

**"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 uncontainable school experiences of mathematics left a lasting impression. Limitations of the research and implications for teachers, SENCOs and EPs are discussed.

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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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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 an 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 one's 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 relevance against a set of inclusion and exclusion criteria. I summarise the purpose, conclusions, participants and methodology of the relevant literature and represent 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 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 & Rätty, 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.