behaviour and therefore appeared greater. These results indicated that children's learning needs were treated differently depending on the perspective taken by the SENCO.

Helwig, Anderson and Tindal's (2001) research study used correlation analysis of rating scales from 29 teachers to conclude that teachers did not consider student gender when rating students' mathematical skill. However, larger scale and longitudinal studies showed that SENCOs' views of mathematics learning across the genders were affected by more than just mathematics assessment scores. Robinson-Cimpian, Lubienski, Ganley & Copur-Gencturk (2014) produced a piece of research in the US which investigated teachers' perceptions of students' mathematics ability and how

this affected early gender gaps in achievement. The researchers used data from the Early Childhood Longitudinal Study to demonstrate that teachers rated boys' mathematics proficiency higher than girls' once behaviour and approaches to learning were taken into account. Riegle-Crumb & Humphries (2012) analysed longitudinal data which also demonstrated gender bias against girls in teacher perceptions of mathematics ability. Teachers' perceptions of mathematics ability were influenced by variables such as the teachers' perceptions of students' effort and behaviour.

Siivonen (2013) interviewed Finnish adults in education about their mathematics experiences at school. This was a qualitative piece of in depth narrative life history research (Labov & Waletzky, 1997). The researcher stated that how people told narratives let the listener know how they placed themselves in terms of social categories. Siivonen (2013) asked twenty Finnish graduates of adult education about narratives of learning and how they constructed the "educability" of people from different social groups. Although the researchers did not ask specifically about mathematics, many "horror stories" of mathematics lessons emerged. The research found that mathematics was construed as a masculine prototype of intelligence, and that being good at mathematics was seen as equivalent to being intelligent and having natural talent. The narratives expressed adult students' worries about their ability and competence as learners. Siivonen (2013) concluded that learning mathematics related to "individual conceptions of ability in an intrusive way that has consequences far beyond ability and competence to study and learn the subject" (p522).

2.3.1.4 Research on perceptions of specific learning difficulties

The literature searches did not produce any studies which looked specifically at teachers' perceptions of dyscalculia. However, there was more literature available on dyslexia, the specific difficulty in literacy that dyscalculia has been often compared with. Lindqvist, Nilholm, Almqvist, & Wetso's (2011) large scale study indicated that the different professional groups differed about how schools should work with children who needed help.. Kärkkäinen and Räty (2001) showed that parents tended to have a more optimistic view of their child's learning than their teachers did, indicating that views of individual children's learning can differ between individuals. Stake (2002) recorded interviews with teachers and found that teacher perceptions of education and student achievement varied hugely, but that ultimately teachers focused on grades to indicate how they perceived student performance. This highlighted the reliance these teachers had on assessment as an indicator of achievement, rather than a more nuanced view of the other factors which contribute to children's learning. Paradice (2001) produced a small-scale qualitative study which looked into the different ways parents, educational psychologists and SENCOs understood dyslexia. Like dyscalculia, Paradice acknowledged that the word 'dyslexia' was used frequently but there was no agreed definition and therefore was no common understanding of the term. In her analysis, Paradice found that all participants agreed strongly with the statement that dyslexia existed. The responses about the causes of dyslexia were varied, but most respondents agreed that there was a difference between

a dyslexic and a poor reader. The results showed that “most of the participants believe that dyslexia and intelligence are somehow linked and are using a discrepancy definition” (Paradice, 2001, p224).

2.3.1.5 Research on cultural or religious factors affecting teacher perceptions of students’ learning

Research also indicated that teachers’ views on mathematics learning and teaching was linked with their attitudes to other areas of their lives, such as their mathematics content knowledge (Bowers & Doerr, 2001). Socio-political influences also affect teacher perceptions- Dunn (2003), for example, showed that education reform in Namibia affected teachers’ beliefs about mathematics.

A series of Cantonese studies explored a link between teachers’ worldviews, religious views and their thinking around mathematics teaching. Chan and Wong (2014) conducted semi-structured interviews with three mathematics teachers to unpick the connection between their religious views and their attitudes to mathematics learning and teaching. The authors found that religious beliefs influenced participants’ beliefs on mathematics teaching, although the authors were keen to stress the subtleties of both religious beliefs and views on mathematics learning. This research cited other Cantonese research that explored how teachers’ values might affect their students, such as Zhang and Wong’s (2014) study which showed that teacher’s world views

influenced how they approached mathematics learning and teaching, and Leu, Chan and Wong (2014) and Chan, Wong and Leu (2012) who had found that Chinese participants from a Christian faith saw mathematics as more precise and 'calculable' than from other major Chinese religions. In Chan and Wong's (2014) study, the Christian participant took the view that mathematics was either 'right or wrong'- an absolutist and infallible view – and this fitted with her worldview which rested on a similarly absolutist philosophy, whereas the Buddhist participant also saw mathematics as infallible, but as separate from human culture which was why, she said, she found it fun. This research provided rich information on teachers' perspectives of mathematics learning and how this connected with their worldviews and previous experiences. Its methodology of semi-structured interviews and in-depth analysis fitted its research aims appropriately and its conclusions provided a rich insight into teachers' thinking.

2.3.2 Literature on experiences and narratives of mathematics learning

2.3.2.1 Research on dynamics and relationships within the mathematics classroom

Angier and Povey (1999) examined the culture of a mathematics classroom by interviewing a teacher and her students over three years. This was a longitudinal and in depth study into the classroom dynamics of this teacher and her class from year 9 to year 11. The findings from interviews concluded that the mathematics classroom environment was a constraint to learning because of the unequal power dynamic that was present in the

classroom that was not present in other contexts, such as in the playground. Both teacher and pupils acknowledged that the other was much more “on their level” during break times. They found that the mathematics classroom did not take account of the social maturity of the students, and students struggled to form identities as learners as they also tackled social and personal lives. The researchers concluded that “the curriculum and the perspective on the nature of mathematics which it embodies are not separable from the nature of the relationships amongst classroom participants” (p222). The teacher in this research struggled against restrictive constraints made on her pedagogical approach by a curriculum that required students to follow text books. The teacher and her students (to a lesser extent) found text book learning created an environment which was closed off to creative thinking and where achieving a correct answer was the only goal. The teacher this research focused on aimed to overcome these constraints by acknowledging power dynamics inherent in the classroom and by teaching broader epistemological themes alongside mathematics, so that her students understood mathematics as a means to communicate, appreciate others’ opinions, and understand the world. This approach meant that her students’ relationships with mathematics was nuanced and reflective, they saw mathematics as a way that helped them understand their place in the world.

2.3.2.2 Research on teachers’ mathematical identity

Lipovec and Antolin’s (2013) Slovenian research explored preservice teachers’ mathematical identities. School time memories were seen as important in forming these identities and this followed from research that had

analysed school-time memories and divided these into five groups (Kaasila, 2000). In Lipovec and Antolin's (2013) study participants wrote down their mathematical autobiographies and from the 214 responses, a 'prototypical' story was created. In a second phase of the research nearly 70% of 301 further participants indentified with the prototype narrative. The prototypical mathematics narrative included "(1) an idyllic phase in elementary education, (2) teachers' lack of ethical and professional competence at secondary level, and (3) a major turning point in upper secondary school, including significantly lower grades and seeing teachers as strict, fear-evoking figures" (p183). This research provided important data on how these preservice teachers had experienced school, however the research stopped short of exploring why the participants might have experienced school in this way. The large sample size meant that the narrative responses were written down and collected by post rather than recorded verbally. The authors identified this as a criticism of their study as face to face interviews could perhaps have provided more detailed or spontaneous narrative.

2.3.2.3 Research on the emotional factors in teachers' mathematics learning

Caballero, Blanco and Guerrero's (2011) Spanish study evaluated the influence of emotional factors in mathematical problem solving. The researchers conducted 15 sessions with prospective primary school teachers and used questionnaires and focus groups to evaluate the cognitive and affective aspects of mathematical problem solving and to design a training programme which incorporated both these aspects. Previous research

(Schoenfeld, 1992; Mtetwa & Garofalo, 1989; Stodolsky, Stad & Glaesner, 1991) had summarised pupil views on mathematics, which tended to be that in mathematics there was only one correct answer, one way to solve problems and that mathematics was a solitary and mechanical activity with little application to the real world. These views were linked to the lack of feelings of self-efficacy in their own ability. Furthermore, the children's lack of self-efficacy had been linked to their primary school teachers' own lack of mathematics confidence. Cabellero et al's (2011) research considered mathematics from a model that integrated the cognitive with the emotional aspects of mathematics learning: "The basis of learning is not the amount of content learnt, but the degree of autonomy and the level of meaningfulness with which pupils learn" (p283). The researchers concluded that participants expressed traditional views of mathematics insofar as it was right or wrong and uncreative, and that the majority doubted their own ability and had low self-efficacy expectations. These views had a major influence on their learning and teaching.

Bibby's (2002) research also explored teachers' emotional responses to mathematics, and highlighted that "mathematics is often experienced as an intensely emotional subject" (p705). Her article focused on the shame felt in response to other people's criticisms and as an emotional response to doing mathematics. She argued against traditional views of mathematics as an unemotional subject (Paechter, 2001) and named previous research that outlined how teachers' emotional lives impacted their professional lives (Hargreaves & Tucker, 1991; Nias, 1996). Bibby highlighted the large body of research on emotional/affective issues in mathematics education, particularly

mathematics anxiety. However, she noted that the existing literature looked at manifestations of anxiety that reflected a surface level understanding of the difficulties and posited that “much will have been driven into the unconscious by defense strategies” (p706). Bibby discussed at length the complexity of the emotion ‘shame’, and questioned whether it was either necessary or sufficient for anxiety.

> “Finding positive correlations between anxiety and other affective responses such as confidence does not help us to advance either theoretical developments or practical applications [and] rather than examining emotional states such as anxiety, exploring shame as a theoretical construct helps to ‘take into account the complete mosaic of mathematical beliefs” (p707).

As part of the data gathering, Bibby invited her interviewees to complete a mathematics task. This involved ranking questions in order of difficulty then completing three of the questions. This experiential aspect of the interview allowed her to see aspects of the participants’ vulnerability that may not have emerged from the interview alone. Bibby’s research explored the feelings experienced by teachers and connected these with their previous experiences of school. She found that mathematics was a source of shame and discomfort. This method of interview with an experiential task appeared to be an effective way to gain such data and complemented the narrative interviewing. This paper was very influential in my research (see Methodology chapter).

Boylan (2009) examined the social relationships within mathematics learning and teaching, and stated that “social justice requires engagement with both ones own and others’ more uncomfortable emotions... these include emotions that arise in learners from the experience of learning mathematics such as fear, shame, anger [or] self-blame” (p429). Boylan (2009) argued that ‘emotional knowledge’ is an important part of teaching, and that emotional aspects of teaching involve aspects of the individual, relational and socio-political. Boylan wanted to challenge views in which emotions in mathematics education were separate from learning and in need of disciplining or controlling. He questioned perspectives that saw emotions as simply individual responses to mathematics or “as arising from the social interactions in a particular classroom” (p430).

> “Feelings such as frustration and boredom and the actions that can arise can be seen as a form of emotional resistance to the basic injustice of a decontextualised and disconnected mathematics curriculum” (p430).

The paper put forward the idea of teaching mathematics for social justice. The author posited that “part of the socio-political dimension is to know and understand the way in which mathematics is itself presented as non-emotional abstract practice (Walkerdine, 1988) and the relationship between this and gendered participation in mathematics (Paechter, 2001) and to find ways to disrupt this” (p431). Boylan (2009) used experiential scenarios to connect the issue of classroom relationships with emotionality and social justice. The dramatic enactments were termed ‘creative action methods’ and participants were put in the position of students as the researchers acted out teaching roles

with different teaching styles. Students were then invited to reflect on their experience. The different scenarios the participants took part in opened up a space for dialogue about the experience of mathematics learning and participants questioned their previously held beliefs on the nature of mathematics learning and classroom practice. This research highlighted the utility of experiential learning within research, and the complexity of both emotional and socio-political aspects and their impact on mathematics learning.

2.4 Relevant literature from a psychodynamic or psycho-social perspective

I investigated the existing literature which researched psychoanalytic perspectives of mathematics learning and learning difficulties. A search for subject (SU) terms “mathematics” and “psychodynamic” and “psychoanalytic” did not produce any relevant results (see Appendix Table 12). A search for the subject (SU) terms “psychodynamic” and “teaching” produced 45 results, and out of these, two were relevant to this research. These were the books “The learning relationship. Psychoanalytic thinking in education” (Youell, 2006) and the book “The very thought of education: Psychoanalysis and the impossible professions” (Britzman, 2009). These books provided interesting insight into the psychodynamic theory around mathematics learning and SEN, but they provided anecdotal accounts rather than any empirical study of teachers and how this was impacted, or explained, by psychoanalytic thinking. The frameworks outlined in these books are discussed in the Introduction and Discussion sections of this research thesis. I was interested to read about the

psychodynamic perspective on the experiences of mathematics learning, but this literature search highlighted the need for much more robust research in this area.

2.5 Conclusions

In this literature review I investigated literature on teacher's views of learning needs in mathematics which indicated that there was a range of views held by teachers. The literature indicated that teachers' perceptions of mathematics learning can be influenced by external factors, such as their experiences of teaching in special education or teaching students from a variety of backgrounds (Bol & Berry, 2005); spending time with individual students (Wickstrom, 2015); their experiences of mentors in teacher training (Peterson & Williams, 2008); or from attending training (Kul, 2012). However, there is also research to show that how teachers perceive mathematics learning is linked to their pre-existing beliefs or worldviews (Chan & Wong, 2014).

Pre-service and qualified teachers in many of the studies perceived mathematics as a solitary subject where there was only one correct answer, one way to solve problems and with little application to the real world. No literature was found on teachers' perceptions of dyscalculia, but studies around dyslexia indicated that SENCOs, parents and EPs had a variety of opinions and perceptions of these learners and there was a general lack of understanding from SENCOs. Some research indicated a subtle connection

between teachers' world views and their attitudes to mathematics learning and teaching. Research on mathematics learning and gender also indicated that mathematics ability was still being perceived as a prototypically masculine skill. Some studies indicated that teachers attributed learning difficulties to causes external from the student themselves, although in other research teachers attributed the achievement gap to student characteristics, including motivation, family support or how hard they worked. The differences between these findings could be attributed to a variety of causes, such as the range of cultural expectations in different countries, or the amount of teaching experience a teacher had. This highlighted the range of perceptions held by teachers and also how relatively sparse and inconclusive the existing data was.

I also explored the literature on experiences teachers had had of mathematics learning. Contrary to this traditional or absolutist view of mathematics, there was some literature that suggested that mathematics was experienced by learners as an intensely emotional subject, with focus put on feelings of shame, and lack of self-efficacy. Some longitudinal research on the dynamics of a mathematics classroom posited that there were assymetric power relationships which caused students to struggle to form identities as learners. There was a paucity of literature on mathematics from an emotional, psychodynamic or socio-political perspective, and it highlighted the need for more robust research in this area.

2.5.1 The current study

Given this literature, and my context as a researcher, the current study set out to explore education professionals' experiences and perceptions of mathematics learning. The literature highlighted the variety of views teachers hold about mathematics and mathematics learning. There was, however, very little literature on why teachers might take these perspectives. I wanted to find out more about why these views might be held.

The research that explored reasons behind teachers' perceptions approached this by thinking about underlying emotional experiences (Bibby, 2002; Caballero et al, 2011) and/or social factors (Boylan, 2009; Angier & Povey, 1999). I therefore wanted to further explore these links between a teacher's own experience of mathematics learning and their views of mathematics teaching. I was interested in seeing what internal (psychological) and external (social, cultural or political) factors affected participants' views of mathematics learning. Siivonen's (2013) research showed me how a narrative approach could provide in depth data of people's experiences. However, the role of interviewer/interiewee was not addressed and I felt that discussion of this dynamic, and an element of reflexivity from the interviewer would add another important dimension to the research. I was also influenced by Boylan (2009) and Bibby (2002) who combined interviews with an experiential element to explore their participants' experiences in more depth.

Therefore my research questions were as follows:

- How do participants think about children's difficulties in mathematics, and the children who struggle at mathematics?
- What are the participants' attitudes to mathematics tasks?
- What are the participants' perceptions of their own experiences of mathematics learning as a child?
- Why do the participants feel this way?

Chapter 3. Methodology

3.1. Introduction

This research aims to explore how participants think about young people with difficulties in mathematics, participants' attitudes to mathematics and how their perceptions relate to their own experiences of mathematics learning. In this chapter I explain the aims and exploratory purpose of my research, and discuss its psycho-social ontology ("how the person as subject of research is theorised"), epistemology ("how the status of the knowledge generation process is understood") and methodology ("how these together inform how the researcher goes about finding out") (Hollway, 2012, p2). I describe the Free Association Narrative Interviewing (FANI) method (Hollway & Jefferson, 2000) and the research design, which includes interviews with participants alongside a mathematics task. I then discuss the participants' recruitment and sample and the research procedure, including the data capture and the data analysis process and I consider potential ethical issues.

3.2. Aims

The research questions this study aimed to address were:

- How do participants think about children's difficulties in mathematics and the children who struggle at mathematics?
- What are participants' perceptions of their own experiences of mathematics learning as a child?

- How do participants experience doing mathematics tasks?

- Why do participants feel this way?

3.3. Purpose

I sought an understanding of SENCOs' perceptions of mathematics learning in the young people they work with, as well as their perceptions of their own experiences of mathematics, and attitudes and feelings about doing mathematics tasks. I interviewed four SENCOs twice, in each case using Free Association Narrative Interviewing and analysed these interviews based on a psycho-social ontology which took into account both conscious and unconscious themes that emerged. I completed a "research diary" as I undertook this research in order to help me understand the dynamics underlying the interview process.

After conducting a review of existing literature which investigated teachers' experiences of, and attitudes to, mathematics learning, I found that there was very little literature which explored this area, or which investigated this through a psychoanalytic lens. This was therefore an exploratory piece of research which aimed to look into SENCOs' narratives in order to better understand their thinking around working with young people who struggled with mathematics, and also their own attitudes to mathematics learning. Furthermore, I looked at the narratives SENCOs had about their own experiences when they were learning mathematics at school and the impact of this on their current

attitudes. I drew conclusions from the themes that emerged from the interviews.

3.4. Ontology and Epistemology

3.4.1 Ontology: Psycho-social

The ontology of a piece of research is defined as "how the person as a subject of research is theorised" (Hollway, 2002, p2). This research came from a psycho-social ontology. It was based on a stance which acknowledged that individuals have multiple perspectives on the world, and that participants would all have different interpretations of ideas and terminology (Hollway & Jefferson, 2000). A psycho-social ontology assumes that understanding and meaning are developed individually but in coordination with other human beings. People create a model of their social world and how it functions, and construct that reality through language (a social construct), but there are individual reasons, perhaps unconscious, for forming that meaning. Bibby (2011) wrote that:

> "We are all psycho-social beings. In everyday life as well as in much social science, there is a tendency to drift into thinking about things as either internal and individual or external, social events… this dichotomising is a form of splitting and misses the ways in which the internal and the external, the private and the public, the individual and the social are deeply mutually implicated" (p9).

A psycho-social ontology does not reduce a person to either individual (internal) or social (external) processes. Instead, a psycho-

social approach draws on psychoanalytic paradigms of subjectivity but it understands that this subjectivity is situated within social constructs. It avoids the binaries of internal/external, intersubjective/individuality, thinking/action and so on by considering people as 'relational', a third way which is based on Ogden's dialectic: "a struggle with the complexity of the dialectic of individuality and intersubjectivity" (Ogden, 2001, p20).

The psycho-social ontology was selected as the most appropriate and fitting way in which to frame this research. It was decided that the learning relationship could best be explained by a combination of, and interaction between, psychoanalytic and social phenomena. By the psychoanalytic aspects of learning I meant individual conscious and unconscious drives such as anger or fear, which are personal to everyone. These interactions occur within a social context, in learning, this involves the social constructs of education systems, schools, legislation, curricula, friendships, timetables, and so on. It therefore seemed to me to be the only ontological lens that was appropriate for a piece of research that investigated personal perspectives and attitudes to mathematics learning, particularly based on the literature that I had read which, for example, linked feelings of shame to mathematics learning. Shame, a feeling which, by its nature, is not necessarily overtly expressed, can emerge through ways other than the use of words. To analyse the data while being open to unspoken thoughts and feelings, it was necessary to listen to each participant's data set as a whole, and acknowledge tone of voice and other non-verbal cues. A psycho-social

methodology therefore fitted these research aims most appropriately.

3.4.1.1 The “psychoanalytic” in psycho-social

Hollway described a psycho-social approach as “an attempt to go beyond the dualism of psychology and sociology that has afflicted research into identity, using and adapting psychoanalytic ways of thinking to tap not only those aspects of identity accessible through discourses but also those residing in unthought modes- unconscious, preconscious and embodied” (2015, p18). The psychoanalytic aspect of the psycho-social ontology puts forward the idea that internal conflict is an inevitable part of experience, and therefore it considers people as psychologically defended against anxiety. This is a concept based on Klein’s (1997) notion that threats in people’s lives create anxiety, and this anxiety is defended against through unconscious processes which influence people’s actions. These processes are outlined below.

3.4.1.2 Defences against anxiety

Klein’s (1997, 2002) theory of the defended subject outlined the idea that in early infancy one is completely dependent on others and is therefore usually in a state of anxiety. A small baby has no concept of time and is therefore unable to anticipate the satisfaction of being fed when it is feeling angry or frustrated from hunger. A baby therefore feels the opposite and polarised feelings of “bad” when they are hungry and “good” when they are fed. As a baby grows and develops he or she is able to realise that their mother is a whole object in herself who is able

to create feelings of fulfilment as well as frustration. When the baby is in the initial state of either good or bad all-encompassing feelings, this is thought of as a “paranoid-schizoid” state of being. As they develop an understanding of the mother as an object of both good and bad feelings, this is referred to as a “depressive” state. As all people were once babies, all people have internalised both states of mind, the paranoid-schizoid and the depressive. For the most part, adults are able to think from a depressive state of mind, but in times of anxiety, individuals may switch into a paranoid-schizoid state where relational objects are considered catastrophically bad or entirely good. The depressive position is a state of mind in which a person is able to acknowledge good and bad in the same object.

In schools, the feelings experienced in ‘not-knowing’ can be unbearable for some children, and a common defence is that of omnipotence. A child can maintain a sense of omnipotence if they never try the work, and may make excuses or act out in order that they never take that risk of experiencing not knowing something. These children “cannot learn until they have had sufficient containment to take the risk of letting go of the omnipotence, to bear not knowing, and to allow knowledge to exist in another (the teacher)” (Youell, 2006, p30).

3.4.1.3 Splitting and Projection

The concept of splitting originated from Freud (1964) and was

developed by Klein (1997). Klein described how people and objects were often attributed unrealistically good and bad characteristics by others. As a defence against mental pain, people develop mechanisms to ensure they are protected from negative feelings. Splitting occurs when people unconsciously “split” off parts of themselves they consider to be bad, and “project” these instead to someone or something else.

“This splitting of objects into good and bad is the basis for what Klein terms the paranoid-schizoid position; a position to which we may all resort in the face of self-threatening occurrences because it permits us to believe in a good object, on which we can rely, uncontaminated by bad threats which have been split off and located elsewhere” (Hollway & Jefferson, 2000, p20).

In schools, for example, a teacher may accuse management of being incompetent at a time of stress as a defence against their own feelings of incompetence. A child may project their own insecurities around failure into a classmate by accusing them of being stupid.

3.4.1.4 Containment

Bion (1962) formed a model of learning based on the mother/caregiver and baby. A caregiver “contains” the anxieties of the baby by hearing their anxiety, acknowledging it, and feeding the feeling back to them in a manageable and processed way.

> “It is possible for the mother unconsciously to be in touch with the baby’s evacuations or communications of pain, and of his

> expressions of pleasure, to receive them, to be able to engage with and savour them if calm and loving, or to modulate them if distressed and hating, and to had them back to him in recognizable and now tolerable form" (Waddell, 2002, p34).

In this model, the mother becomes the "container" and the baby's emotions are "contained" (Bion, 1962). This is how a baby comes to know and understand the different parts of themselves and their relationships to others. When babies experience an adult containing their anxieties, they experience being thought about. When this is done consistently, the baby internalises this feeling, and is able to draw on the memory of this feeling. The baby is less dependent on the actual physical and mental presence of the caregiver and this internalised memory stays with them into later life.

When containment does not occur, and a baby's feelings of anxiety are not accepted by the mother, the infant's feelings are amplified. "If the projection is not accepted by the mother the infant feels that its feeling that it is dying is stripped of such meaning as it has. It therefore reintrojects, not a fear of dying made tolerable, but a nameless dread" (Bion, 1962, p116).

Containment plays a necessary part in the learning experience. "There is, right from the beginning of life, a complicated intermingling of

individual nature with external experience. As a child grows older, it will be this sense of being accompanied in the task of learning that helps the child" (Youell, 2006, p16). Lack of containment in early childhood can make it hard for a child to be able to learn. "Children who have experienced really inadequate containment do not introject parental figures interested in them and their development." (Youell, 2006, p17). Children can grow up, in this case, overcome by feelings that they are unable to process without a lot of help, and the world becomes a frightening place. To protect themselves, children put up defensive psychological structures against the anxiety, but these structures can often also act as a barrier to learning.

3.4.1.6 The "social" in psycho-social

A psycho-social ontology encompasses the notion that the social, historic and cultural backgrounds of a participant are present in how they feel, act, and make meaning of the world. Conscious processes are influenced by social norms, and "material and ideological institutions such as the state, education, the family and work" (Walkerdine, Lucey & Melody, 2001, p84). My research looked at mathematics learning through a psycho-social perspective, exploring teachers' personal and professional lives with an understanding of complex socio-political and cultural structures of the education system. The research process took into account the extent participants' beliefs were explained by their "shared social circumstances" (Hollway & Jefferson, 2000, p12), as opposed to something unique to them as individuals. The social aspect of

psycho-social research emphasises that social and societal parts of a person are inextricably linked to the psychoanalytic.

3.4.2 Epistemology: Psycho-social

The epistemology of a piece of research is defined as “the way in which knowledge can be gained and communicated” (Scott & Usher, 1996). This research questioned participants’ attitudes towards working with children and towards mathematics itself. I therefore looked at participants’ relationship to objects and concepts in their world. “When researchers focus on participants’ relation to objects in their worlds, the researcher’s relation to that participant in their world is the means through which meaning is made of their experience” (Hollway, 2015, p30). A psycho-social epistemology therefore acknowledges the researcher as part of a dynamic relationship with the participant, that can impact and be impacted by the participant.

> “A psycho-social perspective depends on analysing participants’ relation to aspects of their setting (a relation infused with biography and changed through the workings of imagination) and reflecting on our - the researchers’- relation to our encounter with them” (Hollway, 2015, p30).

A psycho-social epistemology and methodology uses the researcher’s “subjectivity as an instrument of knowing” (Hunt, 1989; quoted in Hollway, 2015, p31). It is important that the researcher is reflective during this process in order to avoid being wholly emotion-led and subjective with insubstantiated evidence. As Hollway explained, “reflection in the psychoanalytic sense is not

just another word for cognitive activity; it requires keeping an open mind and, as Bion's theory of thinking explains, is a supremely emotional process" (Hollway, 2015, p31). A psycho-social epistemology claims that interview data is never completely objective or free from the researcher's world view, class or cultural position, which is why reflexivity is of such importance. "Without examining ourselves we run the risk of letting our unelucidated prejudices dominate our research" (Shaw, 2010, p242).

Bion (1970) differentiated between different types of learning. Learning factual knowledge, and also learning about the process and relationships around that knowledge. A child may learn 2+3=5, but they may also learn that knowing the answer to this is something to be proud of. While other epistemological approaches might be looking to acquire information and gain knowledge, the psychoanalytic epistemology takes a stance where the researcher wants to "know" in the latter, deeper sense.

3.4.2.1 Defended participants

A defended participant will "invest in discourses when these offer positions which provide protection against anxiety and therefore supports to identity" (Hollway & Jefferson, 2000, p23). At times of anxiety, the mind can unconsciously create defences. A rational approach relies on an ability to acknowledge both good and bad characteristics in objects of the external world, without this being compromised by defence mechanisms such as splitting, projection or other unconscious defences.

3.4.2.2 “Defended subject” and “defended researcher”

A psycho-social epistemology not only construes the defended subject as someone who guards against feelings of anxiety through psychological defences, but also acknowledges the defended researcher. Hollway and Jefferson wrote:

> “In line with our theoretical starting-point, we intend to construe both researcher and researched as anxious, defended subjects, whose mental boundaries are porous where unconscious material is concerned. This means that both will be subject to projections and introjections of ideas and feelings coming from the other person” (Hollway & Jefferson, 2000, p45).

The psycho-social methodology understands that impressions a researcher has of a participant, and vice-versa, are not exclusively made from what actually happens in the interview, but also from internal phantasies and their own histories. The dynamics of the interview, and the reasons behind what we say and do, can be accessed through our feelings but not necessarily our conscious awareness. The Free Associative Narrative Interview (FANI) method is based on an understanding that the researcher themselves is not an objective person without history or defenses of their own, instead they too are subject to unconscious processes which affect how they act and react during the process of the interviewing and analysis. “As a researcher, I am no more, no different from the subjects of my research” (Walkerdine, 1997, p73; quoted

in Hollway & Jefferson, 2000, p45). Therefore in the current study I used a research diary both to record details and also to reflect on the emotional impact of the interview encounter, how it left me feeling and what this might have added to my understanding of the interview and participant. I discussed all stages of the research process in psycho-social supervision, including my experiences of the interview and a research diaries.

3.4.2.3 Transference and countertransference

Transference is a phenomenon first named by Freud when his patients "brought their own emotional histories with them into the consulting room" (Youell, 2006, p31). The patients were treating him as if he were someone else in their life, someone that fitted with their own internal world view. Youell (2006) noticed that this phenomenon can be seen clearly in young children moving from their primary caregiver to a new adult, and teachers are often the object of parent-figure transference.

Countertransference is the way in which a person thinks about what may have been projected into them. This involves paying attention to how one is feeling and thinking about whether this is an unconscious communication from the other person. It requires a person knowing himself or herself well enough to be able to recognise if a feeling is their own.

3.5 Method

The method of a piece of research includes the research design, details on participant recruitment and sample size, the procedure of how the research was carried out, and how data was captured and analysed.

3.5.1 Methodology and Design

This research used a qualitative methodology. The main aim of qualitative methodology is to get an understanding of participants' experiences. Robson (2011) wrote that "human consciousness and language, the interactions between people in social situations, the fact that both researcher and researched are human… [require] a radically different approach to research than the traditional quantitative approach" (p17). A qualitative approach was appropriate in this case because of the exploratory nature of the research questions, and as a consequence of the ontology and epistemology. There was very little research in this field and therefore a qualitative methodology was important in order to gain an in depth understanding of the participants, and not be held back by the structure of a hypothesis.

This research used a FANI method "which can elicit from participants' free associations alongside more consciously crafted accounts" (Hollway, 2015, p19). A number of alternative qualitative methodologies could have been used in this research to illicit and analyse participants' narratives. For example, Interpretative Phenomenological Analysis (IPA) (Smith, Larkin & Flowers, 2009) is a well documented methodology which focuses on understanding how

people view themselves and the world around them. Because in IPA the researcher is considered inseparable from the research phenomenon, IPA entails a large degree of reflexivity which would be appropriate for this study. However, IPA tends to look at phenomena in detailed parts, without reference to the participant as a whole person. I chose to use FANI because of the methodology's reference to the participant as a whole person, their history and how their comments in their narrative relate to this. Another appropriate methodology could have been another narrative method such as narrative analysis (Cresswell, 2007). I chose to use FANI and the psycho-social ontology because unlike other qualitative research methodologies, it takes account of the unconscious within their design. FANI methodology was developed because it challenged the assumption that interviewees were sufficiently transparent to themselves to fully explain their intentions or motivations using other methodologies. In this research, SENCOs may have found it easier to discuss their experiences working with children who struggle with mathematics than their own experiences, as it was more recent and coming from a professional capacity. Narratives around their own personal experiences of doing mathematics may have been less apparent and perhaps more defended against. This was due to feelings that may have been defended against such as embarrassment, inadequacy or anxiety. By following the participant's narrative closely, the FANI methodology was an appropriate way through which to capture this. FANI requires the interviewer to stick as closely as possible to the participant's narrative, with the aim of eliciting complete and in depth narratives, which could risk being stilted by structured interview questions. By taking into account the unspoken communication such

as countertransference, FANI methodology can enable the researcher to reflect on the feelings and dynamics which exist within the room but cannot necessarily be captured in words. Feelings of shame, for example, might be communicated through body language, silences, and so on, and these are nonverbal, and often unconscious, ways of communicating difficult feelings. The FANI method attests that one way of noticing someone else's feelings is through the interviewer being reflexive and noticing their own.

Within the first interview of this study, participants were also asked to complete a series of mathematics tasks. This was not in keeping with FANI as it directed the participant towards a certain task (the mathematics task) rather than following their narrative. The purpose of this mathematics task was to introduce an experiential element to the interview. This was in order to prompt the participants about their learning experience in more depth, and to help me as researcher to notice their emotions, the strategies they used, and the dynamics between myself and the participant. The mathematics task was also used to prompt discussion of feelings and narratives around mathematics.

Experiential elements to research on mathematics learning experiences has been used in previous research such as Boylan's (2009) study as discussed in the Literature Review chapter of this thesis. Combining FANI with another method of data collection has a precedent with Hollway's work in "Knowing Mothers" (2015) in which Hollway collected data using infant observation which helped her to understand the mother/baby relationships of the participants. Although the FANI method aims to elicit narratives of experience close to those of true experience, the method relies on language, which is under

conscious control. This means that when asked about narratives of their experiences when learning mathematics a participant could provide a controlled, rational answer. This research aimed to delve deeper into the experiences of doing mathematics, where participants were enabled to get in touch with feelings that were defended against, and it was decided that the best way to access these unpolished experiences was to ask participants to complete a mathematics task *during* the interview. Like Hollway's use of infant observation in "Knowing Mothers" (2015), the purpose of the participant completing a mathematics task was to "enable us to see identities that are less the product of conscious, intentional production through narrative, and more sensitive to affect, to unconscious intersubjectivity and to embodied aspects of identity" (Hollway, 2015, p334).

3.5.2 Participants

This research included a sample of four Special Educational Needs Co-ordinators (SENCOs) who were interviewed twice each, providing eight interviews as data for analysis. SENCOs were chosen as participants because of the unique role that SENCOs play in the area of special needs. SENCOs are teachers who have a specialism in special educational needs (SEN), and the position of SENCO tends to be a managerial/senior leadership position within a school, with the role being obtained through an additional qualification once a teacher has had acquired some years of teaching experience. SENCOs are in a position where they have experience of teaching children from a range of abilities and will have particular experience working with children with special educational needs (SEN). In addition to this, SENCOs

have completed a qualification in SEN and will also have an understanding of the theoretical aspects of SEN and how these are applied in the classroom. They are also in a position where they have frequent contact with the families of young people, as well as the young people in the classroom, and therefore not only have an understanding of the family systemic aspects of learning, but also have an opportunity to affect change in both the school and homes of children with SEN. It was therefore decided that SENCOs would be targeted as a sample for this research.

Four participants were interviewed twice (eight interviews in total). The time between first and second interviews ranged between two and eight weeks. Participants were interviewed twice in order to give them an opportunity in the second interview to respond to their experiences of the first, to comment on their experiences of completing a mathematics task, and to gain a perspective of their thinking over time. The number of participants was therefore influenced by both pragmatic and theoretical reasons (Hollway & Jefferson, 2000, p106). Eight interviews, each between 15 and 60 minutes in length were recorded and analysed.

The participants were SENCOs from different types of schools (two primary schools, one secondary, one special school for Social, Emotional, and Mental Health needs), with a range of years' experience. In terms of their qualifications in mathematics, participants all had a minimum of a C grade at GCSE in mathematics as this is a requirement for undertaking a teaching

qualification. The participants were a mix of genders (three female and one male). The number of years' teaching experience ranged from around 10 to 30 years. All participants described themselves as "white British" which is typical of the ethnography of the local area.

3.5.2.1 Recruitment

Participants were recruited as a convenience sample from the SENCOs in the Local Authority in which I was a Trainee EP. Participants volunteered themselves and were therefore self-selecting. Participant 1 (Laura)[1] was recruited in response to a short presentation I gave to a "SENCO forum". This was attended by approximately 40 SENCOs and an email address was provided to anyone who wished to participate in the research. I received one email of expressed interest (Participant 1).

The three other participants (Patricia, Linda and David) responded to an email that was cascaded by Educational Psychologists in the Local Authority. The email gave a brief overview of the requirements for taking part in the research, the approximate time it would take (two interviews, both under an hour), and the potential benefits from participating. A total of five SENCOs responded to this email, and they were sent further details including a Participant Information Sheet and Consent and Data form (copies of these are provided in the Appendix). After this, one SENCO did not reply, and another sent an email that explained she felt that she could not speak about

[1] All names of people and places are pseudonyms to protect the anonymity of the participants.

mathematics for very long and referred me to a mathematics teacher in her school instead. Despite attempts by myself to clarify and explain and follow up with these SENCOs, these two SENCOs did not participate. Detailed pen portraits of the four participants are provided in the Findings chapter of this thesis.

3.6. Procedure

Participants were interviewed at the school where they worked. For the first interview, participants were recommended to allow an hour for going through the consent form and participant information sheet, and completing the interview and any debrief we felt necessary. For the second interview participants were told that the interview was likely to be shorter than the first, and to allow 45 minutes.

Participants were interviewed using a combination of semi-structured interview questions, and the completion of a mathematics task, as follows.

Interview 1:

1) Factual questions to gain information and set the scene for the interview.

2) Semi-structured interview about a child with mathematics difficulties.

3) Mathematics task.

4) Semi-structured interview about participants' experience of completing the mathematics task and their experiences of learning mathematics at school.

Interview 2:

1) Invitation to participant to discuss their reflections on the previous interview.

3.6.1 Free Association Narrative Interviewing

The Free Association Narrative Interview (FANI) method was developed by Hollway and Jefferson (2000) in order to gain responses about fear of crime. This aimed to "elicit participants' experience in a form dictated as little as possible by the protocol of questions and introduced the idea of a 'defended subject' to take into account the effects of defences against anxiety on participants' actions and the accounts they give of these" (Hollway, 2015, p43). Free association is the process when one idea is spontaneously triggered by another without there necessarily being a logical connection. It was derived by Freud (Freud & Breuer, 1895) and is encouraged by the more flexible nature of the FANI interview methodology.

The interview questions were developed in accordance with the FANI method which meant they were designed to be open ended. Semi-structured questions were pre-prepared and I avoided "why" questions where possible as these were found by Hollway and Jefferson (2000) to elicit rationalised generalisations and intellectualisation, and the "abstraction of such talk, its disconnection from their actual lives, made it hollow" (p32). I used open-ended questions to elicit stories. Interviews were guided by previous ones, and although each interview followed a broadly similar structure, each interview was unique and followed the participant's responses wherever possible. The questions were then followed up, where possible, with the use of the

participants' own ordering and phrasing. The questions below were not devised to be asked word for word but to outline an area of interest that could be asked in a way that felt appropriate. This was because "the idea of standardised delivery to all interviewees derives from an experimental scientific framework and is antithetical to our emphasis on co-meaning making and intersubjectivity" (Hollway, 2015, p45).

The first part of the interview asked two factual questions in order to gain information and set the scene for the interview.

- Would you tell me a little about yourself? How long have you been a teacher and a SENCO?
- At which point in your education did you stop studying mathematics? (GCSE/A-level/degree)

After this, the questions aimed to elicit narratives about the participants' experiences of working with children who struggled with mathematics. These were open ended questions in order to encourage participants' narratives to link to a story. Some or all of the questions below were used as prompts.

- Have you ever worked with a child with learning difficulties in mathematics? tell me about them.
- Can you tell me about a time you worked with this child?
- What was it like? How did you feel? What were your thoughts? What was the child thinking and feeling?

- Can you tell me about a time where you saw this child and this helped you to understand their learning needs in mathematics?

  After completing the mathematics task, participants were asked about their experiences of completing the task and their experiences of learning mathematics at school.

- How did you feel when you were doing these mathematics tasks? Could you talk me through it?

- Can you tell me about a time when you did mathematics when you were at school?

- Can you think of a (specific) time or memory of doing mathematics at school?

- Can you remember any other (specific) occasions where you completed a mathematics task? what did you do and how did you feel?

3.6.2 Mathematics Task

The mathematics task was influenced by Bibby's (2002) paper which explored teachers' feelings of shame around mathematics and emotional defenses against these. She noted that feelings of shame around mathematics were wrapped up with an individual's identity, both personal and professional. Bibby (2002) explored "personal histories with mathematics and the experience of doing mathematics as an adult" (p710). She interviewed teachers firstly about their own personal history regarding mathematics, and a secondly she asked her participants to complete a mathematics task. The task itself and all eight questions within the task were replicated from this piece of

research. Bibby (2002) had selected them from a variety of sources, which she justified below. The questions were as follows:

- “Consider the number M = 33 x 3 x 52 x 3 x 7. Is M divisible by 7? Is M divisible by 5, 2, 9, 63, 11, 15? (Zazkis & Campbell, 1996, p. 542).
- How could you end the remainder of 589 divided by 98 by using a calculator? (you only have a four function calculator—there is no remainder key). (Question used on the King’s 20 days mathematics course taken from American test for teachers: source unknown.)
- How would you convert 1/7 into a decimal? (Question invented by Bibby)
- Which of these numbers are equivalent to 1/5? one fifth, 20%, 1.5, 3/7, 1/5, 0.5, 3/15 1 in 5, five tenths, a fifth, 5/20, 0.2. (Teacher Training Agency, 1998b, p 20).
- A new out of town shopping centre offers building plots of three different sizes: 70 m by 114 m, 450 m by 508 m, 180 m by 235 m. If you were to view these plots from an aeroplane which would appear most square? (Question used on the King’s 20 days mathematics course taken from American test for teachers: source unknown.)
- The price of a video game was increased by 5%. In a sale, its new price was reduced by 5%. Is this price now: the same as the original price; less than the original price; more than the original price? Give your reason. (Teacher Training Agency, 1998b, p21).
- A sales assistant was asked to end the original cost of an item which had been reduced in a sale by 15% to £850. He did the following calculation: £850 x 15/1005 =£127.50, £850 + £127.50 = £977.50. Describe why the sales

assistant has arrived at an incorrect solution and calculate the correct amount. (Teacher Training Agency, 1998b, p21).

- Which is greater, 2/3 or 3/4? 2/3 or 5/8? (Question invented by Bibby)."

(Bibby, 2002, p721)

As with Bibby's (2002) research, participants in this research were presented with these questions on laminated paper and asked to rank them in order from hardest to easiest, they were then asked to attempt the mathematics task they found easiest, one they found middling, and the hardest. Participants had access to pencil and paper, but unlike Bibby's method, in this study participants did not have a calculator. Participants were told that it was the process that was being focused on, and not accuracy, and were not provided with the answers or told whether they were correct or incorrect during the interview, although they were offered to have the answers and working emailed to them afterwards. None of the participants chose to have the answers provided. One participant refused to do the task at all, which is discussed in the following chapters.

During and after participants completed the task they were also asked the following questions:

- Can you talk me through your thinking about why you put them in this order?
- What was your initial reaction to this task?

3.6.3 Data Capture Method

Interviews were audio recorded using the Quicktime recording programme on a laptop and also a hand-held dictaphone. The order in which participants placed their mathematics questions during the mathematics task was photographed. The eight completed recordings were then transcribed. Hollway and Jefferson (2000) recommended the transcribing of all interviews be done by the researcher themselves, but due to time constraints six of the eight interviews were transcribed by a professional transcription service, the other two were transcribed by myself, the researcher. The transcriber was asked to sign a data protection agreement before being sent the data (see appendix). Recordings were transcribed in ordinary speech pattern. All spoken words and sounds were transcribed, including hesitations, false starts, pauses, emphasis, and cut off speech.

3.7 Data Analysis

The interviews were analysed using thematic analysis, while keeping in mind the ‘whole’ person. Thought was given to the researcher-participant relationship, to the narrative, and to the ‘unspoken’ parts of the narrative which were interpreted using psychoanalytic frameworks.

3.7.1 Thematic Analysis

The data was analysed using a variation of Thematic Analysis (Braun & Clarke, 2012). This was because with Thematic Analysis it was possible to “legitimately focus on analysing meaning across the entire data set, or you can

examine one particular aspect of a phenomenon in depth. You can report the obvious or semantic meanings in the data, or you can interrogate the latent meanings, the assumptions and ideas that lie behind what is explicitly stated" (p58, Braun & Clarke, 2014).

While Thematic Analysis allowed me to make sense of experiences participants had in common, I was also able to maintain the individual identities and narratives of the participants which is important within the FANI methodology. I wanted to keep the individuality of the participants key within the process of analysis but I also wanted to notice what my participants had in common, and where the patterns were in the data. Thematic Analysis fitted with the psycho-social approach because it was simply a method of data analysis, rather than being a theoretical approach in itself.

Frosh and Emerson (2005) discussed the fact that all interpretive research involves applying pre-set theoretical concepts. They discriminated between "top down" and "bottom up" procedures. Top down are "dominated by theoretically-derived categories imposing an interpretive "grid" on data in order to interrogate it according to the assumptions or perception derived from those categories" (p310). Bottom up analyses "eschew theory as far as possible at least until the data has been examined performatively in terms of its own emergent properties" (p310). Therefore an inductive/bottom up approach to data coding is driven by what is in the data, and a deductive/top down approach is when a researcher brings a series of concepts and uses this to

code and interpret the data. This research used a combination of both approaches, as “it is impossible to be purely inductive, as we always bring something to the data when we analyse it, and we rarely completely ignore the semantic content of the data” (Braun & Clarke, 2012, p58). Initially I coded from the data based on the participants’ experiences (inductive) but I also analysed the data from a psycho-social lens, taking into account psychoanalytic concepts such as projection and transference. This was facilitated through simultaneous consideration of participants’ in depth pen portraits.

The analysis was performed in a series of stages. Initially I immersed myself in the data by re-reading transcripts, listening to audio recordings, making notes and writing in a reflective diary over time. This enabled me to form some ideas about the meaning of the data, how the participants made sense of their experiences and the assumptions they made. I became intimately familiar with the data set and noticed things which were relevant to the research questions and the individuals’ experiences. The interview transcripts were thought about as a whole, and in relation to elements of the participants’ biographies.

I generated some initial codes for the data using hard-copy print outs of the transcribed interviews, initially to familiarise myself with the data, and then using MAX-QDA software. I imported the interview transcripts into MAX-QDA and began to code each interview in turn. For example, where a participant

discussed memories of not feeling able to do mathematics work, I attributed the code ‘could not do work’. I noticed that some codes were applicable to more than one participant and formed subthemes that fed into broader ‘emergent’ themes. A theme “captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set” (Braun & Clarke, 2006, p82). For example the code ‘could not do work’ fed into the emergent theme of ‘bad experiences of school’. The emergent themes and their subthemes all grouped under three overarching themes, which related directly to the research questions: How the participants thought about mathematics difficulties; participants’ experiences of learning mathematics as a child; and participants’ experiences of the mathematics task. Because this was a psycho-social piece of research it was important that each person maintained their individual identity. Themes were broad and individuals’ stories were maintained in the final analysis. A summary of my coding and how these fitted into themes and subthemes is provided in Appendix 1, and examples from the text and how these were coded are provided in Appendix 2.

I wanted to combine these inductive codes with the deductive, psychoanalytic, lens through which I was analysing the data. Separately from finding themes through MAX-QDA I went through each transcript and audio recording and wrote detailed notes from a psychoanalytic lens. The evidence for my psychoanalytic interpretations was sought from notes I had made in a research diary immediately before and after the interviews and psycho-social supervision which helped me to think about the dynamics and potential blind

spots I may have due to my own psychological defences. To discuss my findings I combined the themes that emerged inductively with my deductive notes, being clear about my evidence for each comment in order to provide a transparent audit trail. For example, when Patricia told me about her feelings about mathematics I analysed the data she presented in the narrative (such as comments like “too much! Hard!” or “no, go away!” in line 147) and added to this my experiences of countertransference during the interview (I felt frustrated) and my knowledge of psychoanalytic theory (defence mechanisms) to interpret her responses. This transparency and triangulation of data ensured that the analysis was as valid and reliable as possible.

3.7.2 Trustworthiness, credibility and reflexivity

Validity in research is concerned with the accuracy of scientific finding. A valid study should demonstrate what was actually happening. Within qualitative research, Denzin (1970) distinguished between ‘internal’ and ‘external’ validity. Internal validity is “the extent to which research findings are a true reflection or representation of reality rather than being the effects of extraneous variables” (p35, Brink, 1993). External validity addresses the “extent to which such representations or reflections of reality are legitimately applicable across groups” (p35, Brink, 1993). Reliability regards how well an researcher collects and records information, the “ability of a research method to yield consistently the same results over repeated testing periods” (p35 Brink, 1993).

In qualitative research, the question of researcher bias is one threat to validity and reliability, another is the unnatural way that a participant may behave when they are in the presence of the researcher. For example, a participant may try to impress a researcher, or give the researcher what they think the researcher wants, or the status differential between researcher and participant could prevent the researcher from obtaining information. Another pitfall is if a researcher loses the ability to look objectively because they believe that they are part of the participant group and therefore become biased. However, in FANI the relationship between the researcher and participant was integral to the methodology, and was scrutinized in detail as part of the analysis, adding to the richness of the data rather than contributing to weakness in the research.

Traditional ways to establish credibility and trustworthiness in qualitative methods involve the researcher being aware of potential bias that could be introduced, either from themselves or the participants. Ways to increase validity of participant responses is to fully inform the participants on the nature of the research, why the research is being undertaken, where the information gathered will be available and to whom in order to reduce the potential to give desirable answers. I did this in my study, in order to establish trust with the participants that their data would all be anonymised. Another way to establish validity is to interview the same participant over time. This was a key aspect to my research, and in the second interviews with participants I clarified any queries I had with them about their experiences in the previous interviews and reflected with them on how they felt about their previous responses to

questions. Validity could have been enhanced if I had met with participants more than twice, in order that I built up a deeper context in which to understand participants, and Hollway's (2011) research met with her participants over an extended period of time. However, constraints over time and resources limited the amount of data I was able to collect.

Limiting the extent of researcher bias can also ensure credibility and trustworthiness of a piece of qualitative research. This could be done by a researcher receiving training in objective interviews (Field & Morse, 1985), and by a researcher examining and disclosing underlying assumptions they hold which can be read alongside the research. The psycho-social response to questions of reliability and validity is 'reflexivity'. I kept a research diary (Thomson, 2009) as part of this reflexive process. This included making notes before and after each interview, and regularly during the process of analysing the data. This research diary provided a method by which I could reflect on my subjective responses and how I could learn about the participant from these. It also gave me evidence of my own blind spots and differences in identity between myself and the participant, and how these had affected the data (Elliot, 2011; Elliott, Ryan & Hollway, 2012).

I met with a non-clinical supervisor, separate from a research supervisor, at various points throughout the data analysis process. I referred to this as psycho-social supervision and in these sessions I brought extracts from transcripts and extracts from my research diary and discussed possible interpretations. Garfield, Reavey and Kotecha's (2010) research highlighted

the different interpretations a researcher and her supervisors made of FANI interview material. They emphasised the need for a clear understanding of the boundaries of the supervisory relationships. For this reason, the boundaries and limits of this psycho-social supervision were discussed at length and agreed on at the beginning and throughout the analysis process. My psycho-social supervisor was an Educational Psychologist and a tutor on the institution's research team, who had experience in producing psycho-social research. Supervision drew from psychoanalytic skills of noticing, listening and allowing oneself to be affected by the material while also maintaining a reflective stance. The supervisory process had parallels with Bion's (1962) concept of containment.

> "A properly contained and held child will know that s/he is safe feeling intense emotion such as anger, that s/he will not die from feeling anger or any other intense and unpleasant emotion… similarly, the psychoanalytic and the supervisor, within their delimited roles, have the responsibility to provide safety in exploring difficult feelings, and to allow safe play with data, whether of personal biography or from interviewees" (Garfield et al, 2010, p157).

Supervision is advocated to enhance the productive use of reflexivity within research (Elliott, Ryan & Hollway, 2012). Supervision from a psycho-social perspective (as well as research supervision) was an important aspect to the research methodology as it put into practice the psychoanalytic principle that "it takes two minds to think a person's most disturbing thoughts" (Ogden, 2009,

p91, quoted in Hollway, 2015, p49). I approached the analysis of the interview material with the model of a 'defended subject' in mind, and myself as a potential defended researcher who was "motivated not to know" certain things (Wengraf, 2000, p144). The FANI process of analysis involved carefully listening to the anxieties participants brought to the narratives and reflecting on the dynamics of the interview process. Reflexivity is seen as a way to understand data that are unavailable to consciousness. "Without reflection, supported and recursive where necessary, responding to emotional impact can result in the indulgent exercise of ones preferred view of the world and imposition of ones own belief system in the service of a wished-for certainty that does not reflect the complexities of what is observed" (Hollway, 2015, p31). Supervision, therefore, provided a method through which I could engage with this subjectivity. This supervision was a protection against "wild analysis" (Elliot, Ryan & Hollway, 2012, p21) as the complex dynamics and interactions of the interviews could be explored, and the participants could be seen from a different perspective rather than simply through the eyes of myself as researcher. In addition, my own feelings and responses could be seen as clues about how the interviewee was feeling. Supervision also addressed the emotional demands of the research task.

3.8. Ethical Considerations

This research gained ethical approval from the ethics committee at the Tavistock and Portman NHS Trust in November 2015. In my Local Education Authority, permission was sought from Principal and Deputy Principal Educational Psychologists for this research to go ahead, and participants

themselves were clearly informed about what the interviews would entail before they agreed to take part. Participants were emailed a Participant Information Sheet and Consent Form at the point of showing an interest, and these were read through and discussed with the participants before any recording began.

Participants were chosen from schools where I was not the currently linked TEP, in order to avoid as much as possible the confusion of the roles of TEP and researcher which could impact both the work completed in our daily school practice and the research interviews. For example, a participant may have felt obliged to participate in the research if I had asked them as their TEP, and may have felt uncomfortable discussing the vulnerable aspects of their own learning experiences or attitudes to mathematics if we were to continue to have a SENCO/EP relationship at the same time.

The reflexive aspect to this research enhanced the ethical position that all things recorded in the interviews and interpreted during data analysis were "necessarily partial" and "always provisional and open to question" (Elliott, Ryan & Hollway, 2012, p3). Recording frustrations and anxieties in a research diary enabled me to reflect on the perceived success or failure of interviews without attributing blame (Elliot, Ryan & Hollway, 2012). Participants were clearly informed that they could withdraw from the research at any time up until the data had been anonymised and analysed, and if they wanted further clarification about the subject or process at any time they were informed that they were free to ask. The Data Protection Act 1998 was adhered to. All data was anonymised and recordings of interviews were listened to only by myself

and were destroyed once the research was complete. Audio recordings were saved on an encrypted device with password protection, and transcripts were stored in a locked filing cabinet. All names of people and places provided in this research were pseudonyms, and some details were changed to protect the participant's anonymity.

3.9. Summary

In this chapter I outlined the aims and purpose of this research, and explained why the research questions fitted into an exploratory design. I discussed that the research followed a psycho-social ontology, in that the participants were theorised in terms of psychoanalytic and societal concepts; a psycho-social epistemology, in that knowledge of participants was gained through an interaction between a defended subject and researcher; and a psycho-social methodology, in which interviews were conducted using the FANI method which followed closely the participants' individual narratives and adhered to psycho-social concepts highlighted in the ontology and epistemology. The data was analysed using thematic analysis while taking close notice of the psychoanalytic methods outlined in the FANI methodology. The recruitment and sampling of participants were discussed, the method of data collection was described in detail and ethical details were underlined.

Chapter 4. Findings

In this chapter I outline my findings through a discussion of themes that emerged from the interviews with the four participants. I discuss a series of themes and subthemes, which map onto the three research questions:

1. How do participants think about children's difficulties in mathematics, and children who struggle at mathematics?
2. What are participants' perceptions of their own experiences of mathematics learning as a child?
3. How do participants experience doing mathematics tasks?

I try to answer the fourth research question,

4. Why do participants feel this way?

throughout the analysis, and address it further in the Discussion chapter of this thesis.

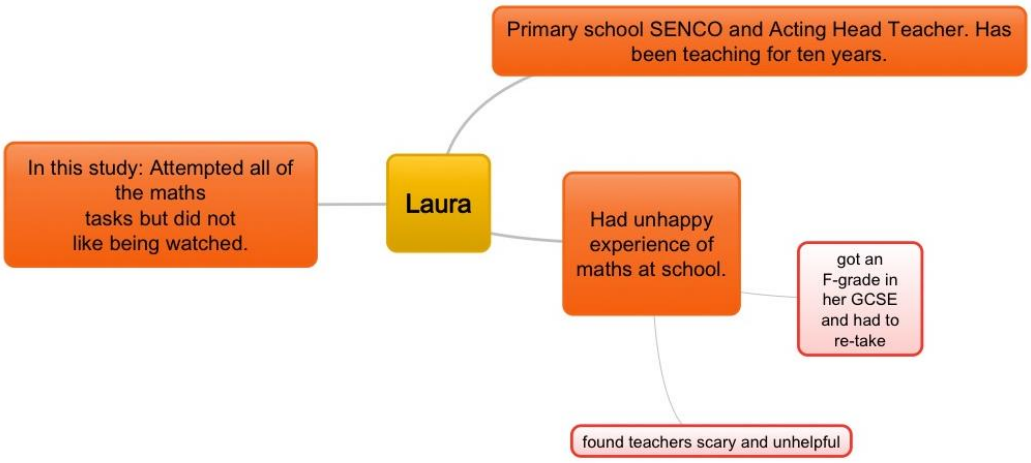
To be true to the psycho-social methodology it is important to maintain each of the participants' individual narratives. I therefore discuss each theme as it applied to each of the four participants. I begin this chapter with an introduction of the four participants through pen portraits. I then go through each participant in turn with regard to the research questions, firstly giving a description of the theme, evidenced by quotations. These quotations are from the participants' first interview unless otherwise specified. Where appropriate I provide my understanding of the theme from a psychoanalytic lens, with

reference to countertransference and other models to reinforce my hypotheses. I then summarise my findings at the end of each section.

4.1. Pen Portraits

4.1.1 SENCO 1. “Laura”

Figure 1. Laura pen portrait



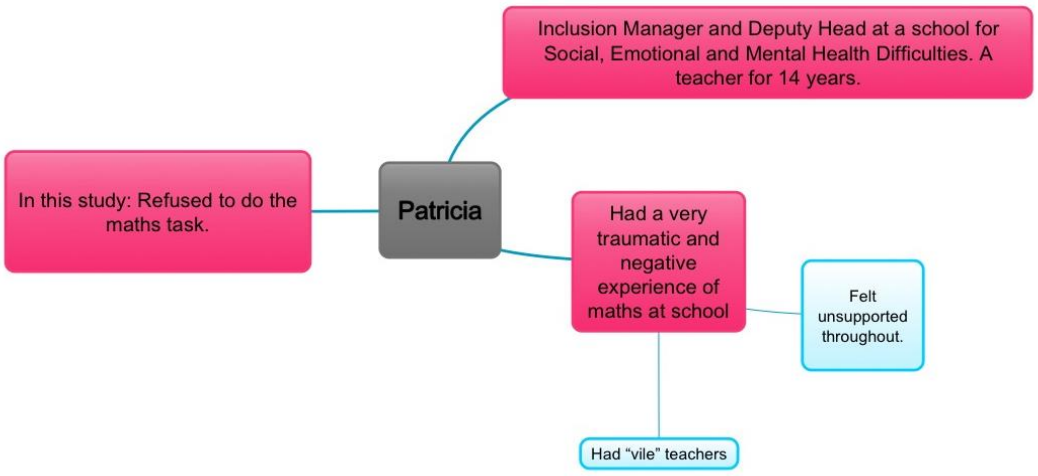
Laura began her teaching career ten years ago as a primary school teacher and then moved to a secondary school to become a Nurture Group teacher. This meant teaching vulnerable children in smaller groups outside the main classroom. She did this for four years until the role of nurture teacher was cut and she was transferred to a mainstream English teaching role. Laura did the SENCO training online and got a job as a full time SENCO in a mainstream primary school, which was where I met her. The school was in a socially deprived area and Laura told me it had a 40% intake from the Traveller community. When I came back for the second interview, Laura had been

promoted to Acting Head Teacher, as the existing Head was on long-term sick leave due to chronic illness.

When Laura studied mathematics at school, she got an F grade for GCSE mathematics, which she described as “awful”. She had a series of bad mathematics experiences at primary school and she said she was in the bottom set at secondary school, with a lot of children with behavioural issues, and she “didn’t really learn much”. She described the teacher losing her temper a lot and sometimes throwing things across the classroom. Laura took a night class to re-take her GCSE mathematics exam and got a C in her GCSE exam the second time round. When she took the mathematics skills test for teaching she described the experience as “perfectly fine”.

4.1.2. SENCO 2: “Patricia”

Figure 2. Patricia pen portrait

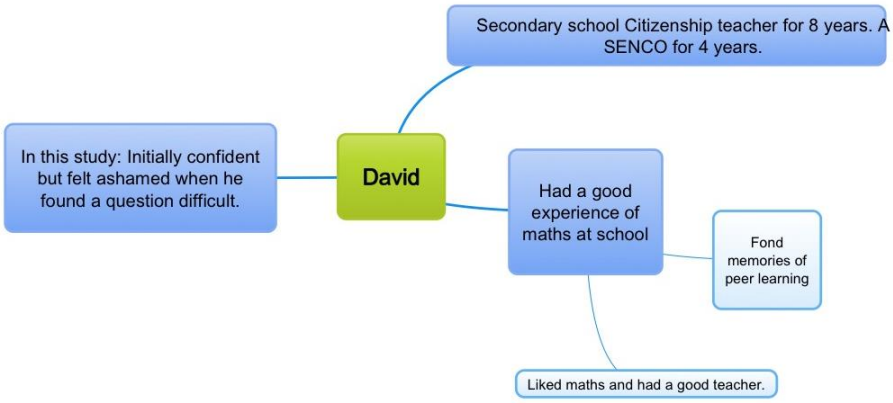


Patricia had been a teacher for 14 years, and had a varied teaching career before coming to her current school, a Free School Academy for students with Social, Emotional and Mental Health needs. Patricia did a PGCE specialising in Secondary school Art and Design. She started teaching in a mainstream secondary school but she wanted to work with the “naughty kids” (line 14) and eventually she moved to work in a Secondary Pupil Referral Unit (PRU). She later co-managed SEN departments of three secondary schools, one of which she ran with her husband, who was a mathematics teacher.

Patricia had an unpleasant experience of learning mathematics as a child and has avoided doing mathematics whenever possible since then. For example, as a teacher she refused to cover mathematics lessons when other staff were absent. She found mathematics lessons to be competitive and confusing, damaging to her self esteem, and traumatic. She did not get the help or teaching that she needed. Patricia got a C at GCSE mathematics, which she described as a “miracle” and told me she was physically sick before her exam. She re-sat her mathematics entry test to teacher training three times, but she felt that this was a much more pleasant experience than being at school as it was computerised and she could re-take the test which removed the possibility of ‘failure’. The second time I spoke to Patricia she told me she was surprised at herself by how passionately she still felt about her negative experiences of school.

4.1.3 SENCO 3: “David”

Figure 3. David pen portrait



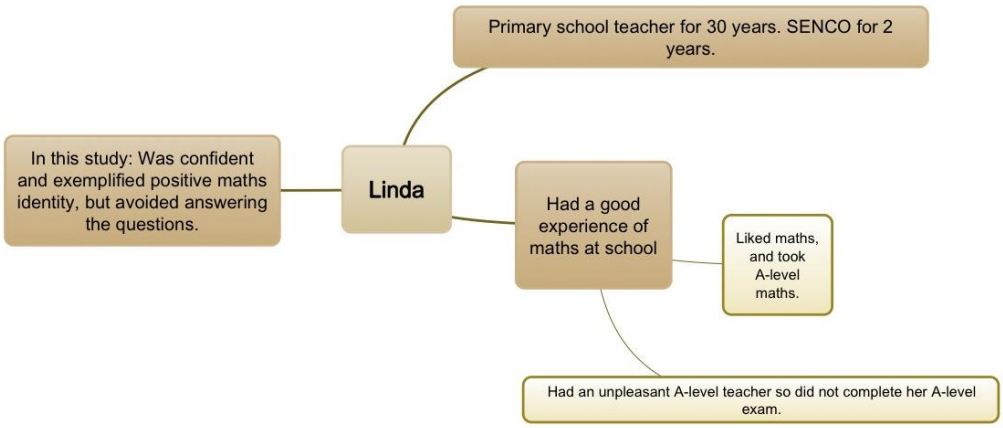
David was a SENCO in a large Secondary School in an affluent rural area. David has been a teacher for 8 years and a SENCO for four and a half. David did a PGCE which specialised Citizenship. Once qualified, David taught in two schools before progressing to the role of SENCO, and remained as SENCO in that school for four years. He had started at his current school three months previously and described himself as ‘fresh’ to the role.

David told me that he had studied mathematics up to GCSE level, when he got a B grade. He had no difficulties with the mathematics skills test at PGCE. David told me he did not mind mathematics. When he was at school, he had a “very, very good teacher” in years seven and eight who was engaging and made mathematics interesting and “real” (line 203). In years 9, 10 and 11 he found that the teachers used a more ‘rote learning’ approach, and he found that he had not thoroughly learned things with this method. He

believed that he was not a natural mathematician, but that he learned well because he had good teachers.

4.1.4. SENCO 4: “Linda”

Figure 4. Linda pen portrait



Linda qualified as a teacher 30 years ago, and has been a primary school teacher since then. She started work as a SENCO a year previously which was “upgraded” (line 17) to Inclusion Manager at the beginning of the academic year. She worked in a mainstream primary school in a suburban area, which was under OFSTED Special Measures and there was a whole school issue around promoting mathematics in the school.

Linda remembered liking mathematics throughout school. She remembered light and airy classrooms in primary school, and doing much better than expected at O-level. Linda was encouraged to take mathematics to A-level, where she had an unhelpful teacher. Because she did not understand the Mechanics section to her A-level syllabus, Linda decided she would not complete this section of the examination. She left sixth form with a D at A-level

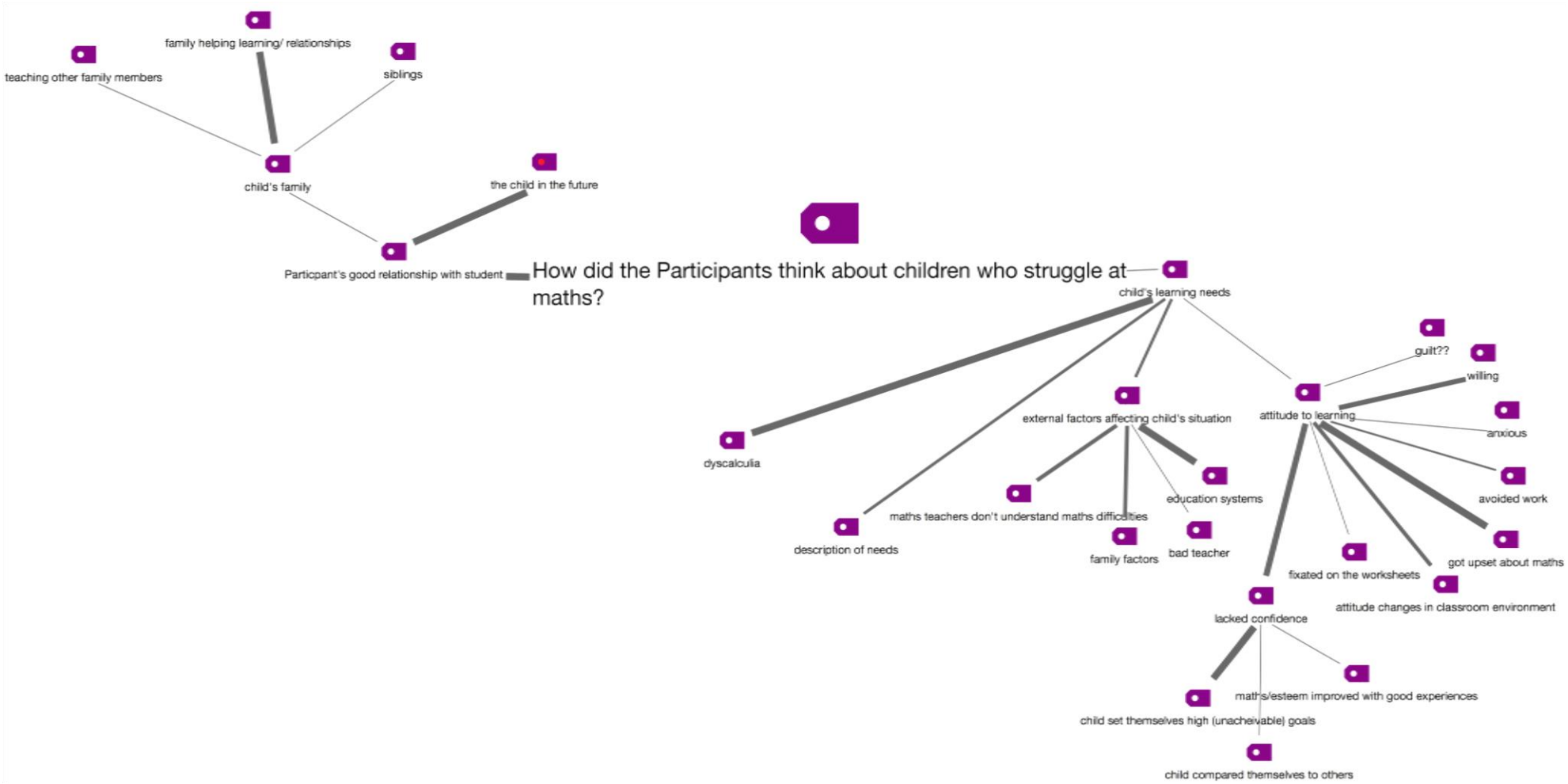
mathematics but remained angry towards her teacher who did not help her when she asked for it. Linda found it hard to remember much from her school days, and although her predominant view of school was that it was an enjoyable place she also remembers fellow students being corporally punished with the slipper. Even in sixth form she recalled a teacher slapping a student's head. Linda specialized in mathematics teaching in her Primary Education degree. Linda had a positive identity as a mathematician, and joked that having an A-level in mathematics got her "respect" in the staffroom.

4.2 How did participants think about children's difficulties in mathematics, and children who struggle at mathematics?

4.2.1 The participants thought about the children as individuals

All the participants were asked to talk about a child they had worked with who struggled at mathematics. In the sections below, I referred to the child the participant chose to talk about as 'their' child/student. All the participants described a good relationship with their child. All participants described their child as willing to learn but having difficulties despite this. David, Linda and Patricia talked about how their good relationships with the child's family made them more inclined to go the extra mile for them. David said "when you're a teacher, you have a relationship, don't you, but when you're involved with the family you do a lot above and beyond" (line 123). By going beyond the expected role of a SENCO, the participants were showing these students that they were being thought about and looked after, and their narrative indicated that this enhanced the students' learning experiences.

Figure 5: Overview of how the participants thought about mathematics difficulties and the children who struggled at mathematics



4.2.1.1 Laura's relationship with 'her' child

Laura's child only joined the Primary school in year 6, and Laura described being frustrated with her child's parents for not flagging up her difficulties sooner. She described the child as incredibly anxious about learning. The girl picked at her clothes nervously and when the EP came to assess the child paced up and down asking "what if I get it wrong?" Laura did not know the child for long but was proud to have got her an Education, Health and Care Plan (EHCP) before she left, which she hoped would ensure the child got support through secondary school.

4.2.1.2 Patricia's relationship with 'her' child

> "I had his timetable in front of my computer and I highlighted his mathematics lessons cos I knew regular as clockwork when he come down to my desk there'd be 'I've got stomach ache; I've got headache; I don't feel well'. He'd shuffle in, he'd stand next to me, and if that didn't get a reaction, didn't get him out the lesson, he'd cry" (Patricia, Line 34).

Patricia described her work with her student in a way that epitomised the container/contained model set out by Bion (1962). Having a copy of her student's timetable above her desk could be seen as a way that Patricia was able to 'hold him in mind' in the same way that a therapist might hold an appointment slot open even if the patient did not turn up. Patricia also told me in the second interview that she was planning to go back to her old workplace to support him as he sat his mathematics exams. She described her work with

him as taking "more of a kind of approach that the mum at the kitchen table trying to do the homework with the child" (line 17 interview 2), that she tried to teach in a parental style, and at her school they were all "very much a family" (line 73). She explained that the student went into foster care during the time she taught him and Patricia's descriptions indicated that as his teacher she was fulfilling a maternal containing role. Patricia later explained that she was married to the child's current mathematics teacher, which provided further information that supported the idea of the family unit she symbolized for this child.

Patricia described working alongside the child as a fellow mathematics-hater.

> "We don't like mathematics (I'm talking to him, this is) but we're going to have to do it anyway" (line 82).

This was an example of Patricia acting as a containment figure to the student. Patricia acknowledged and validated the child's feelings by speaking it aloud, and by adding the pronoun 'we' she indicated genuine empathy. By saying 'we're going to have to do it anyway" Patricia was feeding the anxiety back to the child so that it was now manageable. She modulated his distress and handed it back to him in a "tolerable form" (Waddell, 2002, p34). Patricia communicated that the boundaries were stable (the mathematics still had to be done) but she offered emotional support. Although Patricia might not help him with the practical aspects of mathematics learning, she offered to sit next to

him while he tried it, providing emotional containment so the child was not alone.

4.2.1.3 David's relationship with 'his' child

> "He had a really positive attitude so he was a really lovely student to have in the classroom" (line 107).

David described 'his' student and him chatting frequently with one another, "I'd be on duty at the front gate, you know, standing there and it'd be pouring down with rain or snowing and he'd always come out and stand next to me and talk to me" (line 111). David even went out of his way to give this student and his friends a lift to the year 11 prom in the school minibus because the student had not been able to organise it himself. When David finished talking about his child he told me that he missed him. David appeared to play a valuable role in this child's school life. Conversations at the school gate seemed to be important to the child, providing him with a structured transition to the school day. David told me the student felt able to thank him explicitly for his support. This highlighted the important nurturing role David played for this student.

4.2.1.4. Linda's relationship with 'her' child

Linda described her child as "very willing and wants to learn but she just needs lots and lots of conceptual, pictorial and visual things" (line 75). Linda told me she had taught 'her' child's mother when her mother was at school.

The child's mother had also struggled at mathematics and she thought this was impacting the child's mathematics understanding. Linda told me she was considering giving this child extra mathematics tutoring at weekends. In addition to wanting to support this child's mathematics learning, it seemed Linda was keento provide support to the child's mother where she could.

4.2.2. How did participants think about children's difficulties in mathematics, and children who struggle at mathematics?

4.2.2.1 Laura

Laura attributed some of her child's needs to what could be thought of as 'within child' factors: dyscalculia, dyslexia and, to some extent, anxiety. Laura told me that she had administered a dyscalculia assessment on her child although she realised that one could never really know if someone had dyscalculia. She attributed other areas of the child's needs to systemic factors: parents, school and the wider system. The child had "gaps in her learning" (line 100) and neither parents nor the child's previous school had flagged these up. In speaking more generally, Laura felt passionately for the children did not get help from home.

> "It's heartbreaking really, when you see kids that turn up [to Secondary school] there who still can't read a simple book, or know how to write their address, and you think, how did you end up spending six or seven

> years at school and you still can't do these things? […] you know, the gap, as I said before, just gets wider and wider […] some children are always trying to catch up. If they haven't got the support at home. They don't care" (line 298).

Laura told me that when the child's mother was called into school she did not recognise the child described in the EP report as her own. In Laura's case, disconnection between a child and their family was a cause of frustration and disapproval. This highlighted the important connection that all the participants made between learning and family, and the rivalrous relationships between parents and teachers and that teachers in 'loco parentis' can struggle to navigate the complexities of this role.

Laura described feeling overwhelmed by the level of need at her school. She noted that Educational Psychologists were not available to support children and when they were it was only through the Statutory Assessment system. She felt abandoned by the Specialist Teachers service and OFSTED who offered no solutions only sanctions. With this in mind, Laura's anger towards parents and other professionals felt understandable. Projecting her feelings outwards may have been a psychologically supportive factor. Laura needed to psychologically defend herself against this high level of anxiety, and had projected feelings of incompetence or inadequacy into neglectful parents or impotent support services.

4.2.2.2 Patricia

Patricia described her child's needs as being primarily around a lack of confidence. The child's transition to foster care had an effect on his emotional wellbeing. Despite struggling at mathematics he had set himself the goal of becoming an accountant when he was older. For this student, a professional career in accounting represented an escape from a difficult home life, although his low confidence meant he would say things like "I'm thick, there's no point doing it" (line 55). In this respect, Patricia attributed responsibility for the child's difficulties on his parents.

The student's mathematics difficulties were further compounded by having an inexperienced mathematics teacher. Patricia described his lessons as unimaginative and "old school" (line 100), and the teacher would ask him to go up to the board and write up his answers which dented his self-esteem. She also felt that mathematics lessons being both compulsory and divided into ability sets had a detrimental effect on his and other students' confidence and wellbeing.

4.2.2.3 David

David attributed a lot of his student's difficulties to 'within child' learning disabilities. He described the child as having Global Developmental Delay as his primary need, and he also had a diagnosis of Autism Spectrum Disorder. When I asked David to tell me about a child who struggled at mathematics, he asked me a clarifying question, "specifically with dyscalculia or just generally?"

which implied he understood dyscalculia to be distinguishable from other mathematics learning difficulties. Despite this he told me he understood dyscalculia as:

> "I would say as opposed to necessarily the conceptual understanding of mathematics, it's more to do with the physical elements of it, so the numbers actually on the page. From my understanding, there's a physical difficulty with interpreting the information and manipulating the numbers as well as the conceptual understanding." (David, line 43).

David was generally skeptical about dyscalculia as a condition but told me that this child had not got a diagnosis. David's student would hate doing mathematics in the classroom, and David described the boy as avoiding work by being helpful and assisting the teacher with handing out books, but if you asked him the same questions outside of the mathematics classroom in a context which he was interested in, such as transport distances, he was able to do it.

> "I think it was interesting because he showed some potential but only when he thought it was something he was enjoying" (David, line 81).

David did not attribute any causes of the child's learning difficulties to the parents, in fact he thought that the student was able to do addition because his mother worked in a shop and "at home their skill sets were around adding and they promoted that" (line59). At home the child had good support, but at school David wondered whether his mathematics teachers really understood his

mathematics needs. In addition to this, David blamed the student's primary school for giving him extra SEN support in an "exclusionary" way. The student had become used to individual work with adults and small groups of learners, and therefore struggled in a class of thirty.

David (as well as Patricia) expressed the belief that mathematics teachers did not understand mathematics difficulties since they were innately good at mathematics which meant they lacked to capacity to explain to others. David was reflective on his experiences of learning mathematics as a child and adolescent, and his experiences observing mathematics lessons now. He surmised that mathematics teachers did not understand mathematics difficulties because, by nature of being a mathematics teacher, they themselves found mathematics to be easy and therefore could not comprehend how someone would not understand key concepts.

> "I find that a lot as a teacher now, which is why I volunteered to do the mathematics lessons with the class it's just, in my perception, mathematics teachers tend to understand mathematics so they don't understand the difficulties with it." (David, line 203)

In our second interview, David reflected on pedagogical approaches. He told me he was a student in the 1990s and had seen some big differences in teaching since then. When he observes lessons now, he noticed that History and English lessons look completely different to his lessons at school, with less reliance on text books and more on multi-media, audio books, visual

posters, story boards and so on. However, in terms of pedagogical approach in mathematics, he found little difference between the teaching of mathematics lessons in nearly two decades. He noticed that although there were occasions of creative teaching practices, this was only in exceptional circumstances ("pockets of people who do different things", line 134). In general, he found that mathematics was taught by a teacher at the white board with the students at their desks listening, just as they had done when he was at school. He noted that mathematics teaching seemed to get less creative as the students progressed.

> "…And yet I look at a mathematics classroom, with some exceptions but predominantly speaking, I can go into most mathematics classes and the way that it's taught now is the same as what it was then…. Technology is the biggest change and sort of pedagogical approach and it doesn't seem to have affected mathematics just yet […] Interestingly, the higher up you go, the more boring it becomes. The year seven mathematics group seem to be really engaging. Year nine, it's a mixed bag, and by the time you get to year ten and eleven, it's just learning for your GCSE and it goes back to that sort of chalk and talk style" (line 133).

David's attitude to mathematics teachers was that their pedagogical approach was old fashioned and uncreative. In a similar line to this, Patricia told me her student's mathematics teacher would explain things the same way again and again, she said she wanted to say to them "you're not making it any

more clearer for him, you're just repeating the same instruction!" (line 71). She saw the student's disaffection from mathematics as an inevitable result of rigid and unimaginative teaching. In contrast to this approach, Patricia gave an example of more creative mathematics teaching:

> "There was one particular day I remember, there was 15 teaching assistants, and it was after school, a teaching assistant briefing after school, and he was sat in the corner and he was in a crumpled heap and he couldn't get it. So, lovely kid, so all 15 of us jumped up, and we acted like the items he was talking about in his mathematics so we made it visual for him. And then it became interactive and he started standing in amongst us, and he was the subtraction tool, and it was just lovely." (Patricia, interview 1, line 36).

4.2.2.4 Linda

Linda attributed some of her child's needs to 'within child' factors. She discussed "mathematics blindness" and, having also taught the child's mother, believed this to be partly genetic, although she believed dyscalculia to be a "made up" thing (line 78). The child's mother struggled at mathematics and therefore was not able help her with mathematics homework, and Linda wondered whether that meant that she was not brought up in a "maths rich world" (line 67). In general, Linda wondered whether advances in technology meant that children were not exposed to as much mathematics in general life as they once were. In terms of school influences, Linda acknowledged that throughout the school there were difficulties in teaching number and place

value, and this has impacted on this child. In general, she felt that “children are taught so many different ways to do sums now it’s confusing” (line 145). She felt she had become more understanding of mathematics difficulties with experience.

> “You know that saying they say, “I don’t get it”. I used to say, “What bit don’t you get?” and I didn’t get what they didn’t get if it was really a simple question like 2+1 or something. You know when children just can’t add or know the next number on, but now I’m sort of a little bit more understanding of it and realise that there’s probably something deeper or some need there, or some concept that’s missing.” (line 137, interview. 2).

4.2.3 Summary

1. How did SENCOs think about children who struggled at mathematics?

The SENCOs thought about the children as individuals and described their learning relationships. They saw the child first and their learning needs second. They described the children in terms of personality traits- they were kind, under-confident and hard working. The SENCOs all had positive and meaningful relationships with the children.

2. How did SENCOs think about children’s learning difficulties in mathematics?

The SENCOs attributed the causes of children’s difficulties to learning difficulties within the child, poor teaching or poor parenting. None of the SENCOs apportioned any blame to the child on their motivation or effort. While

difficulties were blamed on other teachers' poor teaching style or skills, none of the participants blamed themselves.

Why did SENCOs feel this way?

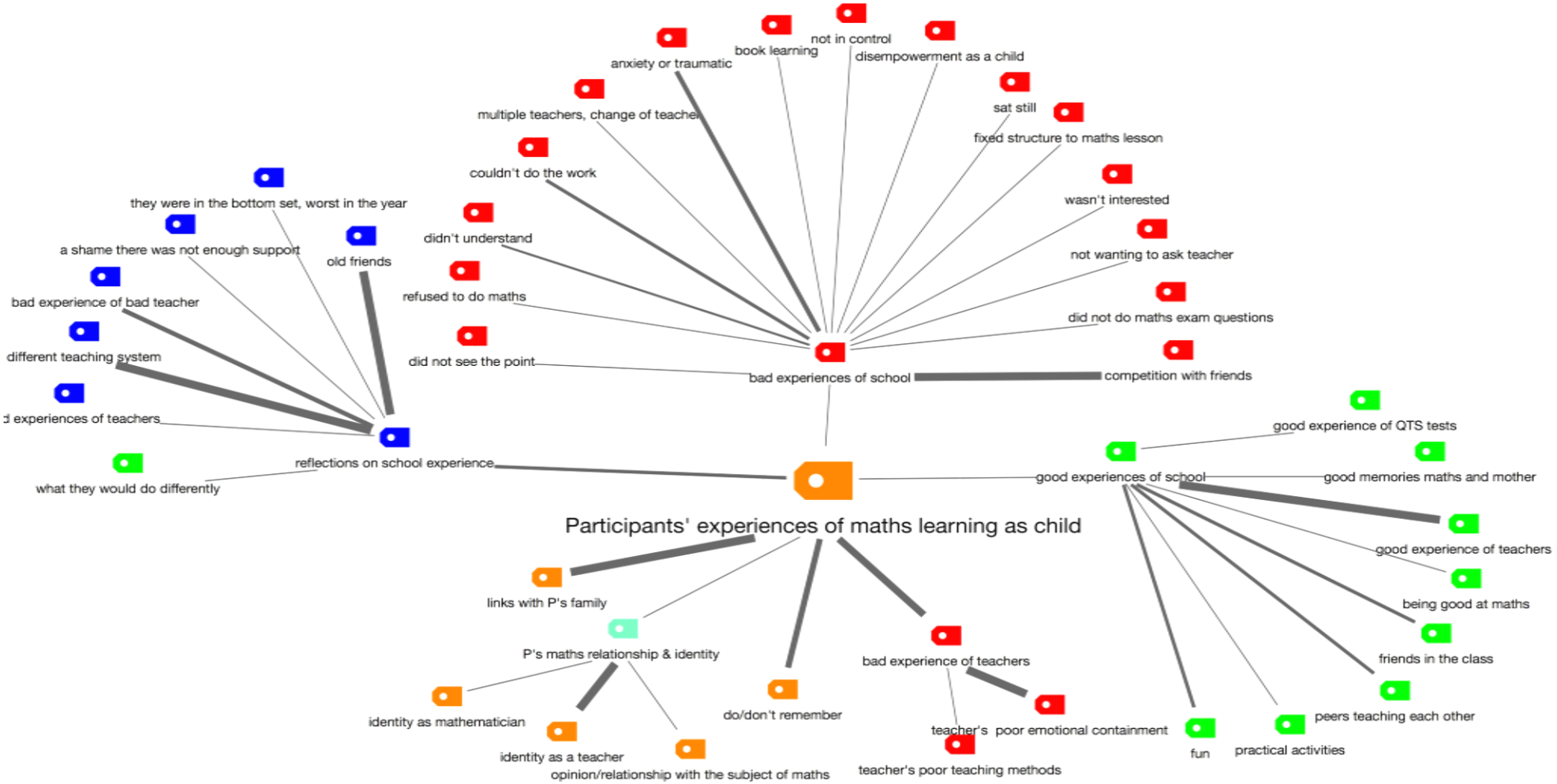
This lack of self-blame could be seen as the participants employing a defensive strategy of splitting and projection. Participants split off the intolerable aspects of the learning process, and projected these into others, thus protecting themselves from being in the difficult position of uncertainty, ignorance or impotence.

The fact that no SENCOs blamed the children indicated the strength of their relationship with the children. It could be due to the SENCOs having a good understanding of SEN, and systemic factors affecting learning. In some cases it could be due to SENCOs projectively identifying with their students.

The way that participants attributed causes of children's mathematics difficulties can be understood from both the psycho-analytic and social aspects of the psycho-social ontology. From the psychoanalytic lens, by blaming others the participants were able to project uncomfortable feelings onto others and thus defend themselves against anxieties of feeling incompetent. In addition to this, the participants raised issues around the nature of mathematics teaching which had social causes and implications. Participants noticed that mathematics could be taught in unimaginative ways without adequate explanation or emotional containment. This pedagogical style was seen by the participants as influential in children's learning difficulties in mathematics.

4.3. What are participants' perceptions of their own experiences of learning mathematics as a child?

Figure 6. Overview of how participants experienced mathematics learning as a child



4.3.1. Mathematics lessons involved feelings of disempowerment, competition and rivalry, book learning, and vulnerability.

4.3.1.1 Laura's experience of school

Laura had memories of a punitive mathematics teacher:

> "she, sort of… lack of patience, and used to throw the board rubber and it was the days of chalk and- you know when you used to roll it down? -I'm old now! So she used to rub that out and then throw it" (line 275).

Laura's experience of mathematics learning in secondary school seemed to be dominated by feelings of fear and vulnerability. She left Secondary school with an F-grade, which she thought was "awful" (line 279). Laura remembered sitting as far as she could away from the teacher ("I didn't want to be near her", line 275) and she and her friends would take it in turns to ask clarifying questions as they feared getting told off.

> "I remember, it must have been my turn, to go up to the desk, and she's "yes?" like- she's quite- you know- then- banging her fist on the table "I've just told you what to do!" it was quite intimidating" (line 275).

Laura remembered the teacher losing her temper and throwing things across the room in anger. "We was all scared of her, we wouldn't ask for help we would just get on with it" (line 55- 58). Laura and I both laughed nervously when Laura

told me about this impatient and volatile mathematics teacher she had in secondary school. Psychoanalytic theory on laughter suggests that laughter can be an expending of nervous energy (Billig, 2005). The statement that Laura's teacher was angry and threw things was clearly not funny but my reaction indicates that I found the comment uncomfortable to hear. After discussion with my supervisor and reference to my research diary, I wondered whether this was because I was feeling some of my participants' discomfort at remembering being scared and vulnerable. We giggled as participant and interviewer in the same way her and her classmates giggled in the classroom when they were too scared to ask questions.

After Laura told me about feeling intimidated as a child, Laura's tone seemed to shift to one that was more assertive. She said "if you was an adult, you wouldn't put up with it!" (line 277). This encapsulated the feelings of frustration which Laura felt about the power dynamics within the mathematics classroom. Laura was describing a teacher/pupil dynamic where the teacher was seen as having all the knowledge but refusing to share it. Laura did not feel empowered as a learner to explore the answers for herself. The students in her class timidly approached the frustrated teacher's desk to ask for answers because the teacher had not created a classroom environment where students felt safe. They therefore did not feel safe enough to 'not know', which, as Youell (2006) noted, is integral to the learning process. Laura remembered being scared and feeling stupid because of the position she was put in by her teachers. This power differential blocked Laura from achieving in her GCSE exams, and had a lasting impact on her identity as a mathematician.

Laura told me that her teacher when she was in year 5 at school told her mother to stop doing mathematics with her at home.

> "P: when I was a child my mum would sit with me, at home, and she told me.. she would- I'd love these massive long sums like […] I'd have um, we'd sit and do, like, sums and I'd evidently love it, and I do remember doing that with her, and then when I went to… […] one of the teachers had my mum in after school and told her off for doing work with me and told her that. I think that's possibly where my thing of it came from, is that she was teaching her wrong, my mum was teaching me the wrong way, the wrong method… and my mum's argument was 'well she knows how to do them does it matter how you get an answer? And then the teacher went 'no!' don't do anything more with her at home because, um, it's confusing her. And obviously, I think, um, it probably is where it stems from. And then after that Mum was a bit… didn't know if she should help me or not. [I: right] P: Then I obviously got bad experiences of teachers who didn't have any patience and things and- yeah.. so… it kind of put me off. I thought 'I don't like it any more' and then you kind of, you get nervous from it don't you. [I: yeah] P: and you don't do well if you're nervous… you got put under pressure and… yeah… it probably is that" (line 196-205).

This narrative could symbolise the 'split' or ambivalence Laura feels about being a teacher. Laura's teacher severed a bond between Laura and her mother which centred around doing mathematics together. The image of Laura doing

"massive long sums" with her mother is nurturing and loving, and when this teacher spoke to her mother and "told her off" this had a direct effect on Laura's relationship with her mother. Her mother no longer felt confident to help Laura, the nurturing mathematics games with her mother stopped and Laura felt "I don't like it any more". This moment in Laura's life symbolised a shift from a "love" of mathematics, to not liking it any more, and with this something of the maternal bond was lost. Moreover, it was a teacher that had caused this loss.

4.3.1.2 Patricia's experience of school

> "Pass or fail. Are you good or are you not" (line 259).

Patricia described her primary school mathematics lessons as being dominated by a system of cards which contained mathematics questions that each student worked through.

> "Every single class in that entire school, cos it was infants and juniors, ran on SMP[2] cards. And when you got to the second year of juniors you were expected to be on the green box…but this green box had lots of horrible things in it" (line 173).

[2] SMP stands for "School Mathematics Project" and was a system of learning mathematics popular in the 1980's in which children worked through a series of cards at their own pace. Cards were marked 1-1, 1-2. Etc according to their difficulty level and were stored in coloured boxes according to difficulty.

Patricia listed a series of mathematical functions that were contained in these boxes, and her way of speaking made me feel quite anxious. She told me about these card with a quick and urgent delivery, listing things she had not been able to understand, getting faster and louder. Sometimes she switched to speaking in the present tense, such as “I can’t do it” (line 178).

> “P: I was sat there with this card, and I can’t do it. Everyone is completing their cards, and everyone else is moving on, everyone’s moved onto the other box, everyone’s doing this and everyone’s doing that…. and I’m sat with that SMP card.
>
> I: right
>
> P: and I can’t do it. I asked the teachin- teacher and she explained but I still don’t geddit. Then I have to wait another 20 minutes or so while she’s wandering around the class helping everyone else… and I still don’t get it. And I don’t geddit over and over and over again” (Patricia, line 178- 181).

The repetition and intensity of her speech made me feel like I wanted it to stop. It felt aggressive but fragile, vulnerability spoken with such anger. It was so powerful and relentless, but what she was saying was so helpless. I believe my feelings during this were countertransference. My psychoanalytic interpretation was that Patricia’s memories were so raw she was experiencing them as strongly as she had when she was at school. The feelings of anxiety were intolerable for her, and they were therefore projected into me. A possible transference relationship, where I symbolised the teacher

and she the student meant that all the anger, fear and anxiety that she felt towards her former teachers was momentarily transferred to me.

Patricia told me that one of the SMP cards involved everyone doing a survey of the class, measuring them and ordering the data. She told me about one card that instructed pupils to weigh everyone in the class and put the weights in order on a graph. Patricia told me she was weighed thirty times. I wondered about this being a metaphor for Patricia's experience of mathematics lessons as a whole. She was being measured on something so personal and sensitive, repeatedly and relentlessly, with no support, and this sensitive information was broadcast to the class for everyone to compare. She found it "intrusive" (line 191), and it seemed that mathematics lessons as a whole made Patricia feel powerless and vulnerable. Patricia made a conscious decision to defend herself from such anxiety. "I decided that I was never going to do it ever again. That was it." (line 199). This is a powerful example of the defenses that can pervade through to adulthood.

Patricia's reflections on the first interview was "my absolute dislike of mathematics really. It's just I'm very, very, anti-mathematics" (interview 2, line 9). Patricia saw mathematics as something that was "either right or wrong." (line 46).

> "There's no in between. There's no case of 'oh you did really well on that let's extend the answer' it's just, there's a tick in the book or a cross in the book" (line 46).

I wondered if her refusal to engage with mathematics since childhood explained her simplistic “black and white” (line 259) view of the subject. For Patricia, mathematics itself was damaging to self esteem:

> “it’s easy for kids to see if they’re any good or they’re not any good, (using the language they would use, not talking as me) because they can see how many crosses they’ve got and how many crosses their mate’s got, and that instant comparison, and that instant knock on self esteem” (line 48).

Mathematics for Patricia was a very clear way to position people within a hierarchy. “Scaling” (line 61), “benchmarking” (line 61) and “setting” (line 53) were ways to attribute a position to young people “mathematics, just, it ranks you” (line 254). For Patricia, this was a “grim” (line 61) thing to do to children, and it “could make or break kids” (line 63).

> “What happens to the self esteem to those who were competing work from the orange box?” (line 63).

For Patricia, mathematics was ticks and crosses, coloured boxes, competition and setting. These marks and sets in mathematics seemed to Patricia to have a direct link to a person’s self-worth. Like a denigrating label, she said it “kills kids” (line 65), “kills off their self esteem” (line 67).

The extent to the feelings of disempowerment that Patricia felt were further exemplified when I asked her in the second interview what advice she would give to her former self as a struggling child.

> "I don't know because it's that whole alien thing, isn't it? You become very distant to everybody and the rest of the class and you approach the teacher and ask the teacher but if the teacher still isn't giving you that back then what can you do? You can't go back and tell the child, "Oh, no, you should still be approaching the teacher". If the child is still getting the same response from the teacher, it doesn't work. It really doesn't work so then what do you do? You're not going to set a child up to get rejected or to fail each time" (Patricia, interview 2, line 29).

Even now when she thought back on her experience she felt that there was nothing her younger self could do, she was powerless. The use of words like "rejected" and "fail" were poignant and I believe "that whole alien thing" was a reference to the concept of alienation. Patricia seemed to experience her primary school teacher as an uncontaining figure. Like a neglectful mother, the teacher had the power to help but did not. Patricia's anxieties at finding mathematics difficult were therefore amplified rather than contained. Patricia experienced rivalry and competition as something truly devastating. Patricia could not tolerate this, and rejected mathematics in the way that she felt mathematics had rejected her.

Patricia's experience of teachers in primary school was one of neglect. She needed help and did not get it. In secondary school the feelings she described felt more persecutory.

> "There was this vile mathematics teacher. She looked like a witch, she was known as a witch, she had long black hair [dramatic whisper] this big pointy nose [normal voice again] and she'd make very personal comments about people. So you didn't wanna be in her class" (line 217).

This teacher wanted Patricia to go up to the front of the board to explain mathematics answers and she would speak out "very loudly" (line 252) in class about the marks Patricia had got. This, along with personal comments and like the experience of being weighed at Primary School, implied a feeling of exposure and vulnerability. Patricia described the experience as "horrendous" (line 221). The length of time this went on for seemed unbearable.

> "So you can't say to the teacher, miss I don't get it; or can you explain it differently; or how do I do that? or Miss I'm stuck. Because all the time you're [clicks fingers] waiting for this sarcastic comment back. It just so happens my mathematics teacher for 4 years out of 5 was very sarcastic. She still teaches there, she teaches my nephew, and she STILL is sarcastic […] She had these massive crosses in your book, and they were extremely massive. It's the *power*. You'd sit there and it was just, it was vile" (Line 246).

What struck me in Patricia's narrative was how raw her feelings were. At some points when she spoke I felt almost like crying. I interpreted this as a countertransference of Patricia's feelings onto me. The relentlessness with which she related the narrative, repeating words like 'vile' and 'power' felt like she was re-living a painful memory. In the second interview with Patricia she told me how she had surprised herself in feeling this way.

> "I've been thinking about the fact that I actually didn't realise I'd been that affected by mathematics at school. I knew that I had a bit of a dislike about it and not happy about doing mathematics but that's it. Me and mathematics – I'm 37 years old now. I thought I'd have gotten over it by now but I haven't (laughter)" (Patricia, interview 2, line 15).

It seemed Patricia's feeling around mathematics had been so well defended against until this interview, that in talking about them she still felt the anger that she had done as a child. The laughter seemed to break a tension that was perhaps caused by the expression of such a devastating statement- that she had not yet overcome her dislike of mathematics from so many years ago. The fact that it was a surprise how much it affected her could indicate that she has not had the opportunity to reflect and process her experiences, which appeared to have affected her quite profoundly. Patricia said that mathematics lessons had sent her over the edge when there were other difficult things going on in her life. "There's lots of things. We've all got things, haven't we, that happened in our

lives, that just completely [noise, to indicate being overwhelmed]. And for me at that point, mathematics just went out the window. And I've ridden every wave since, how to get round and get out of doing mathematics!" (line 272).This reminded me of the child she spoke about ("he'd been through a lot in his life. Um and just mathematics lessons would just push him over the edge" line 36). I wondered if in some ways she identified with the child she spoke about who she had worked with as a teacher. I wondered if Patricia could be projecting into her student her unprocessed emotional experiences, projectively identifying with him, and her excellent support for this student and the draw to go the 'extra mile' to help him, was a sign that Patricia was trying in some way to rescue her unhappy former self.

Patricia had rejected mathematics, but had volunteered to be part of this research study. I felt there was a lot to process in Patricia's complex relationship with mathematics. I felt relieved when I finished this interview and this could have been another countertransference. Patricia had spoken about this insecurity she had been shouldering for so long. Patricia's narrative acutely demonstrated how the teacher/pupil relationship can affect a learner.

4.3.1.3 David's experience of school

David described his school experience by saying "most mathematics lessons were in your seat, all the tables are facing the front" (line 227). There was a fixed structure to the sessions, "you have all the information on the board and then you just do that, and you get the textbook, page ten, and you

do the first ten questions. That's what I remember about mathematics. That was the structure of mathematics lessons pretty much all the way through" (David, line 227). David, like Patricia, remembered the competitive nature of mathematics lessons. He worked through a series of textbooks "with a competition as to who could get through the book to the end" (line 129). Although David felt comfortable in his position, he was very aware of the hierarchy in the class.

> "I do remember the driving force behind it was let's see who could get to the highest book quickest, you know. I don't know if it's true but I think in our heads, we had it that if you were on book four, you should be in the year above so you're really smart because you should be in the year above." (line 243)

David remembered competing with his peers, "are you on the purple book yet? No? You're thick!" (line 245). The red book, he told me, meant that you had "established yourself" (line 157). David commented on how pointless it was to remember the colours of his old mathematics books. It did, however, perhaps indicate how poignant it was at the time, a symbol of the class's pecking order.

I was interested to note how differently David experienced the competitive nature of mathematics lessons compared with Patricia. Both raised this as an issue, but David was able to tolerate the competition as friendly rivalry, pushing him to try harder. The main differences identifiable

from their two narratives was that David found support in his peers, he had creative teaching sessions in Primary school, and good teachers in Secondary. David enjoyed the practical lessons and going outside for creative mathematics teaching at Primary school. He believed he learned more from his friends than his teachers.

> "You can be really casual about it, you know, "Did you get that answer?" and you can say it like that almost. You can almost maintain slight credibility in asking that question, can't you, when you can't say, "Sorry, I don't understand" (line 235).

He felt that telling a teacher that he did not understand was admitting a difficulty that was embarrassing, but asking his friends casually was a way of finding out an answer whilst maintaining credibility.

4.3.1.4 Linda's experience of school

Linda described her mathematics lessons as generally being text book based. Linda told me "There weren't any practical things. There weren't any resources. There wasn't any apparatus" line 57. Linda remembered a great teacher "a lovely man. I still remember him even thousands of years later. He was a really good teacher and really committed and passionate about mathematics" (line 165). Although Linda did not remember much about school, she "just knew" that she enjoyed mathematics (line 182).

Linda had expressed a confident and positive identity around her mathematics ability, she had done well in her O-levels and taken mathematics on to A-level, however she had missed out the whole section on 'Mechanics' out of her exam, because she had not understood the teaching.

> "P: When I went into A Level, I had Mr [Smith] who was the deputy head at the time who was [dictatorial] and an awful man. If you didn't get it, he just sort of slapped you. In those days, you'd get hit or he'd shout at you.
>
> I: Even at sixth form?
>
> P: Yeah, you'd get told off or I remember someone getting slapped around the head. There were three sections to the paper and one of the sections was for mechanics which he taught, and I just couldn't understand it. I could not understand it and he didn't care that I didn't understand it. He would just shout at you and call you thick and things" (line 165-169).

Linda continued to blame her A-level result on this bad teaching experience, but Linda's account of her experience felt much less emotionally charged than some of the other participants. She seemed to me to have a more 'matter of fact' delivery. She told me that things were different at the time she was at school, and that was just how they were. She had difficulty remembering a lot of her school experience, and when she remembered children being physically punished it was conveyed in a way that I did not feel any emotional affect. When I asked about her primary school experience she said:

> “I’ve got the feeling of it being very light, friendly and fun, you know, nothing traumatic. I remember people getting the slipper” (line 191).

Perhaps Linda’s positive identity as a confident mathematician meant that Linda was not angry about her school experiences, or perhaps it was because she was older than the other participants so it felt more distant. I also wondered if our dynamics within the interview, where she maintained a dominant position throughout, meant that it was not socially appropriate for her to communicate the emotion which could have accompanied what she was saying.

In the second interview with Linda, when I asked her what she remembered from the previous interview, she said “Oh, the only thing that stands out for me is the bad experience with the bad teacher” (line 30) she went on to say “I do think that if you don’t have a teacher that is understanding, resourceful, or sensitive to the needs then I think that you will always have that bad experience of mathematics” (line 35).

4.3.2 Summary

What were participants’ perceptions of their own experiences of learning mathematics as a child?

1. When considered collectively participants recollected mathematics learning as a time when they felt vulnerable or disempowered, although each participant experienced this to a different degree, and through a psycho-social lens could be thought about as more or less defended against these feelings. In terms of the

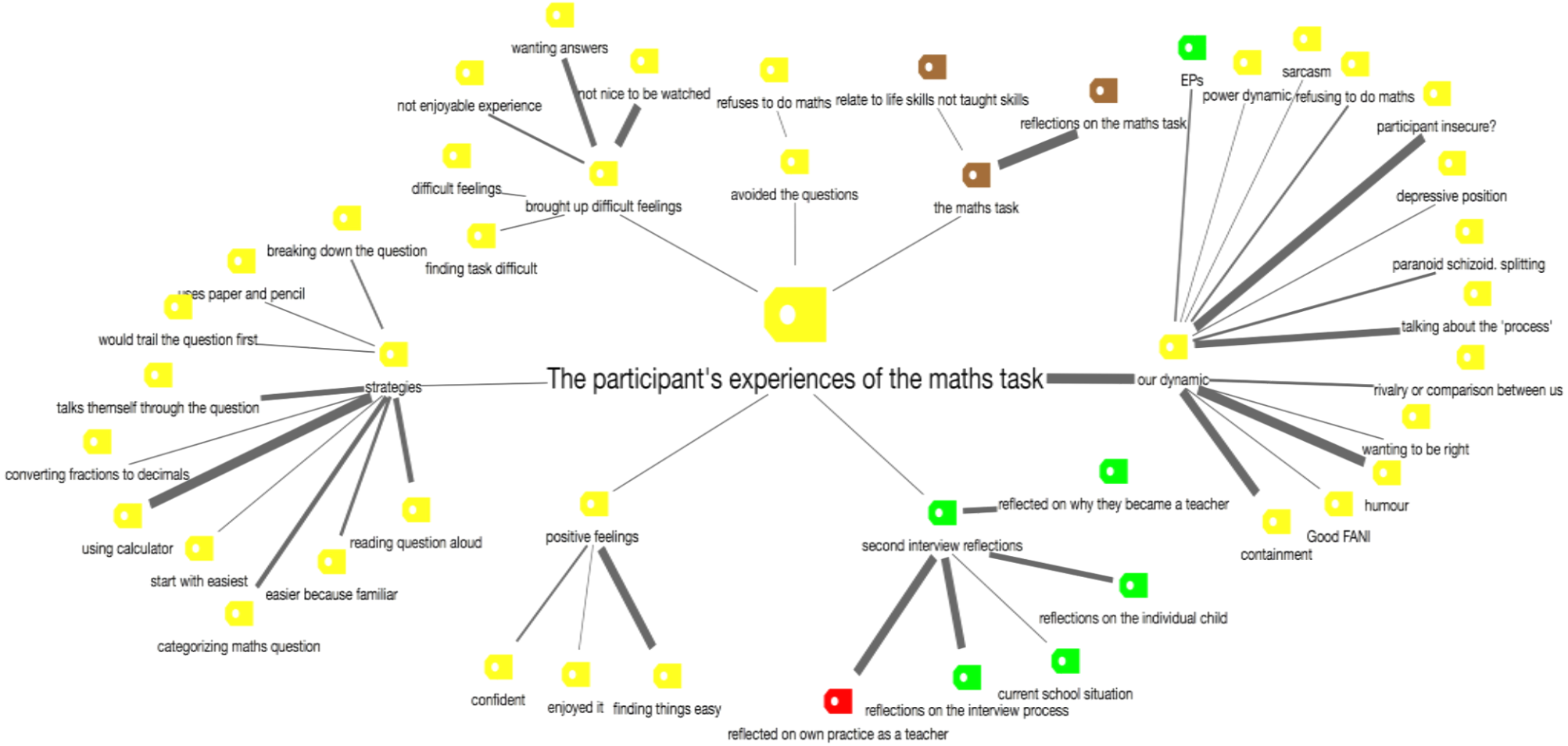
mathematics classroom, participants discussed how their lessons had involved sitting at desks with the teacher explaining at the front of the room. This method of teaching was experienced as boring, and, for some, traumatic. When participants were asked about school they all discussed their teachers, which highlighted the dominant role that teachers played in all their narratives. All participants told me a grade when I asked about their experience. This implied that they attributed some form of identity onto that grade. For all of the participants, mathematics at school seemed to be synonymous with mathematics teachers. I asked each of them about their experience of mathematics at school and all four responded with a comment about a mathematics teacher. All of them attributed their insecurities with mathematics to poor teaching experiences.

2. Uncontaining school experiences of mathematics left a lasting impression on the participants. Three of the four participants (Laura, Linda and Patricia) still felt strongly about their teachers' negative impact. Although negative stories dominated, participants did also mention positive aspects of their mathematics learning experiences. Each participant provided examples of the pivotal role teachers played in forming their relationship with mathematics and identities as mathematicians. From a psycho-social perspective, when there was lack of containment from the mathematics teacher, this had hugely negative consequences.

4.4. How do participants experience doing mathematics tasks?

The mathematics task was not in keeping with Free Association Narrative Interviewing, which follows the narrative of the interviewee. Instead, the mathematics task imposed a structure on the interview which was dominated by the myself, the interviewer. The mathematics task involved me in fact directly asking the interviewee to do something. It imposed a challenge on the participant, which may have made them uncomfortable. As such, it was not following their lead, but directing their attention. Despite this, the reactions of the participants can be analysed from a psycho-social perspective, taking into account the spoken and unspoken anxiety and dynamics at play during the interaction.

Figure 7. Overview of how participants experienced the mathematics task



4.4.1 Laura's experiences of the mathematics task

Laura was not confident as she began the task. When I showed Laura the mathematics questions and asked her to put them in order of hardest to easiest, she initially said that they were all hard She said "all of them" in a quiet voice, and immediately retracted the statement, similar to the way she had told me her F-grade was awful and then retracted.

The introduction of the mathematics task had an interesting impact on our interviewer/interviewee dynamic, and it appeared that we had formed a transference relationship where I had become the provider of tasks and tools with which to do the task, and Laura had been stripped of her competence. This was exemplified by me telling her which question to do, and then giving her paper and pencil, and furthermore telling her she did not have to use it. I also used the pronouns "we" and "let's". At the time I was not aware my use of pronoun had changed, which makes me think the transference relationship had formed unconsciously.

Despite the years of experience she had told me about at the beginning of our interview, Laura was labeling herself as someone who "must be stupid". Laura said

> "I mean you see these and you feel 'oh I don't like this' and you see that's how I feel now […] it's getting an answer and being told you're no good at it. I'm looking at another one now to do. I don't wanna do that one!" (line 218).

After revealing personal information about her own childhood, and being listened to, Laura appeared to have a renewed confidence and attempted the mathematics tasks. She read through the questions thoroughly and when she told me the answer, she asked it was in a much happier and less nervous manner than before. Laura used the phrase, “my brain tells me that that’s the answer” (line 234). This comment led me to hypothesise that Laura had split off part of her thinking when it came to mathematics tasks. Her metaphor was that her brain is doing the mathematics and telling her the answer, implying that her brain was separate from herself. This made me think that Laura did not identify with the part of her that was capable of doing mathematics tasks, although she seemed confident to trust this part of herself. This “split” was further evidenced when Laura attempted the next mathematics question, the one she felt was the most difficult. Laura seemed split between the “brain” part of her that wanted to do the task, similar to the competent teacher aspect of her identity, (“I don’t like fractions very much,” and “I quite like the word problem ones”), and a critical negative voice that was telling her she could not do it, which linked to her narrative of her experience doing mathematics at school (“ok I’m not doing [the task]…” (line 162) and “I must be really stupid probably”, line 188).

Analysis of Laura’s narrative as she talked through these mathematics questions could be split into her talking as a child and her talking as a teacher. Laura started the maths task in a childlike and underconfident way, she told me she would need to draw out pictures of pies and colour sections in order to

understand the question about fractions “Like the kids do… I must be really stupid probably!” (line 167). As she grew more confident, Laura switched to talking as if she were a teacher. Laura started the process by saying “if I was a child I would” but then amended her comment- “the child would” (line 246). She noticed that she had done this “I’m doing it like a teacher isn’t it” (line 248). When I asked what she meant by this, she said “you break it down into things that you can manage” (line 250). She carried on working out the mathematics and making comments like:

“I’d tell the children that 2x2 is 4 […] it’s a really long winded way of doing it isn’t it but then they can see what’s going on” (line 251)

“tell the children that that’s what they need to add up” (line 254)

“well you’d show the children that” (line 256)

“I was just -children need to break it down into pieces” (line 258).

Laura seemed to have switched from position of the vulnerable child-like position, who labelled herself as ‘stupid’ (line 190) and was overwhelmed by the task (line 154). By talking to me in her teacher role, she has become confident and methodical, talking through each step of the mathematics calculation, breaking it down into “things that you can manage”. Her self-depricating comments had a much more light hearted tone to them, and she qualified her processes by telling me they were helpful for children when learning.

Laura persevered for several minutes on this mathematics task, writing

out methodically all her calculations with paper and pencil, and explaining out loud which method would be appropriate for each part of the question, such as “the bus stop method” (line 261) to describe division. She completed the task and pushed the paper away from her. I felt relief, that she had persevered and attempted the question so proficiently. This was possibly a countertransference from Laura as I believe she felt relief too because of her next comment:

> “You know actually, it’s not- when you break it down- it’s ok. And I guess that’s the thing for mathematics isn’t it, you break it down. I would say to the children, if you read something and think ‘oh my god I can’t do that’ and then if you break it down into bits, and you can do, then it’s not so bad” (line 163).

At another point in the interview Laura differentiated between her memories of teaching her “own” memories, implying that the memories of teaching were somehow not her own. Laura appeared to split her childlike self from her teacher self, and like when it was “her brain” (line 234) that told her the answer to the mathematics question previously, she seems to identify more with the childlike self. Laura told me at the end that she had not enjoyed doing the mathematics task, and instead she would prefer to “read a nice poem or draw a picture, or colour something in, or paint a picture” (line 325). These activities struck me as particularly child-like, and further added to my hypothesis that we had created a transference relationship.

Laura talked herself through the task, which was a helpful strategy in terms of breaking down the questions into manageable chunks. However, Laura frequently reprimanded herself, and made negative comments about her ability at the task, negative thoughts about herself and comments about how she thought I must feel about her. For example, “I must be stupid” (line 189), “hang on, no I’m wrong” (line 230), “I’m not being decisive am I” (line 244), and “you’ll laugh at me when you leave here won’t you” (line 50). Although Laura initially avoided answering the mathematics questions and told me about her experiences as a child instead, she did attempt and complete all parts to the task, breaking down even the hardest questions into sections and using a pencil and paper to do long multiplication and division. She wanted to know whether she had got the answers right. Her reflections of the experience were that she had felt rushed, but that with a bit of processing time they “weren’t quite as bad as what I thought” (line 142, interview 2). She said it made her more aware of how teachers can rush children who may just need a bit more time.

4.4.2. Patricia’s experiences of the mathematics task

Patricia made it clear that she would not be attempting the mathematics questions, although she did put them in order of difficulty. She made comments such as “no, not touching it” (line 137), “too much! hard!” (line 147) and “oh my god, no, go away!” (line 147). She placed the questions in order of hardest to easiest based on how the questions appeared, such as if they had

equations in “equations died in the second year of junior school” (line 131), or if there was a lot of writing. The question that she felt was more “bearable” was the one that involved going into a shop, because it had a story attached. She went through the questions very quickly and rushed, and told me she was not reading them properly. Patricia did not use strategies that may have helped her with the task, for example reading through the questions aloud to herself.

Patricia put a lot of energy into her comments about not doing mathematics. In my research diaries, and through psycho-social supervision, I tried to understand why Patricia had volunteered to take part in the research but refused to do the mathematics. My understanding came through reflecting on my countertransference. At this point in the interview I was frustrated that Patricia would not try a mathematics question, I was nervous about pushing her too far and scared she would terminate the interview. I was a bit intimidated by her comments like “no, go away!” (line 147). I used the countertransference to hypothesise that Patricia was also feeling frustrated, nervous, scared or maybe intimidated by the mathematics questions. When I asked her to do a mathematics question our dynamic mimicked teacher and student and that became a transference relationship. Patricia projected into me these intolerable feelings.

My interview with Patricia demonstrated the strength of emotions that mathematics can stir up. She had warned be at the start of the interview to be prepared for her to be oppositional. It also highlighted how powerful projections can be experienced by teachers. It showed the potential for conflict within a mathematics classroom (teachers could put sanctions in place for refusal) and for students to become disaffected (students could refuse to do mathematics

as a defense against intolerable feelings). Moreover, it showed that these difficult classroom experiences can be replicated in transference relationships throughout adulthood.

4.2.3 David's experiences of the mathematics task

When I presented the mathematics questions to David he asked me some questions. Firstly he wanted to know if I knew the answers, and then if I was good at mathematics.

"P: Do you know the answers? Did you come up with these questions?

I : don't know the answers.

P: Okay.

I: I'm just more interested in the process.

P: Okay. Is mathematics an area of strength for you? Is that something you find quite easy?

I: That's interesting that you asked me that. What do you think?

P: I would have assumed that mathematics was something that potentially you found relatively easy, I would assume. Just from my interpretation of mathematics teachers, I would assume that you were okay at this.

I: Oh, I see. So, did you assume I was a mathematics teacher?

P: No, I just assumed that you were good at mathematics, like somebody who is a mathematics teacher" (lines 149- 157).

These questions reminded me of the rivalry David spoke about that he had experienced when he was at school. Through asking these questions David seemed to be gauging my status as competition. David began the task by confidently separating the questions into functions. He talked me through his thinking, explaining why things looked easier or harder. Harder questions were those with multiple steps where there was lots to remember, where it would take time to work out what the questions were asking him. The easier ones, he said, involved functions he was more familiar with. David completed the first question easily and confidently, and explained his answer. He said that he knew that answer as soon as he saw the questions, but he had explained it using numbers for my benefit. David approached the second question equally confidently. He did it quickly in his head, repeating "straight away" to let me know how quick his mental mathematics was, then explained his answer.

David stumbled on the third mathematics question. He read through the questions and told me that he was not sure what the question wanted him to do. He said that "I'm sure I probably could figure it out" (line 185) but after this his narrative began to include more negative self talk.

"I can't figure out how to do that" (line 181)

"I'm guessing" (line 183)

"I can't remember" (line 185)

"I'm being lazy" (line 185)

"That's bad. I can't remember how to do the multiplication. My basic mathematics has let me down, now. No, I've lost it. No. I can't do the last one" (line 187).

David told me he felt "a little element of shame" (line 195). He seemed frustrated with himself for not remembering how to do the mathematics. He attributed his feeling of shame to rote learning mathematics at school, this meant that he found things hard to remember, he explained. In the second interview David was very reflective about doing the mathematics task. He said "if I was reading a report and didn't know what something meant I'd quite happily ask. But when it was mathematics I remember being embarrassed about it rather than thinking 'I'll just ask'" (line 11, interview 2). David told me that it was because it was mathematics that made it so embarrassing. If it was a general knowledge question he said he would have been more confident about asking. He said he felt he should have known the answer.

"I remember thinking 'I'm ashamed because I should know how to do that and I've forgotten" (line 17, interview 2).

The difficulty in expressing feelings of shame, or perhaps the ineffable nature of it, was articulated in David's comment:

> "I don't know why I was ashamed, but I do remember saying that and I think that probably was the right term. There's lots of things behind shame isn't there" (line 21, interview 2).

David admitted to me that once I had left after the first interview he had portrayed me in a negative way to his colleagues, and I wondered whether this was a response to being made to feel embarrassed. David had also reflected on the concept of mathematics in interview 2. David said he had initially seen mathematics as something that one could be either good or bad at. But on reflection, after our first interview, he told me he had begun to think of it from a more 'depressive' position.

> "Well, I think my initial thoughts, well my attitude was that you're good or you're bad but I think when we started talking about it a bit more, it came about that actually you can be okay at it depending on the frequency of use" (line 7, interview 2).

He noticed how others he had spoken to had a more polarised, black and white view of mathematics, that individuals were "either a number person or a word person" (line 35 interview 2). People's attitudes seemed often to be gendered, their husbands were number people, so they were not. David's

attitude in the second interview had developed from this perspective. He told me his wife and him both shared the mortgage tasks, and “I’m alright at some parts of mathematics. It’s just that some parts I’m not so good at” (line 55 interview 2). Like the child David had discussed previously, in some places and times he could do mathematics, and at others he could not or did not want to. David attributed the shame he felt at not being able to do some mathematics questions to his teaching when he was at school and to the fact that he had not practised much mathematics recently so had forgotten things. He seemed confident that with a bit of revision he would be competent at mathematics.

> “I mean, if I was teaching it or I was using it regularly, if I worked in a profession where I had to use numbers, I would be quite happy to do it and I’d probably be as good as anyone else at doing mathematics” (line 209).

In the second interview David told me he had focused on the negative feelings he had experienced, those of shame and embarrassment. He had thought about his identity with mathematics. He had reflected on the pedagogy of mathematics and the differences in teaching styles since he was at school. He said that as a result of this he had put in a new nurture group intervention in his school.

4.4.4 Linda's experiences of the mathematics task

Linda was confident at attempting the mathematics task. When Linda saw the questions she explained how she would go about doing each one, but did not actually attempt any of the questions. She explained in the second interview that she embarrassed about potentially getting them wrong.

> "I quite enjoyed trying to work out which ones I could do, but then again you get frustrated if you think 'Oh I can't remember how to do that' and then it's quite hard when someone's watching you as well, sitting over you. It's quite hard" (line 133, interview 2).

Linda decided which questions were "easy" and she thought some parts were "obvious" (line 147). She said that she liked the ones that challenged her. She was able to just 'see' the answer, and she knew the methods very confidently ("I know the rule for that", line 147). She wanted to use a calculator, and when I said there was no calculator she talked about using the calculator on her phone instead. I felt that Linda was not going to be told what to do.

Linda interrupted me quite frequently throughout the interview. She was clearly busy and although she told people her office was engaged, we were interrupted more than once by staff wanting to speak to her. She told me she was glad the interview was "speedy and efficient" (line

200). Despite this confidence, I noticed that Linda did not actually do any of the questions. Linda said “I think sometimes as you get older you get a bit embarrassed if you can’t work out the answer” (line 161). Linda reflected in the second interview that she had noticed that she gave up quickly with the task and this was a pattern for her when she found a task difficult.

4.4.5. Summary

What were participants’ experiences of doing the mathematics task?

1. Feelings of shame were either explicitly expressed or inferred from all participants.

David explicitly told me that they felt ashamed and embarrassed at not being able to do part of the task. Patricia refused to do the task. Linda did not answer any of the questions, although she told me how she would go about them. She told me in the second interview she did not attempt the questions properly because she was worried about being embarrassed if she could not do them. Laura, Linda and Patricia also indicated shame; through avoidance in Linda’s case, refusal in Patricia’s, and Laura calling herself ‘stupid’. All four participants told me they did not like being watched.

2. Participants’ experiences of the mathematics task linked with their experiences of learning mathematics at school.

Patricia refused to do the task, and told me this was because of negative school experiences. Laura was nervous, and explained that her reticence to complete the task was due to bad experiences at school. David was slightly competitive with me, asking whether I knew the answers or whether I was a mathematics teacher. He had also described his mathematics classes at school as involving friendly competition with peers. Linda appeared the most confident at the task, although it was noticeable that she did not actually attempt any of the questions. This linked to her narrative about being confident and enjoying mathematics at school but not completing a section of her A-level paper she was not confident with. Participants with a more positive experience of school were more confident to use strategies to support them in the tasks.

4.5. Conclusions of Findings

My participants' conceptualisation of mathematics difficulties in others had many similarities. The causes were a combination of within child factors, emotional factors such as anxiety, and family and school influences. When they spoke about their own experiences of mathematics learning, this unearthed powerful and often painful memories. In completing the mathematics tasks, participants' emotions were explicitly and implicitly expressed. The dynamic between myself and the participant was affected by what they and I brought to the interview in terms of expectations and past experiences. For clarity, the themes that emerged with respect to the interview questions are represented below on table 5.

Table 5. Themes that emerged with respect to the interview questions

Interview question	Theme that emerged
How did participants think about children's difficulties in mathematics, and children who struggle at mathematics?	The SENCOs thought about the children as individuals with whom they had positive and meaningful learning relationships.
	The SENCOs attributed the causes of children's difficulties to learning difficulties as 'within child', poor teaching or poor parenting.
What were participants' perceptions of their own experiences of mathematics learning as a child?	Participants recollected mathematics learning as a time when they felt vulnerable or disempowered.
	Uncontaining school experiences of mathematics left a lasting impression on the participants.
How did participants experience doing mathematics tasks?	Feelings of shame were either explicitly expressed or inferred by all participants.
	Participants' experiences of the mathematics task linked with their experiences of learning mathematics at school.

Chapter 5. Discussion

In this chapter I discuss the findings that emerged out of the interview data with my four participants. I discuss each theme in turn, giving consideration to each point from psychoanalytic and socio-cultural perspectives, as well as exploring other psychological models that were appropriate. I then examine the limitations of this study, and the implications of the research. As this is a reflexive piece of research, I try to acknowledge my role as researcher throughout the research process, and in this chapter I briefly reflect on the findings and experience of this research before underlining the conclusions of this study.

5.1. A summary of my findings

1. LEARNING RELATIONSHIPS.

   The participants thought about the children as individuals with whom they had positive and meaningful learning relationships.

2. ATTRIBUTING CAUSES.

   The participants attributed the causes of children's difficulties in mathematics to learning difficulties within the child, poor teaching or poor parenting.

3. MATHEMATICS AND VULNERABILITY.

Participants recollected mathematics learning as a time when they felt vulnerable or disempowered.

4. MATHEMATICS IDENTITY.

   Uncontaining school experiences of mathematics left a lasting impression on the participants.

5. SHAME.

   Feelings of shame were either explicitly expressed or inferred by all participants.

6. THE LEARNING EXPERIENCE.

   Participants' experiences of the mathematics task linked with their experiences of learning mathematics at school.

Theme 1. LEARNING RELATIONSHIPS

The SENCOs thought about the children as individuals with whom they had positive and meaningful learning relationships. The participants described their students in terms of their personality traits. They described them as kind, under-confident and hardworking. The SENCOs described working with these children in a nurturing and emotionally containing way. SENCOs described acting as containment figures in these students' learning. For example, by sitting with the students as they worked, or talking with them at the school gates, which let the children know they were held in mind. Although none of the SENCOs named a psychological theory they were following, their

interactions can be explained through the container/contained model (Bion, 1962). Their descriptions of their work with the children contrasted with how they described experiencing the negative aspects of mathematics when they were at school, and were more similar to their experiences of kind teachers who had helped them learn.

Theme 2. ATTRIBUTING CAUSES

The SENCOs attributed the causes of children's difficulties to learning difficulties within the child, poor teaching or poor parenting.

Participants tended to attribute the causes of the children's learning difficulties to a) the child's family not flagging up needs, b) other teachers or school systems or c) within-child difficulties such as Global Developmental Delay. Difficulties were not attributed to the child's lack of effort or motivation, or to anything the participants themselves could have done differently. The way that participants attributed causes of mathematics difficulty can be understood from both the psychoanalytic and social aspects of the psycho-social ontology. From the psychoanalytic lens, by blaming others the participants were able to project uncomfortable feelings onto others and therefore defend themselves against anxieties of feeling incompetent. This lack of self-blame could be seen as the participants employing a defensive strategy of splitting and projection. Participants split off the intolerable aspects of the learning process, and projected these into others, thus protecting themselves from being in the difficult position of uncertainty, ignorance

or impotence. The fact that no SENCOs blamed the children could be due to the participants having a good understanding of SEN and systemic factors affecting learning. However, particularly in Patricia's case another interpretation could be made. She could have been projectively identifying with the student.

From a social perspective of the psycho-social ontology, the participants raised issues around the nature of mathematics teaching which had social implications. Participants expressed beliefs that mathematics was being taught in unimaginative ways and mathematics teachers did not seem to understand mathematics difficulties, which affected how the children learned.

5.2.1 Attributing causes to the child's family

Participants raised the complex dynamics that can exist between teacher and parent as teachers navigated the role of containment figure while also maintaining a professional distance. When discussing their child, each participant spoke about the child's family. Linking with parents is an element of the SENCO role that the participants clearly valued, and saw as important for the child's development. One participant apportioned blame to children's family for not flagging up special needs, another participant reported that the parent's lack of mathematical skills impacted on the child's mathematics learning, and another implied that the child's disrupted home life had affected his confidence for learning mathematics. For three participants, gaps between the children who did and did not achieve at school were attributed to parents not supporting

their children adequately at home with schoolwork. Conversely, David was keen to point out when parents were supportive of their child's learning and of the school. With respect to this, David's child was the only one with a series of 'within child' diagnoses (Global Developmental Delay and Autism) and perhaps he therefore felt less need to psychologically defend himself against perceived accusations of poor teaching.

5.2.2 Attributing causes to other teachers and school systems

Some participants discussed their beliefs that mathematics teachers understood mathematics so they tended not to understand the difficulties with it. From a psychoanalytic perspective, the attribution of cause to other teachers and systems could also be seen as a defensive mechanism. The projection of failings onto others can be seen as a defence from the failing being attributed to the person themselves.

Some participants noted the shortcomings of other school systems. David posited that the SEN systems in primary schools were not inclusive, when a child had lots of support outside of the classroom this did not prepare them well for secondary school. Laura told me that the previous school her child had attended had not recognised or highlighted any special needs despite the child having acute anxiety and poor achievement across the subjects. It was only Linda who recognised her own school's role in the needs of her child, acknowledging that 'number' was a problem throughout the school.

Due to the reflexive nature of this research, I acknowledged my own defences as interviewer, and my role as a Trainee EP in the interview. When Laura in her second interview told me about an EP who had arrived at a meeting unprepared, I immediately blamed the wider system for the pressure EPs are under which suggested I too was defensive of my position. The current socio-political environment of cuts to education services could be creating a more pressured environment where resources are scarcer. Brown (2008) discussed the social pressures that teachers are under that create anxiety alongside projections from students, and in a time of high pressure, there are more anxious feelings to be projected into others.

5.2.3 Participants attributing learning difficulties to 'within child' factors

Participants tended to describe their individual students as willing to learn but anxious. Perhaps it was the phrasing of the term 'struggled' in the question, but the students described were all trying hard to overcome their difficulties with mathematics. Some difficulties were attributed to 'within child' difficulties, such as Global Developmental Delay (David). Linda acknowledged there might be a genetic component to SEN, but she seemed to also think it could be down to exposure to mathematics in everyday life. Across the participants there was an acknowledgement that there were aspects of mathematics that the children could not achieve at the moment, but the participants'

narratives emphasised ways that good teaching could improve students' learning. The participants seemed to think about these students' learning in a way that meant the students could always develop with suitable teaching.

Dyscalculia was raised by all four participants. The two more confident mathematicians (David and Linda) were sceptical about the diagnosis, whereas the less mathematics-confident participants (Laura and Patricia) seemed to perceive dyscalculia as a real condition although perhaps hard to identify. The four different ways of understanding 'dyscalculia' provided by the four participants emphasised the continued lack of clarity about the concept of a learning difficulty specific to mathematics.

In my research, David's child was the only one to have been diagnosed with within-child difficulties. He was also the only participant not to attribute learning difficulty causes to the parents. From a psycho-social perspective, David was able to maintain a position where the child, his family and David himself were free from blame by attributing the causes to a difficulty within the student over which the student had no control. A within-child diagnosis offered an explanation for learning difficulties which enabled all the people concerned to remain psychologically defended against feelings of incompetence.

Theme 3. MATHEMATICS AND VULNERABILITY

Participants' negative feelings around mathematics were associated with rivalry, disempowerment or vulnerability. Participants discussed how their lessons had involved sitting at desks with a teacher at the front of the room. This method of teaching was experienced as boring, and when the teachers were also angry, it was experienced as traumatic. When Patricia was in secondary school she remembered a 'vile' experience of her teacher putting crosses in her book next to incorrect answers as she sat watching. She described this as if the teacher was doing this to demonstrate her power. Whether or not this was the case, one person (the teacher) giving another person (Patricia) a cross clearly indicated an unequal power balance. Linda described her mathematics teacher slapping students and calling them 'thick', even when they were in sixth form.

Previous research (Angier & Povey, 1999) has found that text book learning created an environment closed off to thinking, and that the mathematics classroom had unequal dynamics between teacher and students. The mathematics classroom separated the emotional aspects of learning from the content, and created an environment where getting the correct answer was the only goal. The curriculum and approach to mathematics were seen as relevant to the relationships within the classroom. When participants were asked about school they all discussed their teachers, which highlighted the dominant role that teachers played in all their narratives. In this situation my research indicated that the emotions can go unspoken. Laura described being

afraid to ask, Patricia described keeping her head down, Linda did not do her mathematics A-level exam in full. All three expressed anger that they still felt about it.

Emotional reactions to mathematics are a consequence of how mathematics itself is thought about. It was striking how painful the memories of mathematics learning were for some participants. Mathematics anxiety was defined as “a negative emotional response in situations involving mathematical reasoning that is characterised by avoidance as well as feelings of stress and anxiety” (Suárez-Pellicioni, Núñez-Peña & Colomé, 2015, p1). By this definition, it seems that at least Patricia and perhaps also Laura could fit under this umbrella term. The purpose of this research was to investigate how participants felt about mathematics, and I had not anticipated to unearth such powerfully painful experiences as those described by Patricia and Laura.

The participants, particularly Patricia and David, emphasised how the nature of mathematics lessons being taught in uncreative and linear ways created an atmosphere where students were encouraged to compare themselves against each other. Patricia’s experience of ‘SMP cards’ in coloured boxes that her class worked through in stages, and David’s experience of working through different coloured books, emphasised to them the hierarchy of the class and their position within it. The drive was to finish books or cards ahead of your peers, not to understand or enjoy the

mathematics. Mathematics, for Laura and Patricia particularly, was linked with being put in a “set” at secondary school, a symbol of the class’s pecking order. Laura and Patricia described being ‘put’, or ‘ending up’ in a certain set, with unpleasant teachers and other problems such as behavioural issues. This emphasised the lack of control they had in this decision. Setting in mathematics was an overt indication of a student’s rank within the year group, and evoked strong feelings.

Boylan’s (2009) research looked into mathematics learning from a perspective of social justice. He stressed that the emotional aspects of teaching involved aspects of the individual, relational and socio-political. Boylan emphasised that emotional aspects of mathematics learning should not be considered as solely within an individual or due to a particular one-off dynamic between two people. Instead, Boylan (2009) alluded to a wider context from which these deep seated emotions should be viewed, and considered the socio-political factors such as curriculum, and the expectations from society about what a mathematics lesson should look like.

> “Feelings such as frustration and boredom and the actions that can arise can be seen as a form of emotional resistance to the basic injustice of a decontextualised and disconnected mathematics curriculum” (Boylan, 2009, p430).

Youell (2006) wrote that “for many, the mere fact of being one child in a class of many stirs up powerful feelings of sibling rivalry. The tests then play directly into those unconscious preoccupations with who is the best and who is Mummy’s (teacher’s) favourite child” (p150). In a containing environment rivalry could be experienced as competition, in the way David did. But in an unsafe space, this rivalry was experienced by Patricia as rejection. Patricia received her own anxieties projected back with rejection from the containment figure. The way that Patricia experienced her primary school mathematics lessons was more akin to Bion’s “nameless dread” (Bion, 1962, p183), as she was in need but rejected by the maternal figure.

Theme 4. MATHEMATICS IDENTITY

Uncontaining school experiences of mathematics left a lasting impression on the participants. The participants’ experiences of learning mathematics as a child appeared to have a lasting and profound effect on how they remembered school experiences; how they thought about mathematics; and how they thought of themselves as mathematicians and teachers.

All of the participants described unpleasant times learning mathematics as a child. This experience had a profound effect on the SENCOs, and for some it seemed to permeate how they thought of themselves as individuals. When I asked about their experience of mathematics at school, all participants told me the grade they had achieved at GCSE level. This made me wonder whether more was being attributed to this grade than merely an exam result, in

a way the participants were implying that the grade reflected themselves in some way. Brown referenced Winnicott (1966), and stated that “for many students, not only does mathematics fail to add up, it can also come to *represent* the failure of things to add up” (Brown, 2008, in de Freitas and Nolan ed, 2008, p27) and that “the internalising of experience associated with learning mathematics can become bound up with other internal dynamics” (p28).

Brown (2008) stated that complex dynamics of the classroom were taught alongside the explicit learning in the classroom, and that the complexity of a mathematics classroom extended beyond conscious processes. This study has shown that mathematics learning is more than just the content knowledge.

> “The relational laws and structures of mathematics become available for unconscious representations in the psyche of learners and teachers. They are used to represent both success and failure- in mathematics, in personal development and in personal relations” (p30).

This research demonstrated the poignancy of bad school experiences and the role of such experiences in forming identities which last to adulthood. Patricia in particular continued to see mathematics as a confidence crushing subject. Bibby (2001) quoted “perhaps paradoxically, the least confident mathematicians may well be the most vociferous in holding to the narrow conception of mathematics that they themselves have experienced most difficulty with” (Galbraith & Chant, 1990; quoted in Bibby, 2001, p708). For

Patricia, her experience of school affected her so profoundly that all her subsequent experiences of 14 years teaching, and her knowledge of learning theories such as Growth Mindset (Dweck, 2006) has not been able to alter her attitudes.

The ramifications of the hypothesis that mathematics ability forms part of identity are wide ranging. It was notable, for example, that the participants with a more positive identity as a mathematician used helpful strategies to enable them to complete the task. David and Linda talked themselves through the questions, reading them aloud, breaking them into steps and so on. Laura adopted two polarised identities almost simultaneously throughout the interview as both a vulnerable student, and a confident teacher. Laura's ability to 'split' off the part of her identity that she considered to be an incompetent mathematician from the part of her that was a competent teacher could be seen to represent an unconscious defence mechanism that meant that although she identified as a bad mathematician, she was able to simultaneously think of herself as a good teacher. In order for her to successfully complete the mathematics questions she talked through the question as if she were teaching her children. However, Patricia's defence against the anxiety of mathematics was to avoid it altogether, and this was less helpful as a strategy. Patricia had defended against trying and failing, but at the same time had denied herself the satisfaction of attempting and achieving a task. By avoiding mathematics Patricia held on to an identity as someone who could not do something, and which in turn led to her holding on to the associated sense of frustration this entailed.

Theme 5. SHAME

Feelings of shame were either explicitly expressed or inferred from all participants. Laura and David explicitly told me they felt ashamed or embarrassed at not being able to complete the mathematics tasks during the interviews. Linda told me she did not attempt the questions properly because she was worried about being embarrassed if she could not do them. Patricia refused to attempt the mathematics questions whatsoever, and although she did not tell me that this was because she felt ashamed or embarrassed, her point-blank refusal indicated to me that this was a defence against trying and failing. All the participants told me they did not like being watched, and none of them asked me for help. During the mathematics task Laura and David labelled themselves with negative attributes, Laura called herself ‘stupid’, David called himself ‘lazy’.

When participants thought about mathematics difficulties in others they attributed it to teaching or parenting. When they thought about their own difficulties they also attributed this to their teaching experiences, but what the experiential element of this study added was the emotional link between perceiving difficulties and attributing causes. Bion (1970) discussed different types of knowledge a child learns: factual knowledge, but also knowledge held in relationships. A child may learn 2+3=5, but they may also learn that knowing the answer to this is something to be proud of. When the participants in my

study learnt mathematics, they also had learnt that not knowing the answer, not being able to work something out, was shameful.

Patricia talked about her secondary school teacher reading out her marks very loudly which she found horrendous. The implication here was that her marks were things she was not proud of. When Laura told me she had got an F grade at her GCSE exam the first time round, she did so as if she was embarrassed about this. Initially emphasising it and unable to attribute blame to herself or say the word 'awful'.

When Laura was finding part of the mathematics task difficult, she said "I must be stupid", as if the opposite of "able to do mathematics task" was "stupid". This linked mathematics and overall intelligence. The opposite construct to 'stupid' would be 'clever' or 'intelligent'. Linda had told me that an A-level in mathematics gained "respect", which again implied that having a qualification in mathematics was somehow more noteworthy than having one in another subject. The links between mathematics and feelings of shame made more sense when mathematics talent was thought of as equating to intelligence.

Bibby (2002) discussed the concept of shame in mathematics at length. She noted Scheff's (1994) conceptualization of shame, "the suggestion here is that mathematics (and perhaps particularly school mathematics) provides the right conditions for the engendering of

shame" (p708). She wrote that "notions of shame are wrapped up with identity and self-perception" (p708) and personal and social aspects of identity may be threatened by feelings of shame.

Theme 6. THE LEARNING EXPERIENCE

Participants' experiences of the mathematics task linked with their experiences of learning mathematics at school. This research demonstrated the complex emotions and perceptions that are held with regard to learning mathematics. Furthermore, it seemed to demonstrate that experiencing and discussing these emotions changed the perception participants had about them. Noticing these emotions seemed to stimulate a change in itself.

The interview experience led to the participants making changes in their professional development. Some of them had made decisions to change their teaching practice or style, for example David decided to set up a Nurture Group, Patricia made a decision to look out for children who kept their heads down in order to avoid mathematics, and Laura decided to allow children more time to think before she told them the answers. But perhaps the most significant impact of the research interviews was that the participants had noticed something within themselves about their attitudes to mathematics. Bringing to the fore of their mind some of their unspoken attitudes, the participants had surprised themselves with their own opinions. Laura realised she was not as bad as she thought she was. David too expressed a change in perception since the first interview. He had synthesised what could be thought of as a paranoid-schizoid view that 'people are either good at mathematics or

they are not', to a more depressive view that people can be sometimes good at some aspects of mathematics.

Therapeutic approaches from a psychodynamic perspective encourage individuals to notice things in themselves in order to avoid inadvertently passing on these unprocessed thoughts through projection or transference. This process is often framed in terms of intergenerational trauma, where unprocessed trauma is passed on from parent to child. Winnicott's (1966) role in government during the evacuation of children in the second world war meant he was influential in shaping a national response to "general unconscious anxiety that the devastation of war could become manifest in disturbing ways in the next generation" (Brown, 2008, p27). Some psychologists and educationalists have questioned whether something similar could happen in the teaching and learning relationship. According to the participants' narratives, the relationships they now had with children who struggle at mathematics were more positive and nurturing than what they had experienced.

Brown (2008) discussed that the dominant discourses around mathematics teaching and learning imply that children make mathematical connections, "creating internal mathematical models to represent the physical world and the structures and patterns within mathematics itself" (p28). However, Brown posits that in reality learners pick up more than simply the cognitive models of mathematics, learners also make "unconscious associations between mathematical elements and relational dynamics that they are exploring in the transitional adolescent space between child and

adult" (p28). This echoes Bion's theory of knowledge- that when a child learns a skill, they acquire new factual knowledge but also learn about the process. Bion (1970) discussed different types of knowledge: factual knowledge, and also knowledge held in relationships. A child may learn 2+3=5, but they may also learn that knowing the answer to this is something to be proud of. Bibby argued that

> "What is notable, talking to children of all ages about knowing and learning, is the extent to which they *know* that *what and how they know content* is intimately bound up in relationships" (2006, p1).

This research showed that participants experienced feelings of discomfort and shame when doing the mathematics task, and the participants linked this to the relationships they had experienced when they were learning mathematics as children.

5.7 Limitations of findings

My research indicated that SENCOs thought of learning difficulties in a way that did not attribute causes to the child's effort or motivation. This contrasted with Bol and Berry's (2005) study, and was in line with Peltenberg and Heuvel-Panhuizen's (2012) study of SEN teachers. SENCOs have time and opportunity to develop more meaningful relationships with individual children compared to maingrade teachers (as in Bol and Berry, 2005) but this could also be attributed to the methodology. Participants in my research were asked to talk about one individual, and it was therefore likely that they chose a student they had a particular connection with, also, the child's hard working

nature could be attributed to the use of the word ‘struggled’ in the interview question. The nature of the methodology encouraged participants to talk about the child as an individual. If a different methodology were used participants could have been more inclined to intellectualise. For example, in Bol and Berry’s (2005) study, participants were asked about the ‘achievement gap’, which may have encouraged a broader answer which did not emphasise the individual nature of learners. The FANI methodology aimed to focus on narratives of relationships, and as with all qualitative research, there is a risk that participants told me the narratives they though I wanted to hear. I tried to overcome this by thinking about the context and dynamics within which the participants spoke and to pay attention to the unspoken aspects of the narratives.

The psycho-social methodology and ontology is in its infancy, and therefore many criticisms can be posited. Being a relatively new approach to qualitative research there is not a gold standard from which to compare with, as there is in other more well established methodologies. Frosh and Baraitser (2008) challenged the idea of applying psychoanalytic concepts and techniques to qualitative research. As an extension of a typical critique of qualitative research, the psycho-social methodology can be questioned in terms of its subjectivity- would another researcher interpret the data in the same way. Rustin (2008) responded to this in the same journal and put forward an argument against these criticisms. Frosh and Baraitser (2008) challenged the idea of applying psychoanalytic concepts and techniques to qualitative research. They offered “sympathetic criticism both of psychosocial studies and of psychoanalysis” (p346). The article maintains that while these

approaches are legitimate, psychoanalysis has often been theorized too loosely within psychosocial studies, and that a psychoanalytic approach which was more tentative would be more appropriate.

Michael Rustin (2008) responded to this article, noting that psychoanalysis is an established field of professional practice, and "defends the "depth" model of psychoanalytic investigation" (p406). It acknowledges the debate that exists around the field of psycho-social studies and their contributing paradigms, which is to be expected during a time of emergence of a new field such as this. He argues that

> "psychoanalysis has… been developing for more than a century, mostly outside the university system, as an autonomous profession, it is true, but with its own powerful intellectual tradition and with well-established national and international systems of training, professional accreditation, and publication" (p410). He states that "insofar as psychoanalysis is committed (more or less by definition) to the idea of unconscious mental life, the idea of "depth" is inseparable from it" (p411).

I have tried throughout this research to be as transparent as possible, and in addition to this I have additionally included all my coding in the appendix (Appendix 2) in order to create a clear audit trail. My psychoanalytic interpretations of were made with reference to a research diary and through psycho-social supervision. This reflexive practices enabled me to engage with the subjectivity of the researcher position. Throughout the research I have

acknowledged my role as a potentially defended researcher, and guarded against “wild analysis” (Elliot, Ryan & Hollway, 2012, p21) as far as is possible, in order to be remain transparent and to ensure the validity and reliability of the findings.

5.8 Opportunities for further research

The participants had similar perspectives on how they viewed their students’ learning. However, the participants were SENCOs, and as such had a specialist understanding of SEN. An opportunity for further research would be to research the perspectives of non-specialist class teachers or subject teachers who might not have such a nuanced idea of SEN. This research did not investigate how teachers’ experiences affected their own teaching. The methodology relied on listening to the perspectives expressed in the participants’ narrative. An area for further research would be to link the teachers’ experiences of learning with their teaching. An observation of the power dynamics in their classrooms could provide more information on what participants are unconsciously projecting. Further research could investigate how teacher experiences of learning manifested in their style of teaching.

5.9 Implications this research has for education professionals

5.9.1 Psychoanalytic theory in EP practice

This research opens up to discussion the possibility of EPs being more open to using psychoanalytic theory in their work and research.

There has been a history within the Tavistock and Portman NHS Trust of linking psychodynamic thinking and educational psychology. The EP Doctorate at the Tavistock emphasises psychodynamic aspects within learning, teaching, group dynamics and relationships within schools. However, there has been little research into the synthesis between psychoanalysis and educational psychology. It has been suggested that psychoanalytic frameworks in Educational Psychology can be "usefully incorporated into EP practice to enrich the quality of reflection on that practice" (Pellegrini, 2010, p252). Psychodynamic psychology can, however, be seen as lacking an evidence base (Brewin & Andrews, 2000) and in the socio-political context of a work environment under increasing scrutiny, more solution focused or evidence based models tend to be relied on. Bateman and Fonagy's (2000) meta-analysis found there was evidence to the effectiveness of this approach in a therapeutic context, but it seems that psychodynamic theory is much more rarely applied to learning. It could be argued, as Pellegrini (2010) does, that the lack of engagement with psychodynamic psychology may itself be as the result of a self-preserving defence process.

> "The strict adherence to problem-solving analysis models and to 'evidence-based' practice may be defences against using one's feelings to understand another person's experience, attending to what they are saying or communicating, and helping them manage the anxieties they may be experiencing… following a 'scientific' problem-solving checklist to deal with the mess of real-life problems can provide powerful armour against unconscious intrusions" (Pellegrini, 2010, p258).

One possible reason for the reliance on positivist paradigms, like absolutist perspectives of mathematics, is that these provide a much needed certainty in the learning profession where anxiety is being projected into professionals from both students and systemic or even political pressures (Bibby, 2006). This research therefore aims to increase the awareness among the EP and teaching profession about the possible benefits of using reflection on feelings as a positive and helpful way to enhance our understanding. That focussing on the process of learning, not the product, can add to our understanding of children's learning. EPs who are able to work with teachers and parents in a psychodynamic style ay be able to increase the thinking and understanding that adults have around students, which may improve empathy and ultimately the students' learning experience.

5.9.2 Professionals' reflection on their role in assessment

This research highlighted the importance of relationships in learning. Participants found the one to one situation doing mathematics uncomfortable. This has implications for EPs and other professionals who carry out individual assessment. This includes professionals being aware of their own role in the potential discomfort in the children being assessed. It also highlighted potential transference, countertransference, or projection processes that may occur within the assessment relationship, and how this may affect the assessment, especially, for example, when personal questions are asked following an assessment.

When administering certain cognitive assessments often an EP does not provide answers to the child even if they ask for them (the British Abilities Scale 3 specifies a script for denying a child answers). Themes of disempowerment as a child emerged from the interview data, and one participant (Laura) told me that as an adult she would not put up with being treated in the way she was as a child. This raised the issue of the child's consent within individual assessment.

Furthermore, a number of difficult feelings could have been stirred up in a child during a cognitive assessment and this may not be at the forefront of the EP's mind when they move swiftly from cognitive assessment to more personal questions about family or school friends. The participants I interviewed felt ashamed, and were articulate and confident enough to express this. In EP assessments with children, with a much more unequal power dynamic, education professionals should be mindful of what a child is feeling and not saying. A lot of information on participants' learning emerged from the maths task, including the helpful and unhelpful strategies they used and their attitudes to learning tasks. Forms of assessment such as Dynamic Assessment (Elliott, Lauchlan & Stringer, 1996) encourage more focus on the process of a child's learning. My research supports evidence that assessment methods like these which take into account the child's behaviour, approach to learning and attitudes to the assessor provide more insight into a child's learning than solely the production of an assessment score. This research

adds weight to theoretical perspectives that support intervention and learning such as mediated approaches (Stringer, 2008).

5.9.3 Importance of relationships in learning

This research highlights the important role that teachers play in their students' lifelong attitudes and identities. The research demonstrated that for these participants, the way in which they were taught mathematics influenced how they continued to think about themselves in adulthood, both as mathematicians and, in some ways, more generally.

Teachers, SENCOs, and EPs should continue to be aware of the potential for the teacher to exacerbate a child's difficulties with mathematics. This research indicated that this may be due to an unconscious dynamic, and the teacher could even be unaware of it. Participants described experiences of feeling fearful of, and undermined by, their teachers and this had lasting implications. How and why these difficult dynamics occur, and whether they continue to do so, is an opportunity for further research.

With the pressures being put on schools and learning in the current social climate, learners internalise more than just mathematical content knowledge. Negative emotional affect can also be transferred to students, and Brown (2008) stated that this could be a lot more than "the prevailing pedagogy can risk acknowledging" (p28). Ultimately, from the experiences

described by my participants when they were learning mathematics at school, the prevailing memories were not of the mathematics content that they learned. Instead, participants' dominant memories were of the relationships with teachers and peers. The relationships within mathematics learning were therefore paramount. Teachers' feelings about mathematics may be consciously or unconsciously transferred to their students. It may be useful to take from this research that in mathematics classrooms, school systems, and in the internal worlds of those people that work and learn in a school, learners are internalising more than just cognitive links.

5.9.4 How we think about mathematics

This research adds to the growing literature which questions the nature of mathematics itself, and how it is conceptualised. This research suggests that mathematics continues to be thought of in an 'absolutist' way, in that it is either right or wrong, with only one way to attain the right answers. This research could tentatively suggest that, though a very small sample, participants with a more negative identity as mathematicians had a more 'absolutist' conception of mathematics learning, and a more concrete conceptualization of 'dyscalculia'. This has implications for broader thinking about dyscalculia and mathematics related learning difficulties. Difficulties in mathematics can be approached as the result of a negative learning environment engendered by the absolutist idea of mathematics, which encourages a form of teaching which rejects containment through varied approaches, and which also creates a binary of right/wrong, good/bad and

success/failure which can have a lasting, profound negative effect on learners.

Moreover, this research showed that for one participant, a within-child diagnosis of learning difficulty offered an explanation for the child's difficulties which enabled all the people concerned to remain psychologically defended against feelings of incompetence. David was able to maintain a position where the child, his family and David himself were free from blame by attributing the causes to a difficulty within the student over which the student had no control. This adds another perspective on the academic debates around 'within child' difficulties in mathematics, such as dyscalculia.

5.9.5 Pedagogical approaches alienating students

This research suggests that in some cases, mathematics has been taught in a way that has alienated its students. Rigid and uncreative teaching methods combined with little emotional support resulted in one participant rejecting mathematics altogether. However, this participant acknowledged that mathematics did not need to be taught in this way, showing that although the subject might be considered absolutist, the teaching approach need not be.

This research also highlighted the perception of some participants that teachers of mathematics tended not to understand mathematics

difficulties. The implications of this research could encourage greater communication between subject teachers, so that mathematics teachers and SENCOs can share expertise in SEN and mathematics teaching, and create greater understanding between the different roles, in order to increase expertise in supporting students who struggle with mathematics.

The EP role can make a valuable contribution in relation to pedagogy. EPs are in an ideal position from which to provide perspectives on pedagogical approaches due to their expertise in systemic whole school perspectives, combined with teaching experience and knowledge of psychological frameworks. As well as this, EPs have knowledge of current research which investigates psychological theory put into practice, and are experienced in consultative approaches and facilitating group training with teachers in which teachers can share knowledge and expertise with one another.

Current EP input in this area has proved effective, notably Solity's (2008) work on mathematics in schools. The KRM programme (Solity, 2008) is underpinned theoretically by instructional psychology, which emphasises the importance of a child's learning environment rather than their strengths or weaknesses. "The learning environment embraces all aspects of the contexts in which teaching occurs and where teachers exert an influence. These include the context of what is

taught, the way it is structured, teaching methodology and the location where teaching takes place" (KRM-PER website, 2016). This approach takes into account students' previous formal and informal teaching environments. "Students' perceived strengths and weaknesses, their perceived learning styles, what they do well and what they fail to master are all seen to be a direct response to the way in which they have been taught" (KRM-PER website, 2016). The KRM maths programme focuses on enabling children to understand principles underlying mathematics, as opposed to learning by rote, the focus is therefore on understanding key mathematical principles, such as balancing equations, rather than getting correct answers to sums, which are either right or wrong. Preliminary research into its effectiveness indicates that out of five schools, over a three year period (from Reception to year 2) children made significantly better progress with the KRM programme than with the National Numeracy Strategy interventions, particularly in being able to generalise their skills (Solity, Shapiro, Pendle & Wall, submitted).

5.9.6 Helpful reflection

This research indicated that participants found it helpful to have a space to reflect on their own experiences and attitudes. Providing teachers, SENCOs, and EPs opportunities to reflect on their past experiences, and be

reminded of the vulnerability involved in learning, could be helpful to creating supportive educational environments.

5.10 Personal reflections

Self-reflection was key to all aspects of this research, and as a reflexive researcher I benefitted from noticing my own role in interview dynamics and my own feelings about mathematics and learning through psycho-social supervision and in a reflective diary. I was struck particularly by the links participants had made between the mother and child within mathematics learning. My personal experience was of a mother who passionately hated mathematics and avoided it at all costs, yet my earliest memories are of her counting soothingly to get me to sleep. Because of this, numbers have always had a calming and soothing emotional association for me. Perhaps for this reason, I have a strong positive association with mathematics and I attribute the A grade I got at A-level mathematics to the positive feelings I had internalised from my pre-verbal experiences. Perhaps this also led me to engage in certain ways in the interviews, and I have tried to acknowledge throughout the research that I too am susceptible to psychological defences. In the profession of educational psychology, noticing ones own role in a teaching or learning relationship is paramount and I believe it will continue to be valuable for effective assessment and understanding of learning needs.

5.11 Feedback to stakeholders/participants

No feedback has been given to the participants. Each participant was offered to be sent a pen-portrait of themselves and an edited brief summary of the findings, and each participant was offered a copy of the finished thesis once completed. Follow up phone calls were also offered. The participants chose not to receive feedback on this research when asked in person before and after the interviews, or via email. In fact, when I have encountered one participant in another professional setting within a group of EPs they did not acknowledge that they knew me. I wondered about the reasons behind the decisions not to receive feedback, and hypothesised about the feelings that this maths task brought up for the participants that they might not be interested in re-visiting. Although having participants validate their pen portraits and summary of their experience would add reliability to my data, I feel there is an ethical aspect with regards to sending my feedback when it is not wanted. Participants' decisions not to hear from me again is their right, and I believe it is unethical to continue to attempt contact with them if they do not wish to hear from me.

5.12 Summary

In this chapter I have highlighted a summary of my findings which outlined my participants' views that the causes of children's learning needs in mathematics were around the family, school or within child factors; that negative feelings around mathematics concerned feelings

of competition and rivalry, disempowerment and vulnerability, and shame at feeling not being able to do something; that mathematics learning as a child had a profound effect on the participants and permeated how they thought of themselves as people; and that the interview experience led the SENCOs to notice things about themselves. I considered the findings in the context of the existing literature and relevant psychological theory. I then outlined some of the limitations of this research, and highlighted some key implications for education professionals which revolved around being mindful of unconscious processes that may occur in the teaching, learning and assessment relationships. My research demonstrated that even highly experienced SENCOs were sometimes unaware of how powerfully they felt about their mathematics learning experiences, and that awareness of our own feelings can be helpful in contributing to a positive learning relationship.

Chapter 6. Conclusion

This research explored maths learning and teaching experiences from a psycho-social perspective. The psycho-social epistemology and ontology was integral to the research, as it informed the methodology and approach which took account of the researcher's own role as a defended subject within the process. Through a series of in depth interviews which included semi structured interviews using a Free Association Narrative Interview (FANI) method, and an experiential task, participants told me about their experiences of teaching, learning and doing mathematics.

The data from the participants was thought about from the perspectives of both psychoanalytic psychology, and the social constructs of the education system. Participants' narratives were considered individually as a whole, but when considered collectively, a series of themes emerged. Participants' narratives around working as SENCOs with individual students who struggled at maths centred around their relationships with the students, and highlighted the importance of nurturing and containing SENCO/pupil relationships as being central to learning. When the participants thought about the causes of their students' learning difficulties, they tended to attribute these to poor mathematics teaching, parenting which lacked involvement, or 'within child' difficulties over which the child had no control. From a psycho-social perspective this was thought about in terms of the positive conceptualisation the participants had with their students, and as a psychological defence.

When the participants thought about their own experiences of learning mathematics at school, their narratives indicated feelings of vulnerability and disempowerment. SENCOs tended to remember school mathematics as taught in an unimaginative way which encouraged competition between classmates. For some participants, mathematics at school was remembered as a traumatic and left a lasting impression through to adulthood, and the idea of mathematics elicited strong negative feelings. Some positive memories were also discussed. When the participants took part in a mathematics task, feelings of shame or embarrassment were expressed or inferred by all of them. This hindered their ability to engage with task or use appropriate strategies. Participants' experiences of the mathematics task linked with their experiences of learning mathematics at school. For the participants who had internalised negative feelings from their school experiences, this impacted negatively on their willingness to engage with the tasks. Participants were considered as being defended against these negative feelings to different degrees, and one participant in particular has refused to engage with any mathematics since her school experiences.

This research has implications in terms of how educational professionals think about learning difficulties and also mathematics learning. The emphasis on the process of learning, rather than the content knowledge, produced in depth and helpful information on participants' experiences of learning and doing mathematics. This has implications for assessment of students, which can often focus on the product, and suggests that other forms of assessment that take account of the power dynamics, attitudes to learning

relationships and approaches to learning could provide richer information on students' learning needs.

This research highlighted the importance of the teaching relationship, and the possibility in pressured times for feelings to be projected or transferred into others. The psycho-social perspective encourages thinking which integrates consideration of socio-political pressures with internal working models of individual psychology. It stressed that when a child learns a new piece of information, they learn the content of the information, but also internalise the thinking around the information, such as whether they should feel proud to know it.

Mathematics can be thought of in different ways, as an absolutist subject in which the goal is to attain correct answers through rigid methods, or as a creative means of knowing the world. When mathematics is taught in a way that encourages closed off thinking that is completely separate from the emotions, and is combined with an uncontaining teaching style, this can have negative effects on adults' identities as mathematicians. Participants raised concerns that mathematics was still being taught in these uncreative ways. The interviews showed that participants had strong feelings about mathematics, and that noticing these feelings was helpful for them in terms of their approaches to their SENCO role and how they thought about their students and themselves. This approach of this research highlighted the pivotal role that personal reflection can play in education.

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