The Development of the Spelling Self-Efficacy Measure

Paper 1: The Construction of the Spelling Self-Efficacy Measure

Paper 2: The Administration and Validation of the Spelling Self-Efficacy Measure (Revised)

Submitted by William Edward Shield to the University of Exeter as a thesis for the degree of Doctor of Educational, Child and Community Psychology

May 2013

Signed:

……

Acknowledgements

I would like to thank all of the children, teachers, support staff and colleagues who participated in this research and made the process of data collection such a pleasurable and useful experience.

Thanks must be given to both of my supervisors, who kept faith in me despite a muddled start to the research process. The look of relief on their faces once the data had been collected was wonderful.

Finally, thanks must go to my friends, my family and, most importantly, my partner for helping, supporting and encouraging me throughout this doctorate.

Overview of Thesis

This thesis is formed of two papers. The first paper is concerned with the construction and design of the Spelling Self-Efficacy Measure (SSEM), based upon the constructs that children have about learning to spell and findings from a literature search. The second paper further develops the SSEM, carrying out a large test administration and validation, and then exploring relationships between perceived efficacy beliefs and spelling ability.

The rationale to create a measure of spelling self-efficacy originally stemmed from conversations with teachers during my placement experiences as a trainee educational psychologist. It was often the case that children in schools were not making progress in literacy, despite ongoing and high quality intervention and support. I carried out a literature review and found that the majority of spelling support packages were focused on building children's mastery of skills rather than any focus on the emotional aspects of learning. I had many conversations with teachers about ways in which they could support children's beliefs in their capabilities to learn, and had positive reviews with lots of school staff about how this had helped them make interventions more personalised to the child.

The two papers in this thesis outline the steps taken to develop and construct the Spelling Self-Efficacy Measure. There were originally five domains underpinning the Spelling Self-Efficacy Measure: Belief in Own Ability to Learn to Spell; Belief in Learner Characteristics; Belief in the Need for Help from Others; Belief in Phonological Awareness; and Belief in Technical Understanding of Spelling. These five areas were condensed through analysis in both Paper 1 and Paper 2 to propose a revised Spelling Self-Efficacy Measure underpinned by three domains: Phonological Awareness, Learner Independence and Optimism in Abilities; Learner Confidence and Resilience.

The Spelling Self-Efficacy Measure has been found to be a reliable and valid scale to explore children's perceived efficacy beliefs about learning to spell. Consistent with existing research, significant correlations have been found between a child's spelling ability and their level of spelling self-efficacy, as measured by the SSEM.

Table of Contents

List of Tables and Figures

Figures

Tables

The Development of the Spelling Self-Efficacy Measure

Paper 1: The Construction of the Spelling Self-Efficacy Measure

Abstract

Promoting literacy is a national focus across schools in the UK, and education settings use a range of different schemes to help provide support for learners who find reading, writing or spelling difficult. The majority of these support packages neglect to consider ways in which teachers and school staff can facilitate the development of children's sense of belief in their capabilities to succeed in learning.

This paper is therefore concerned with the construction of the Spelling Self-Efficacy Measure (SSEM), based on findings from the literature and individual work with children. It is envisaged that the SSEM could be used with children when planning targeted literacy support that is personalised and effective.

In Phase 1 of this research, I met with children in Year 5 (n = 7) and Year 8 (n = 11) to talk to them about their beliefs in regards to learning to spell. I used triadic elicitation activities from Personal Construct Psychology in order to further understand their perceptions about 'good spellers' and 'not so good spellers'. Constructs were elicited and formed the basis for items in the SSEM. Other items were devised based on previous research into the area of learning to spell.

The SSEM was piloted in Phase 2 with children in Year Groups 4, 5 and 6 (n = 17). An analysis was carried out to assess the usefulness of each item on the SSEM. Cronbach alpha correlation coefficients were calculated to assess the internal consistency of the SSEM, finding the revised version of 23 items to have good reliability ($\propto$ = .865). Implications for the use of the SSEM are discussed in more detail, and a rationale is provided for further validation of the measure in Paper 2 of this thesis.

1.0 Introduction

1.1 Research Purpose and Context

The current UK Government is committed to raising children's levels of literacy by the time they leave primary school in Year 6 (Department for Education (DfE), 2012c). Figures from the DfE suggest that 17 per cent of seven-year-old children and 23 per cent of 11-year old children were working below the expected level in literacy in 2012 (Truss, 2013). The DfE (2012) has also reported high levels of young adults entering the workplace with a lack of the basic literacy skills required to work effectively.

This academic year (2012-13) will see the introduction of the new English Grammar, Punctuation and Spelling Test (Standards & Testing Agency, 2012) for all children in Year 6. The test will assess children's sentence grammar knowledge, punctuation, vocabulary and spelling, and the DfE hope this will encourage primary schools to "place a strong focus on the teaching of key writing techniques and ensure that children leave primary school confident in these skills" (Truss, 2013, para. 4).

As the figures above suggest, many school children need additional support with their spelling at school, either through differentiated teaching plans, small group work or individual sessions with an adult. Brooks has recently updated his 2002 review of reading and writing intervention schemes entitled, '*What works for pupils with literacy difficulties? The effectiveness of intervention schemes*' (Brooks, 2013). This report evaluates a range of literacy interventions in order to help schools choose between different schemes. It can be seen in the report that the primary focus of most of these interventions is to support children with mastering skills and knowledge, as opposed to targeting social and emotional aspects of learning such as self-esteem, self-concept and self-efficacy.

At the beginning of this research process, I carried out a small online survey with teachers in mainstream primary schools (N = 8) (Appendix A3). A cross section of year groups was represented from Early Years through to Key Stage 2. All

respondents stated that there were children in their class who were not making progress in literacy, and that literacy difficulties were preventing children in their class from making expected progress across the curriculum. The majority of respondents (*n* = 7) stated that there were children in their class who were not making progress across the curriculum, specifically due to their difficulties with spelling.

The survey asked about the focus of any additional literacy support offered to children in the class. The top four areas given were phonics, individual reading, speaking and listening activities, and handwriting. Only one respondent stated that intervention in their classroom was focused on activities designed to increase children's belief in their ability to learn how to spell. This led me to further exploration into the literature surrounding self-efficacy and the impact it may have on school success.

In my work as a trainee educational psychologist, I often engage in consultation with school staff to problem solve why certain children are still making little or no progress despite access to well delivered interventions. Teachers frequently report that they feel it is due to a child's view of himself or herself as a learner, more specifically the child's perceived belief in their capabilities to learn. The links between self-efficacy and academic success have been well documented (Pajares, 1997), with research suggesting school as the principal setting in which children develop self-efficacy beliefs about learning (Bandura, 1994). It has been proposed that at school, self-efficacy beliefs can influence the choices children make about which learning activities to engage in, the effort they put in to completing these tasks, how long to persevere when challenged and the degree of anxiety or confidence they will experience during learning (Bandura, 1986; Pajares, 1997).

In my literature review (Appendix A2), I found relatively few studies that have explored the relationship between spelling and motivational or belief variables such as self-efficacy. I found only one study in which the authors devised a self-efficacy

measure for spelling to use with school children (Ranking, Bruning, & Timme, 1994), however the researchers did not use a widely representative sample. Although it was reported that the measure had high reliability, no comment was made about the validity of the measure or the ability to generalise it to the wider population.

The overall purpose of this thesis is therefore to address a gap in the research, and construct a valid and reliable questionnaire to measure 'spelling self-efficacy', or children's perceived beliefs in their capability to learn to spell at school. It is envisaged that school staff will be able to use the questionnaire with children in order to plan and deliver effective interventions that target children's self-efficacy needs as well as skill mastery.

1.2 Research Aims

The broad research aims for this thesis are:

1. To develop ideas about the areas relevant to perceived efficacy in spelling
2. To follow a theoretical framework and construct a valid and reliable spelling self-efficacy inventory for general and comparative use

The specific aims of Paper 1 are to define the construct of spelling self-efficacy, design a spelling self-efficacy questionnaire, and carry out a pilot test in order to make any necessary revisions. Paper 2 is a systematic validation of the questionnaire and an exploration into relationships between spelling self-efficacy and spelling ability.

1.3 Literature Review

This review of the literature will introduce the construct of self-efficacy and why it is important to consider perceived efficacy in schools and learning contexts. This section will also briefly explore the use of Classical Test Theory in the design and

evaluation of psychometric tests. A more extensive literature review is included in Appendix A2.

1.3.1 Self-Efficacy

Defining Self-Efficacy

Bandura introduced the construct of self-efficacy within his social learning theory (Bandura, 1977b) and social cognitive theory (Bandura, 1986). He suggested self-efficacy is the belief a person holds about their ability to successfully complete a given task or behaviour within a particular context. Self-efficacy beliefs are personal judgements about capability that significantly influence an individual's choice of task or activity, their persistence and ultimately the success of their performance (Bandura, 1986). Bandura claims that perceived efficacy can impact behaviour "not only directly, but by its impact on other determinants such as goals and aspirations, outcome expectations, affective proclivities and perceptions of impediments and opportunities in the social environment" (Bandura, 2006, p. 309). Self-efficacy can also influence an individual's resilience, perseverance, optimism, emotional wellbeing and coping abilities (Bandura, 1994, 1997, 2006).

Social learning theory (Bandura, 1977b) expands Skinner's (1938) behaviourist principles of reinforcement to include a focus on vicarious learning through social modelling. The notion of human agency, how individuals influence their own thoughts, motivations and behaviour, is central to social learning theory (Smith, Arnkoff, & Wright, 1990). Social learning theory suggests a reciprocal causal relationship between behaviours, the environment and personal factors (Bandura, 1977b). Self-efficacy judgements (a personal factor) can therefore be conceptualised as, "mediating the interaction between behaviour and environmental factors" (Norwich, 1987, p. 384).

Self-efficacy is also integral to Bandura's social cognitive theory (Bandura, 1986). This theory considers the impact that cognitive factors, such as perceptions, beliefs and expectations, might have on an individual's capacity to learn. Central to social

cognitive theory is the notion of a self-system, which enables individuals a certain degree of control over their thoughts, feelings, motivations and actions. Bandura illustrates the construct of self-efficacy within social cognitive theory. He suggests that individuals reflect on their experiences of both success and failure to form beliefs about how likely they are to succeed in the future. Bandura argues, "self-efficacy beliefs determine how people feel, think, motivate themselves and behave" (1994, p. 71). Behaviours that have been shown in research to promote self-efficacy include providing specific goal setting and feedback about prior performance (Hattie & Timperley, 2007; Schunk, 1990), collaborative learning environments (Dunlap, 2005), and learning skills to mastery through instructional models (Bandura, 1997; McCarthy, Meier, & Rinderer, 1985; Schunk, 1985)

Self-Efficacy at School

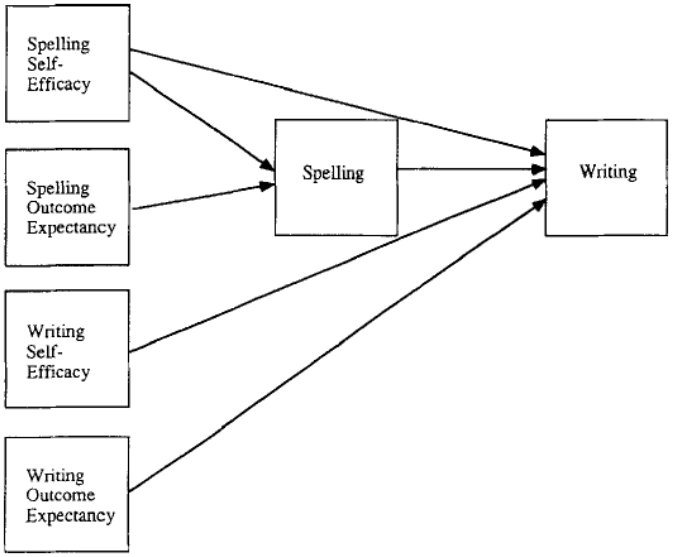
Bandura (1994) views school as the key setting in which children develop self-efficacy beliefs about learning, primarily through mastering cognitive skills. At school, self-efficacy beliefs will influence the choices children make about learning activities to engage in, and the effort and perseverance they put in to completing these tasks (Wadsworth, Husman, Duggan, & Pennington, 2007), their motivation (Miltiadou & Savenye, 2003; Norwich, 1987) and the degree of anxiety or confidence they will experience (Bandura, 1986). Schunk and Pajares (2004) discuss self-efficacy in a learning context, suggesting that children are more likely to engage in learning when they have high self-efficacy beliefs for learning skills, ultimately impacting on their overall success and achievement.

Self-Efficacy and Spelling

In my thorough literature search, I found relatively few studies that have explored the relationship between spelling and self-efficacy. Ranking, Bruning, Timme, & Katkanant (1993) examined self-efficacy beliefs about writing and spelling, proposing a causal model in which perceptions of self-efficacy in spelling have both direct and indirect effects on spelling and writing ability (Figure 1.1). This model emphasises the roles of efficacy beliefs and outcome expectancies on spelling abilities. Ranking

et al. found support for their hypothesis that spelling self-efficacy was positively correlated to performance in both a spelling test and a written essay.

Figure 1.1: Proposed Causal Model from Ranking, et al. (1993, p. 158)



Ranking, Bruning and Timme (1994) furthered this study and created a spelling self-efficacy measure that had high reliability using Cronbach's alpha (Cronbach, 1951). This scale was restricted to a large but non-representative sample of children from the same school district and the authors did not report validating the measure in any way. The instrument was a self-report measure and the authors make no comment about whether it was differentiated for children with a low reading ability or other barriers to learning. In a similar study, although not within a school population, Jones, Varberg, Manger, Eikeland, & Asbjørnsen (2012) examined the reading and writing self-efficacy of Norweigan prisoners. The authors suggest that a screening assessment of reading and writing self-efficacy is essential so that the prisoners can "develop a realistic picture of their own skills, which is a condition for progress in acquisition of skills" (p. 348).

1.3.2 Measuring Self-Efficacy

Measuring Self-Efficacy

Measuring self-efficacy can be a problematic task, particularly due to the lack of theoretical clarity about self-efficacy as a complex measureable concept (Norwich, 1987). Measures of self-efficacy can sometimes be too generalised, often reflecting "global or generalised attitudes about capabilities bearing slight or no resemblance" (Pajares, 1997, Assessing Self-Efficacy Beliefs, para. 1) to the specific task being analysed.

In his guide to constructing self-efficacy scales, Bandura (2006) highlights some key features of a good scale, including:

- Items must be a judgement of your capability to do a specific task
- Items must be phrased as 'can do' rather than 'will do'
- Items must be distinguished from other constructs
- Items must be rated on a response scale from 0 (cannot do at all) to a higher number (highly certain can do). In addition, response scales should be positive and not include numbers below 0.
- Scales should include challenging items and gradations of difficulty to avoid ceiling effects
- There should be a practice item so that children understand the numerical scale values

In order to minimise response bias, Bandura (2006) suggests participants should be allowed to make private judgements without personal identification, have the assurance of confidentiality and anonymity, and the title of the measure should be non-descript.

Pajares (1997) argues that self-efficacy measures should consider different dimensions that underpin the criteria task that is being assessed. For example, to write an essay an individual needs to have knowledge of a range of specific skills,

such as grammatical structure, punctuation, organisation of sentences and so on. In addition, learners will need confidence in writing and forming letters. This suggests that it can be difficult to assess efficacy beliefs about a *specific* task in a *specific* context without a valid and reliable measure.

Bandura (2006) further states that researchers should have a "good conceptual analysis of the relevant domain of functioning" (p. 310) in order to construct a valid self-efficacy scale. He gives the example of weight loss, suggesting that an assessment of efficacy beliefs should consider behavioural factors, such as the perceived capability to adjust eating habits, maintain better physical health, and regulate food purchases. A comprehensive efficacy assessment should thus make links to behavioural factors that can be controlled, rather than only exploring the target construct (Bandura, 2006). With Bandura's comments in mind, it will be key to ensure that in addition to efficacy beliefs, the spelling self-efficacy measure also explores any behavioural factors that children consider important when learning how to spell.

1.3.2 Test Design and Construction

Classical Test Theory

Classical Test Theory (CTT) has been used for test development for over 80 years (J. Kline, 2005). The theory postulates that there is a distinguishable difference between a *true* score and an *observed* score (Spector, 1992). The observed score (*O*) on a test (i.e. the actual score obtained on the test) includes a true score (*T*) and a random error (*E*). The less the random error, the more likely it is that the observed score will reflect the true score.

$$O = T + E$$

True scores cannot be observed and must be inferred from the observed scores by estimating the mean score an individual might achieve if they had an infinite number of attempts to complete the test. Psychometricians have found that this estimation

can be calculated based on a single administration of a measure to a large group of people (J. Kline, 2005), rather than multiple administrations to a single person.

While Spector (1992) suggests that CTT can be extended to include an additional *bias* component, for example social desirability, Kline (2005) contends that systematic errors and bias are not well explained through this theory. It can be argued that other test theories such as Item Response Theory (IRT) better detect bias and therefore "offer enhanced reliability assessment and increased prevision in ability measurement" (VandenBos, 2007, p. 176). CTT is test-oriented rather than item-oriented, meaning that we are unable to predict how well individuals may do on specific items (J. Kline, 2005).

Summated Rating Scales

The use of summated rating scales to measure attitudes, feelings, perceptions, values and opinions is common within the social sciences, although good scales can be difficult to construct (Spector, 1992). The invention of rating scales is attributed to Likert who used numbered scales for the assessment of attitudes, based on principles of CTT.

Spector (1992) lists four characteristics of summated rating scales:

1. A scale has multiple items that will be combined or summed
2. Each item must aim to measure something that can vary quantitatively
3. There are no 'right' or 'wrong' answers to items and so the scale cannot be used to assess ability or knowledge
4. Items must be written as statements and respondents are asked to give ratings in response to the item

If constructed well, summated rating scales can have good reliability and validity, are inexpensive to develop, and are straightforward to administer to a large participant sample (Spector, 1992). However, summated rating scales rely on respondents

having a sufficient level of reading ability and understanding of scales. This is a consideration that will be discussed further throughout this thesis.

2.0 Research Design and Methodology

2.1 Research Aims and Research Questions

The broad research aims for this thesis are:

- To develop ideas about the areas relevant to perceived efficacy in spelling
- To follow a theoretical framework and construct a valid and reliable spelling self-efficacy inventory for general and comparative use

I have followed Spector's (1992) framework for developing a summated rating scale and the thesis will be therefore be organised in the five stages of his model. Paper 1 comprises Stage 1, *Define Construct*, Stage 2, *Design Scale*, and Stage 3, *Pilot Test*, of Spector's theoretical framework. The research questions for this paper are therefore:

1. What are children's constructs about learning to spell?
2. To what extent is a measure of spelling self-efficacy a reliable tool in exploring children's efficacy beliefs in relation to learning how to spell?

This particular study was carried out in two phases. Phase 1 was concerned with designing the spelling self-efficacy measure (SSEM), based on children's constructs and ideas from the research literature. In Phase 2 the SSEM was piloted and revised ready for further analysis in Paper 2.

2.2 Theoretical Assumptions

Pragmatism gives priority to individuals' everyday experience, and puts an emphasis on abduction, intersubjectivity and transferability (Morgan, 2007). The approach offers an alternative to the paradigms of positivism and interpretivism, capturing

both objective and subjective points of view and allowing for mixed-methods methodology.

Abductive reasoning allows the researcher to move between induction and deduction, rather than being confined to either induction, as in the qualitative approach, or deduction, as in the quantitative approach. Morgan (2007) suggests that "one of the most common uses of abduction in pragmatic reasoning is to further a process of inquiry that evaluates the results of prior inductions through their ability to predict the workability of future lines of behaviour" (p. 71). Abductive reasoning will allow for this research to elicit children's views and constructs in order to determine theories that will underpin the spelling self-efficacy measure. Inferences from this first phase of the research will then be assessed through action by piloting and analysing the transferability of this questionnaire.

Throughout this research study, I am adopting intersubjective assumptions about the knowledge produced. Intersubjectivity allows researchers the flexibility of working within either a subjective or objective epistemology, recognising that there can be a degree of objectivity to socially constructed knowledge and meaning. This duality allows individuals to hold unique interpretations of what could be a single and objective world (Teddlie & Tashakkori, 2009).

Whilst this study is initially concerned with eliciting and exploring children's unique constructs about the world, it then attempts to objectify this knowledge, to a degree, and create a statistically reliable questionnaire that allows for the transferability of results and findings. A pragmatic approach allows researchers to move away from results that are *either* context-bound *or* generalisable. Morgan (2007) suggests "an important question is the extent to which we can take the things that we learn with one type of method in one specific setting and make the most appropriate use of that knowledge in other circumstances" (p. 72). He emphasises the need to further investigate and evaluate the extent to which knowledge can be transferred outside our research sample.

A mixed-methods approach is in line with pragmatic assumptions (Teddlie & Tashakkori, 2009). The self-efficacy measure will be designed drawing upon qualitative approaches and then piloted using quantitative methods.

2.3 Sampling and Participants

2.3.1 Phase 1

Phase 1 of this research took place across two local authorities within the South West of England. Participants were gathered from two primary schools and one secondary school in which I had previously established relationships with the senior leadership teams.

In order to allow for comparison across spelling ability ranges, I asked each school's Special Educational Needs Coordinator (SENCO) to select a sample of participants in Year 5 (primary) or Year 8 (secondary) who were identified by the school as having difficulties with spelling, and a sample of children who did not have difficulties with spelling. SENCOs selected participants based on recent assessment data including spelling ages and National Curriculum assessment. A total of 18 participants were identified. Table 2.1 summarises the number of participants in each category.

Table 2.1: Summary of Participants (*N* = 18)

	Year 5 (*n* = 7)	Year 8 (*n* = 11)
No Teacher Perceived Difficulties with Spelling (*n* = 8)	3	5
Teacher Perceived Difficulties with Spelling (*n* = 10)	4	6

2.3.2 Phase 2

Phase 2 was carried out in one primary school in the West Midlands. I worked with Class 3, a mixed class of Year 4 (*n* = 9), Year 5 (*n* = 6) and Year 6 (*n* = 2) children. This gave a total of 17 participants.

2.4 Ethical Considerations

Please see Appendix A1 for a full discussion of ethical considerations.

2.5 Methods

The framework developed by Spector (1992) was followed during the design of the Spelling Self-Efficacy Measure. Spector outlines five stages to summated rating scale construction:

1. The construct must be clearly and precisely defined.
2. Items for the scale should be written and the exact format of the scale should be decided.
3. There should be a pilot test with a small group of respondents. The scale should then be revised based on participants' comments about any items that are confusing or ambiguous.
4. The scale should be completed by a sample of 100-200 respondents and internal-consistency should be calculated for the scale. If the scale does not have a sufficient level of internal-consistency, the construct must be redefined and the items rewritten.
5. The scale should be validated and normed, testing hypotheses about relationships with other variables.

This paper will cover the first three stages in two phases; Phase 1 of the research will comprise of defining the construct and designing the scale, Phase 2 will comprise of piloting the scale and carrying out an item analysis.

2.5.1 Phase 1: Defining the Construct and Designing the Scale

Personal Constructs

In order to define the concept of spelling self-efficacy, I first wanted to explore how children construct people who are good at learning to spell and those who are not so good at learning to spell. I met individually with a sample of children (*N* = 18) in Year

5 (*n* = 7) and Year 8 (*n* = 11). The children had been selected by their school's SENCO as outlined in section 2.3.1 of this thesis. Information sheets had been sent home to each participant so that parents could provide informed consent (Appendix A4). Before commencing the meeting I talked to participants about the research study and showed the consent form that their parent or carer had signed.

Each session took approximately 45 minutes and included an informal and open-ended discussion about spelling, followed by a triadic elicitation activity and completion of a repertory grid. Discussions started with the open-ended question, *'tell me about learning to spell at this school'*. From this, a conversation took place about learning how to spell covering topics such as spelling tests, styles of teaching and enjoyment of spelling.

A grid elicitation interview was carried out as outlined by Jankowicz (2004), drawing upon elaboration techniques such as laddering in order to "evoke meaningful psychological constructs" (Butler & Green, 2007, p. 65). The elements included in the triadic-elicitation were:

1. Myself now
2. Myself in the past
3. Myself in the future
4. Ideal self
5. Someone who is good at learning to spell
6. Someone who is not very good at learning to spell
7. The best speller in the world
8. The worst speller in the world

Participants were asked to pick three elements at random with the instruction *'tell me something that is the same about two that is different from the third'*. I recorded the emergent constructs and repertory grids were used for children to rate each

element on the construct and its polar 'opposite'. The elicited constructs were then used to create items for the Spelling Self-Efficacy Measure (SSEM).

Literature Search

I used a theory-driven approach (J. Kline, 2005) to write a number of items based upon existing research studies (for example Solity & Deavers, 1999; Tompkins, 2010) and national policy and guidance for teachers from the Department for Education (for example DfE, 2012a; DfEE, 1998). I explored the literature to further understand the 'building blocks' of learning to spell. More specifically, I wanted to know the skills children had to acquire before they could engage effectively in learning to spell, for example, alphabetic understanding and recognition, letter formation, and phonological awareness. A list of the items developed from the literature is included in Appendix A5.

2.5.2 Phase 2: Pilot Test and Item Analysis

The SSEM was piloted on a group of Key Stage 2 children (*N* = 17). Information sheets had been sent home to each participant so that parents could provide informed consent (Appendix A5). The participants were given clear instructions and circled ratings on a record sheet (Appendix A11) while I read each item aloud (Appendix A10). The class teacher and her teaching assistant provided additional support for individual students.

2.6 Analysis Procedures

2.6.1 Phase 1: Defining the Construct and Designing the Scale

The intention of both the open-ended discussion and the elicitation activity were to encourage participants to start thinking about learning to spell at school and to reveal their constructs around being a good speller.

Repertory grids were visually inspected and constructs relating to the elements *Best Speller in the World, Worst Speller in the World, Someone Good at Learning to Spell,*

Someone Who Finds Learning to Spell Difficult, were recorded and formulated into items for the SSEM.

2.6.2 Phase 2: Pilot Test and Item Analysis

Classical Test Theory (CTT) states that tests should be subject to an item analysis, initially drawing upon means and standard deviations of individual items to decide upon their usefulness (J. Kline, 2005; Spector, 1992). Similarly, Bandura (2006) states the importance of pre-testing items to check for ambiguity. He suggests that items should be eliminated if most participants check either the same response point or the maximum response point. This to ensure that items differentiate among respondents and that each efficacy item has sufficient difficulty and challenge. Bandura also suggests that there should be correlations between items measuring the same domain of efficacy.

The data were therefore subject to the following analyses:

- Normality and distribution checks
- Descriptive statistics analysis including means, standard deviations and ranges
- Cronbach's Alpha to explore issues of reliability and internal consistency within the SSEM, and to ensure items measuring the same domain of efficacy were correlated

3.0 Analysis and Results

3.1 Phase 1: Defining the Construct and Designing the Scale

3.1.1 Personal Constructs

Participants offered a variety of different personal constructs, examples of which are given in Table 3.1. These were used to devise items for the SSEM, for example the construct of *resiliency* became the item, "*I can be resilient when I am learning to spell at school*". Based on this exercise, 18 items were written for the SSEM (Appendix A8).

Table 3.1: Summary of Elicited Constructs

Elicited constructs about people who are good at learning to spell:	Determined, confident, neat, hard working, successful, kind, happy, optimistic, clever, smart, educational, trustworthy, protective, positive, geeky, boastful, friendly, funny, boring, entertaining, joyful, gifted, push self to limits, resilient, careful, cautious, uses initiative, protective, normal, laid back, fun, active, down to earth, strange, anti-social, cocky, jolly, selfish, arrogant, relaxed, posh, interactive, dressed smartly
Elicited constructs about people who are not very good at learning to spell:	Unsuccessful, sad, not good at learning, uncaring, bully, ignorant, stupid, untrustworthy, rough, nasty, confused, shy, not very neat, sad, dull, boring, selfish, unconfident, serious, not much fun, lazy, dumb, strange, social, positive, not arrogant, naughty, jumpy, hyper, shy, scruffy

The repertory grids were compiled using the online WebGrid5 programme (Gains & Shaw, 2005). Whilst no within-cluster analysis was carried out for the purpose of this research, examples of repertory grids and cluster maps are included in Appendix A9 and ideas for further research are explored in the discussion section.

3.1.2 Existing Literature

In order to construct a useful and valid spelling self-efficacy measure, it was important to understand the 'building blocks' of learning to spell. As mentioned previously, Pajares (1997) highlights the need for self-efficacy scales to measure the

different dimensions that underpin the criteria task in question. Items for the Spelling Self-Efficacy Measure were therefore written based upon aspects of the Phonological Assessment Battery (Frederickson, Frith, & Reason, 1997), the Phonics Screening Check (DfE, 2012b), the Devon Early Reading Programme (Devon LDP Educational Psychology Service, 2011), the Sound Spelling programme (Devon LDP Educational Psychology Service, 2009), the Early Reading Research (Solity & Deavers, 1999; Solity & Vousden, 2009) and the National Literacy Strategy (DfEE, 1998). From this literature, an additional 31 items were written for the SSEM.

3.1.3 Organisation of the SSEM

Based on the findings from elicitation exercises and the literature search, I organised the items into five subscales:

1. Spelling Self-Efficacy
2. Learner Characteristics
3. Learner Independence
4. Phonological Awareness
5. Technical Understanding

In order to minimise researcher bias, I asked a Year 6 teacher with a literacy specialism to also organise the items into the five categories as I had previously done. He categorised the items into the same areas that I had, e.g. the item 'At school I can hear the different sounds in long words' was placed into the Phonological Awareness category. I then structured the items into a random order for the spelling self-efficacy questionnaire. Items were organised into subscales to reflect Pajares (1997) assertion that self-efficacy measures should consider the range of domains that underpin the efficacy beliefs being assessed.

Guidance was taken from Bandura (2006) to ensure items were written as 'I can…' statements, although the wording of Bandura's rating descriptors was changed slightly in order to make it more child-friendly. For example his phrase *'Moderately*

certain can do' was changed to *'I can sometimes do that'*. Sufficient gradations of difficulty were built into each efficacy item to try and minimise ceiling effects.

Although Spector (1992) suggests that most summated rating scales have between four and seven response choices, Bandura (2006) suggests a 101-point scale. Due to the age range of the children I was designing this for, I used a scale from 0 to 10 whilst bearing in mind Bandura's comment that "scales that use only a few steps should be avoided because they are less sensitive and less reliable" (2006, p. 312). The items for the SSEM are included in Appendix A10.

3.2 Phase 2: Pilot Test and Item Analysis

3.2.1 Analysis of Individual Items

Kline (2005) sets out a number of guiding principles to follow when constructing test items:

- Deal with only one central thought
- Be precise
- Be brief
- Avoid awkward wording that is difficult to understand
- Avoid irrelevant information
- Present items in a positive language
- Avoid double negatives
- Avoid words such as *all* and *none*
- Avoid indeterminate terms like *frequently* or *sometimes*

To therefore ensure the SSEM was constructed in line with Bandura's (2006) framework, Spector's (1992) guidance and Kline's (2005) principles, I devised a checklist to visually screen the SSEM (Table 3.2) before piloting the measure.

Table 3.2: Screening Checklist for Items

Bandura's Principle	Questions to ask of each item	Yes	No
Content Validity	Is the item clear and is the language simple? Is the item short and well written? Does the item contain a single idea? Has jargon and colloquial expressions been avoided?	☐	☐
Content Validity	Are items phrased as 'can do' (judgement of capability) rather than 'will do' (statement of intention)?	☐	☐
Content Validity	Are items distinguishable from other constructs such as self-esteem (judgement of self-worth), locus of control (belief about outcome contingencies) and outcome expectancies (judgements about outcomes likely to flow from performance)?	☐	☐
Conceptual Analysis of Relevant Domain of Functioning	Does the scale include items to assess perceived capabilities in related behaviours?	☐	☐
Gradations of Challenge	Do items present a suitable degree of challenge to the respondent?	☐	☐
Response Scale	Do items should use single unit intervals ranging from 0 to 10?	☐	☐

The SSEM was then piloted on a sample of primary school children (*N* = 17). Data from Participant 6 and Participant 16 were deleted from the data set as they had only completed the two sample items. The descriptive statistics for each item are shown in Appendix A12.

Bandura (2006) suggests that items should be eliminated where most respondents have either chosen the same response point or the maximum efficacy category. For this reason, the data set was inspected and the decision was made to eliminate items 5, 21, 26, 32, 36, 40, 41 and 50, due to the majority of participants selecting the same (highest) response point (Table 3.3).

Table 3.3: Number of Respondents Selecting Highest Response Point (Total respondents *N* = 15)

Item	Number of Respondents	Percentage of Respondents
5	14	93.3%
21	14	93.3%
26	15	100.0%
32	14	93.3%
36	14	93.3%
40	11	73.3%
41	13	86.7%
50	12	80.0%

3.2.2 Internal Reliability of the Spelling Self-Efficacy Measure (SSEM) Pilot Study

Normality Checks

This initial analysis explored the distribution and normality of the data. Tabachnick and Fidell (2001) suggest that normality (the assumption that variables are normally distributed) can be assessed using either graphical or statistical methods. I used *z*-scores of skewness and kurtosis, in line with the visual inspection of histograms.

Whilst researchers can assume data to be normally distributed if values for skewness and kurtosis are zero, Field (2005) argues that *z*-scores of skewness and kurtosis are more useful to examine. Field suggests that the values of these *z*-scores should lie between -1.96 to +1.96, although this range can be increased to -2.58 to +2.58. Analysis of the *z*-scores for skewness and kurtosis suggests that many items in the data set meet the criteria for normal distribution (Appendix A12). Nevertheless, as the sample size is small (*N* = 15) and not all items within the data set are normally distributed, parametric test assumptions cannot be satisfied.

Inter-Item Correlations

Field (2005) suggests that if items are measuring the same construct, they should significantly correlate at either a 5% or a 1% level of significance. Any that do not should be removed. Moreover, any items correlating too highly (*R* > .9) with other variables may also need deleting.

A Spearman's Rho correlation coefficient was carried out as the data did not meet parametric assumptions. Analysis of the correlation matrix (Appendix A13) suggests that the majority of items on the SSEM correlate significantly with each other. This suggests that items are measuring areas within the same underlying construct domain (spelling self-efficacy). There are also a number of non-significant correlations, which may be explained by the small sample size.

Cronbach's Alpha (Internal Reliability Coefficient)

To assess the internal consistency of the SSEM, Cronbach's alpha ($\propto$) was computed for each subscale and for the SSEM as a whole. An alpha of above 0.80 is generally accepted (Field, 2005) although Kline (1999) suggests that a cut-off point of 0.70 is more appropriate for ability tests.

Cronbach's alpha for the whole scale indicates a reliable scale ($\propto$ = .910) (Appendix A14). Cronbach's alpha also indicates that each subscale is reliable. Table 3.4 shows the Cronbach's alpha for each subscale, along with suggested deletions to increase the value of Cronbach's alpha. The table also shows the revised alpha once deletions had been applied. Cronbach's alpha for the whole scale after suggested deletions indicates a reliable scale ($\propto$ = .903).

Table 3.4: Cronbach's Alpha for Subscales

Subscale	Items	Alpha (∝)	Deletions	Conclusions	Revised Alpha (∝)
1. Spelling Efficacy	1, 2, 7, 9, 11, 47	.797	Item 2 = .817	Remove Item 2	.817
2. Efficacy of Learner Characteristics	29, 31, 34, 35, 38, 39, 42, 43, 44, 49, 51	.915	Item 29 = .916 Item 34 = .923 Item 43 = .921	Remove Item 43	.921
3. Efficacy of Learner Independence	3, 4, 12, 14, 17, 20, 23, 24, 27, 30, 33, 37	.771	Item 14 = .783 Item 27 = .774	Remove Items 14, 27	.788
4. Efficacy of phonological awareness	6, 13, 15, 16, 22, 25, 28	.709	Item 22 = .714 Item 28 = .724	Remove Items 22, 28	.759
5. Efficacy of Technical Understanding	8, 10, 18, 19, 48	.837	Item 18 = .880	Remove Item 18	.880

3.3 Construction of Spelling Self-Efficacy Measure Revised (SSEM^{R})

Feedback from the participants in the pilot group was that too many items were too similar. I also had concerns that there were still too many items on the SSEM. I therefore examined the remaining 34 items and decided to remove items within the subscales that I perceived as too alike. I asked a primary school Year 6 teacher with a literacy specialism to complete the same exercise. We then compared our decisions and I created a revised SSEM (hereby known as SSEM^{R}) with a total of 23 items. Items that mentioned 'home' were also eliminated from the measure to keep the focus on learning to spell within the context of school.

Although the reliability coefficient is slightly lower after the further removal of items, the Cronbach's alpha for the revised SSEM (Appendix A15) still indicates a reliable scale (∝ = .865). Table 3.5 shows the Cronbach's alpha for each revised subscale.

Table 3.5: Cronbach's Alpha for Revised Subscales

Subscale	Items	Cronbach's Alpha (∝)
1. Spelling Efficacy	1, 7, 9, 11, 47	.817
2. Efficacy of Learner Characteristics	29, 34, 38, 39, 42, 44, 45, 49	.848
3. Efficacy of Learner Independence	30, 33, 37	.859
4. Efficacy of phonological awareness	6, 15, 16, 25	.765
5. Efficacy of Technical Understanding	8, 10, 48	.821

4.0 Summary of Findings

The results from this study suggest the following:

- Children in this sample attributed more positive characteristics to people who they perceived to be good at spelling than those perceived to not be so good at spelling.
- Based on individual work with children and an exploration of the literature, a statistically reliable scale for measuring spelling self-efficacy has been designed and is ready to be validated in Paper 2.

5.0 Discussion

The construct of spelling self-efficacy has been explored in this paper and a summated rating scale has been designed. Revisions to the Spelling Self-Efficacy Measure have been made based on a pilot study and an item analysis.

5.1 Discussion of Theoretical Framework

Measuring the Concept of Spelling Self-Efficacy

Researchers have suggested that the term 'self-efficacy' is often interchanged with 'self-concept' in literature, however it has also been stated that there is a distinct conceptual difference as self-efficacy beliefs are context specific (Bandura, 1977a; Marsh, 1990; Schunk, 1990). Bandura (1997) and Pajares (1997) have warned many measures of self-efficacy are too general, frequently assessing broad confidence levels or generalised attitudes about capabilities. During construction of the SSEM, consideration has been given to the guidelines set out by Bandura (2006) in order to ensure items are both task and context specific. Nevertheless, the SSEM^{R} could be criticised for some items, such as *'at school I can spell every word'*, not being task specific enough. The analysis in Paper 2 aims to further explore the validity of all items on the scale.

Although Bandura's (2006) guidelines for creating self-efficacy measures were followed carefully, some elements were changed during the design process. A shorter rating scale from zero to ten was used instead of Bandura's recommended larger scale. This measure is being designed for use with young children who are likely to have a range of educational needs, in particular low literacy levels. I therefore felt it appropriate to simplify the scale. Bandura suggested the larger scale was to provide a greater detail of accuracy and reliability. While a high reliability coefficient was found in this study, it would be useful to carry out an additional piece of research in order to explore differences in reliability, or indeed differences in

children's overall scores on the SSEM, using a larger scale. This additional research may also tackle issues of generalisability that will be further discussed in Paper 2.

I initially categorised the items for the SSEM into five subscales for the purposes of test organisation and analysis. Care was taken to minimise bias, and correlations between items within subscales were computed during data analysis. Although constricting items to subscales without a statistical analysis, such as a factor analysis, may be open to criticism, it fits with the theoretical assumptions of this research study. As covered in the introductory section of this paper, pragmatism allows researchers to move between inductive and deductive ways of working. This reflects the ability to use the existing literature and children's constructs to determine the theories that underpin the SSEM. These subscales were solely used for constructing the test and will not be considered during further validation in Paper 2.

Summated Rating Scales

Spector's (1992) framework provided an overarching structure for developing the SSEM. Classical Test Theory underpins Spector's framework, concerned with the total test score rather than scores on individual items. Kline (1999, p. 96) argues that "the classical model of error variance is still seen as the most valuable for understanding and constructing psychological tests". Based on previous research (Pajares, 1997; Ranking, et al., 1994) and Bandura's (2006) guidelines, I felt it most appropriate to design a summated rating scale following Classical Test Theory assumptions.

Kline (2000) warns that individuals may interpret scale points on a rating scale differently, even with qualitative descriptors. For the purpose of the SSEM this is an unavoidable possible error that must be considered if standardised at a later date. Alternatives to a rating scale were considered although it would not have been suitable to use dichotomous items with a *yes* / *no* answer. They are insufficient when measuring complex attitudes or opinions like self-efficacy, often resulting in unreliable and reductionist scales (Spector, 1992).

5.2 Discussion of Methods and Analysis

Personal Constructs

Techniques from personal construct psychology (PCP) (Kelly, 1955) were used in order to elicit constructs from children about learning to spell. PCP explains that individuals understand the world and make sense of events and experiences by forming constructs. These constructs allow us to anticipate and predict what will happen in future circumstances (Butler & Green, 2007). This study is rooted in pragmatic philosophical assumptions, which give priority to individuals' everyday experience (Morgan, 2007). PCP elicitation activities were used in order to understand how children make sense of the experience of learning to spell. Personal constructs are unique to an individual (Kelly, 1955) although by making intersubjective epistemological assumptions, we can recognise a degree of objectivity within this socially constructed knowledge and meaning.

During my literature search, I found other studies have explored personal constructs of children in relation to literacy, although none that specifically explored the constructs around learning to spell. Humphrey and Mullins (2002) explored the personal constructs of children with dyslexia, concluding that "children with dyslexia believe that when one is good at reading, one can be considered intelligent and vice-versa" (p. 200). While I did not set out to engage with a substantial study into children's constructs, the conversations I had with children have illuminated many further ideas to research. Similarly to Humphrey and Mullin's study, I observed some differences in the constructs elicited between the children who had been identified as having difficulties with spelling and those children who had not. As personal constructs are unique to the individual, differences in responses are to be expected between participants. However, there was much similarity between participants' responses, for example children in both sample groups tended to describe 'good spellers' as having more positive characteristics than 'poor spellers'. Any more detailed analysis was outside the scope of this research although I will be keen to further research this area.

Although the sample used during this phase of the data analysis was small (*N* = 18) in comparison to other studies such as Humphrey and Mullins (*N* = 118), it was ensured that data was gained from children with (*n* = 10) and without (*n* = 8) identified spelling difficulties. A question could be asked about the age range of the participants in this phase of the study. I worked with children from Year 5 (*n* = 7) and Year 8 (*n* = 11) in order to gain constructs from two different age groups. As a result of this data collection, the decision was made to focus the SSEM on children in Key Stage 2 at this point in time. When talking about learning to spell, some children in Year 8 commented that it was difficult to think about because they were not explicitly learning to spell any more. It could be that while formal spelling teaching happens across Key Stage 2, it is rarely timetabled into the Key Stage 3 curriculum.

Pilot Group and Item Analysis

In order to reduce the number of items on the SSEM, it was administered to a small pilot group comprised of children in Year 4, 5 and 6 (*N* = 17). This was a deviation from Spector's (1992) framework which suggests using a sample size of between 100 to 200 respondents for item analysis, followed by a much larger sample for validation purposes. The reason for a small pilot group was due to time constraints within the scope of this thesis. I am confident that the results from the pilot group, along with feedback from participants and assessments of the scale using Bandura's (2006) guidelines for creating a self-efficacy measure, were sufficient to create an initial self-efficacy scale that can be further analysed in Paper 2. It is worth noting that no claims of internal consistency can be generalised for the SSEM based on this small sample.

The data in this sample were not normally distributed, however there was no theoretical expectation of a normal distribution. The data were not transformed in this study although this will be an area to explore further in Paper 2 with a larger sample group. Research has suggested that reliability coefficient alpha estimates are not robust to non-normally distributed data (Sheng & Sheng, 2012). It will be

important to consider this in the validation sample in Paper 2, as well as ensuring test-retest reliability is calculated in addition to internal consistency estimates.

While the revised SSEM was shown to have a good reliability coefficient, Nunnally and Bernstein (1994) argue that a coefficient should exceed 0.90 if important decisions are to be made for an individual based on the test result. This will therefore by the target reliability coefficient when validating the scale in Paper 2. Pajares (1997) debates how many self-efficacy measures achieve high internal consistency through different phrasings of similar items. Items should require individuals to reflect on their perceived capabilities with a clear task in mind so as to not provide an assessment of the general domain. The SSEM has been carefully constructed to take this into consideration. However, some items may be perceived as being too broad, too general or not specific to one context. Further item analysis is planned for Paper 2 in order to address these issues.

5.3 Strengths and Limitations of SSEM

As a result of the literature review, a gap was highlighted in the research for the need to further promote self-efficacy beliefs during spelling interventions at school. A spelling self-efficacy measure has been designed in order to help teaching staff make spelling support more personalised to a child's individual needs. Limpo and Alves (2013) discuss the longitudinal impact on writing when adults promote children's development of realistic self-efficacy beliefs alongside explicit instruction of spelling skills. This adds to the claims made throughout this paper about the importance of nurturing self-efficacy beliefs during literacy interventions.

There are many debates between researchers about the usefulness and fairness of psychometric testing in education, for example, will it lead to negative labelling or disadvantage (P. Kline, 2000). These factors must be taken into consideration when discussing how education professionals and school staff may use the SSEM questionnaire. Kline (2000) argues that tests must be used appropriately and sound inferences should be made in conjunction with other sources of information.

Further to this, George Kelly advocated that a theory's validity must also be assessed in terms of its usefulness (Fransella, 1995). Whether or not teaching staff feel the SSEM is a useful tool will be important to consider in future research.

If the SSEM is to be used in schools, it will be important to distribute a detailed administration manual to ensure it is not used as a one-off assessment, but as a tool to gain ongoing qualitative and quantitative information for informing intervention and good practice. I envisage the SSEM to be used by skilled teaching assistants or teachers to explore a child's perceived beliefs in their capability to learn how to spell within the context of school. Using the SSEM can identify priority areas, for example it might be important to focus on increasing a learner's confidence and resilience in tackling challenging spelling problems. The SSEM can be used as an ongoing reflective tool to assess the quality of intervention and support offered to the child. Adults will be able to differentiate interventions to focus on building children's self-efficacy and, as hypothesised, their capacity to learn.

A limitation of the SSEM can stem from the assumption that children will complete it with support, so that the adult can gain further qualitative information about the child's perception of learning to spell. Bandura (2006) highlights the importance of allowing people anonymity to make personal judgements in order to avoid possible bias or social desirability issues. It will be important to consider the possible impact that adults may have had on children's ability to make personal judgements of capability when completing the SSEM.

6.0 Conclusions

> … There are situations in which inaccurate self-beliefs, rather than a weak knowledge base or inadequate skills, are responsible for students short-changing themselves academically. In these cases, identifying, challenging and altering inaccurate judgements are essential to academic success and adaptive functioning.
>
> (Pajares & Valiante, 1999, p. 401)

This research has defined the concept of spelling self-efficacy, and a summated rating scale has been developed based upon published literature and children's constructs. The SSEM will be subject to further analysis in Paper 2 of this thesis in order to assess the validity of the scale. Paper 2 will continue to follow the framework discussed by Spector (1992) to statistically validate the SSEM, and explore any relationships between self-efficacy beliefs and spelling ability.

The Development of the Spelling Self-Efficacy Measure

Paper 2: The Administration and Validation of the Spelling Self-Efficacy Measure

Abstract

This paper further develops the revised Spelling Self-Efficacy Measure ($SSEM^R$) as constructed in Paper 1 of this thesis.

The Spelling Self-Efficacy Measure (Revised) was administered to a large sample of children (*N* = 451) and a principal components analysis was carried out, suggesting three underlying domains: Phonological Awareness; Learner Independence and Optimism; Learner Confidence and Resilience. The $SSEM^R$ was reduced to 20 items and the Cronbach's alpha for the $SSEM^R$ was excellent ($\propto$ = .926).

Single-word spelling tests were administered to some participants alongside the $SSEM^R$ (*n* = 235) and significant correlations were found between spelling ability and self-efficacy beliefs as measured by the $SSEM^R$. Children identified as having additional educational needs through inclusion on the schools' Special Educational Needs Code of Practice register, were found to score significantly lower on the $SSEM^R$ than children not identified as having additional needs

This study concluded that the $SSEM^R$ has good psychometric properties of reliability and validity, although limitations for generalising results outside the sample group are discussed. The $SSEM^R$ could be used as a basis for further work both professionally and in a research capacity. It would particularly benefit from further validation and standardisation using a more representative sample group.

1.0 Introduction

1.1 Research Aims

As outlined in Paper 1, this thesis is concerned with developing a statistically valid and reliable summated rating scale, following the framework proposed by Spector (1992). Paper 1 outlines the construction and pilot testing of the Spelling Self-Efficacy Measure (SSEM), and then proposes a revised version of the measure ($SSEM^R$). This paper will report the administration of the $SSEM^R$ to a large sample group and the analysis used to determine reliability and validity of the measure. This paper also aims to explore correlations between children's scores on the $SSEM^R$ and other variables, including spelling ability, special educational needs, age and gender.

1.2 Theoretical Context

The construct of spelling self-efficacy has been explained and discussed in Paper 1 and in the literature review (Appendix A2). This section will briefly outline the theoretical context of assessing reliability and validity in test construction.

1.2.1 Validity

Assessing validity is a fundamental step in constructing and evaluating a test (AERA, APA, & NCME, 1999; Spector, 1992).

> Validation can be viewed as developing a scientifically sound validity argument to support the intended interpretation of test scores and their relevance to the proposed use… As validation proceeds, and new evidence about the meaning of a test's scores becomes available, revisions may be needed in the test, in the conceptual framework that shapes it, and even in the construct underlying the test.
>
> (AERA, et al., 1999, p. 9)

This study will aim to find evidence of validity as suggested by the Standards for Educational and Psychological Testing (AERA, et al., 1999). These standards have moved away from the traditional types of validity (content, construct and criterion

related) and have set out five areas in which to look for evidence of a unitary concept of validity:

- Test content
- Response processes
- Internal structure
- Relations to other variables
- Consequences of testing

In order to either support or refute validity, evidence will be collected within each of these five areas.

Researchers in the area of self-efficacy have tended to assess the validity of existing measures using factor analysis methods. Miller, Coombs and Fuqua (1999) assessed the validity of Bandura's (1989) Multidimensional Scales of Perceived Self-Efficacy (MSPSE) using a principal factor analysis, and Ramkissoon (2004) using a confirmatory factor analysis. Both studies questioned the generalisability of their findings due to their restricted sample population. Choi, Fuqua and Griffin (2001) examined the internal structure of the MSPSE using a series of principal axis factor and principal components analyses. They concluded that further research should assess correlations between scores on the MSPSE to scores on theoretically related constructs in order to establish the MSPSE's usefulness.

1.2.2 Reliability

Spector (1992) highlights the importance of ensuring a scale is internally consistent and that it consistently and reliably reflects the construct that it is aiming to measure. The most common measure of the internal consistency of a scale is Cronbach's alpha (Field, 2005). Cronbach's alpha estimates the reliability of a test, assuming that inter-correlations between items will reflect the error score, if all items are measuring the same underlying construct (Spector, 1992). High correlation indicates low error and low correlation indicates high error. These

correlations will average out and so by increasing either the correlation between items, or the number of items, the coefficient alpha can be raised.

Spector (1992, p. 32) states that a "coefficient alpha reflects internal-consistency reliability, which does not necessarily reflect reliability over time". The SSEM^{R} has been designed based on the assumptions of Classical Test Theory (CTT). Analysis of the test's reliability should therefore focus on estimating how an individual may score if they were to take the test at two separate times. CTT suggests that observed scores (i.e. the actual score obtained on the test) are comprised of a true score, a random error and any bias (J. Kline, 2005; Spector, 1992). If a test is reliable, it is expected that the true score will remain the same across both occasions. The error score may change based on health, fatigue, anxiety or mood (AERA, et al., 1999). The correlation coefficient between the two scores should be significant in order to confirm test-retest reliability. Interestingly, similar studies analysed Cronbach's alpha coefficients for subscales on the MSPSE, but did not complete any test-retest analysis (Choi, et al., 2001; Miller, et al., 1999).

2.0 Research Design and Methodology

2.1 Research Aims and Research Questions

The broad research aims for this thesis are:

- To develop ideas about the areas relevant to perceived efficacy in spelling
- To construct a spelling self-efficacy inventory for general and comparative use and validate it systematically

Paper 2 comprises Stage 4, *Administration and Item Analysis*, and Stage 5, *Validate and Norm*, of Spector's (1992) theoretical framework for developing a summated rating scale. The research questions for this paper are therefore:

1. What is the reliability of the revised Spelling Self-Efficacy Measure (SSEM^{R})?
2. Is the SSEM^{R} a valid measure of spelling self-efficacy?
3. What are the correlations between scores on the SSEM^{R} and spelling ability, additional educational needs, age or gender?

2.2 Theoretical Assumptions

These research questions are concerned with formulating and evaluating statements for the SSEM^{R}, and testing them to produce generalised objective knowledge. They are therefore based within positivist ontology as they are looking for an explanation of behaviour, rather than ascribing meaning and understanding. Robson (2002, p. 21) writes that "positivists look for the existence of a constant relationship… between two variables". This study aims to establish causal relationships between the variables 'spelling self-efficacy' and 'spelling ability'. The findings from this study will be interpreted in light of how any such causal relationships may influence and help plan child-centred intervention.

The nature of statistically validating an instrument logically fits within an empirical framework. The research design will therefore be rooted within a positivist epistemology and make use of quantitative methods. I envisage that findings will be generalisable to a population outside my sample group and methods will be replicable in further studies.

2.3 Sampling and Participants

The research was carried out in schools across three local authorities (Table 2.1), through liaison with the schools' Special Educational Needs Coordinators (SENCOs) and head teachers. Children were aged between 8-11 years old and were in school year group 4, 5 or 6.

Table 2.1: Summary of Local Authorities

Local Authority	Description of LA	Number of Schools	Number of Participants
LA1	Rural, South West	4	240
LA2	Urban, West Midlands	5	181
LA3	Urban, South West	1	30

A suitable sample size was required in order to explore the validity of the SSEM^{R} and ensure a reliable factor analysis. Field (2005, p. 638) states "a researcher [should have] at least 10-15 participants per variable". Comrey & Lee (1992) suggest that when completing a factor analysis, 100 participants is classed as a poor sample size, 300 participants is a good sample size, and 1000 is an excellent sample size. Tabachnick and Fidell (2001) suggest a minimum number of 300 participants for factor analysis. As there are 23 items on the SSEM^{R}, it was therefore important to have at least 230 participants, but ideally 300 or more in order to provide a stable factor solution.

Participants (*N* = 451) in all local authorities were asked to complete the SSEM^{R}. As shown in Table 2.2, 50.55% of participants were male and 49.45% were female. Across age ranges, 31.49% of participants were in Year 4, 34.59% were in Year 5 and 33.92% were in Year 6. This demonstrates a representative sample across both year group and gender.

Table 2.2: Summary of All Participants sorted by LA, Gender and Year Group

	Male				Female				Totals
	LA1	LA2	LA3	Total	LA1	LA2	LA3	Total	
Year 4	56	15	0	71	58	13	0	71	142
Year 5	31	47	0	78	26	52	0	78	156
Year 6	30	30	19	79	39	24	11	74	153
Totals	117	92	19	**228**	123	89	11	**223**	**451**

Participants (*n* = 30) from LA3 were asked to complete the SSEM^{R} twice with a period of 10 days between testing. This was to allow for test-retest reliability analysis, although the timeframe allowed between test and retest will be discussed later in this paper.

In addition to completing the SSEM^{R}, children from LA1 (*n* = 235) were asked to complete the Single Word Spelling Test (SWST) (Sacre & Masterson, 2000). Whilst there was a proportionate split of male to female, children in Year 4 were over-represented in comparison to Year 5 and Year 6 (Table 2.3).

Table 2.3: Summary of Participants Completing the SWST sorted by Gender and Year Group

	Male	Female	Totals
Year 4	54	58	112
Year 5	30	26	56
Year 6	28	39	67
Totals	112	123	**235**

2.4 Ethical Considerations

Please see Appendix A1 for a full discussion of ethical considerations.

2.5 Methods

Research envelopes were posted to each school with clear instructions to follow. Each envelope contained the following (see Appendix A16):

- Teacher's research brief and SSEM^{R} administration instructions
- Parent's research brief including information about ethics
- A demographic / SEN information request form for teachers
- SSEM^{R} for participants (Appendix A17)

- SWST administration instructions for teachers and answer sheets for participants (LA1 only)[1]
- Return envelope

Teachers were asked to read the instructions to their class, outlining the purpose of the research and offering children the opportunity to withdraw. Care was taken to ensure the instructions were clear and did not lead to confusion. Teachers were asked to guide the class in completing the SSEM^{R} and the SWST (LA1 only). Suggestions were given within the research brief for ensuring all children understood how to complete each assessment properly. Teachers were asked to collect all of the answer sheets and return to the researcher along with the demographic information. Asking teachers to refer only to children's initials and not identifying the school on individual answer sheets ensured anonymity.

2.6 Measures Used

Every participant completed the revised Spelling Self-Efficacy Measure (SSEM^{R}) and children in LA1 also completed the Single Word Spelling Test (SWST) (Sacre & Masterson, 2000). The SWST was chosen due to the ease of administering it to a whole group at the same time. The SWST is not restricted to psychologists and has clear instructions for teachers unfamiliar with the assessment. The SWST takes between 15-30 minutes to administer and provides standard scores and spelling ages, standardised to a national UK population (N = 7952).

Sacre and Masterson (2000) report that the SWST test-retest reliability is high with K-R 20 reliabilities between 0.94 and 0.97 for each age-related test. Scores from the SWST standardisation sample demonstrated high correlations with children's National Curriculum levels. In addition, results for one group of children (n = 150) were found to significantly correlate with results on an alternative standardised spelling test (r = .94, p = .001).

[1] Not included in Appendix

2.7 Analysis Procedures

This paper seeks to address issues of validity and reliability in the SSEM^{R}, in addition to any correlations between scores on the SSEM^{R} and a number of variables.

As in Paper 1, each respondent was allocated an anonymous participant code for the purposes of data analysis. The codes comprised four letters (SWST or SSEM) followed by a three-digit number. For example, SWST107 or SSEM241. The data were input and sorted using Microsoft Excel, before being imported into SPSS.

The data were then subject to the following analyses:

- Normality and distribution checks
- Principal Component Analysis to explore issues of validity within the SSEM^{R}
- Cronbach's Alpha and test-retest correlation to explore issues of reliability and internal consistency within the SSEM^{R}
- Correlation analysis between scores on the SSEM^{R} and scores on the SWST
- Correlation analyses between scores on the SSEM^{R} and other variables including Special Educational Needs, Literacy Difficulties, Gender, Age and Year Group

The Standards for Educational and Psychological Testing (AERA, et al., 1999) set out five areas in which to look for evidence of a unitary concept of validity. Table 2.4 outlines the analysis that will be completed in order to gain evidence of validity.

Table 2.4: Analysis of Validity Evidence

Sources of Validity Evidence	Description
Test Content	This is the analysis of the relationship between the items on the SSEM^{R} and the construct of spelling self-efficacy. Each item was analysed in line with Bandura's (2006) recommendations in Paper 1 and will be subject to a further item analysis in this paper. Colleagues will be asked to help validate the categories items are assigned to as part of this process.
Response Processes	Each teacher who's class participates in this study will be asked for feedback about the perceived performance and response engagement of each child.
Internal Structure	Calculating Cronbach's alpha reliability coefficients for the whole scale as well as the subscales, as determined by the principal components analysis, will assess the internal structure.
Relations to other variables	The SSEM^{R} will not be compared with other tests of spelling self-efficacy, as I have not found any published tests with sufficient reliability and validity. The SSEM^{R} will be correlated with a single-word spelling test to explore the relationship between efficacy beliefs and ability.
Consequences of Testing	Consequences and implications of using the SSEM^{R} will be explored theoretically in the discussion section along with suggestions for further research.

3.0 Analysis and Results

3.1 Normality

Initial analysis explored the distribution and normality of the data. Tabachnick and Fidell (2001) suggest that normality, i.e. the assumption that variables are normally distributed, can be assessed using either graphical or statistical methods. I used *z*-scores of skewness and kurtosis, alongside visual inspection of histograms.

3.1.1 Spelling Self-Efficacy Measure Revised (SSEM^{R})

Distribution of Scores on Individual Items

Visual inspection of the histograms and analysis of the *z*-scores for skewness and kurtosis indicates that no items in the data set meet the criteria for normal distribution (Appendix A18).

To attempt to reduce the impact of any outliers, I transformed the data using both a log transformation and a reciprocal transformation. Neither of the transformations corrected the problem and so this analysis will continue by using statistical tests that do not rely on the assumption of normally distributed data.

This analysis will therefore continue by assuming that the data do not meet parametric assumptions.

3.1.2 Single Word Spelling Test (SWST)

Scores on the SWST meet normality assumptions for skewness but not for kurtosis. Visual inspection of the histogram suggests that the data are the shape expected of a normal distribution (Appendix A19). The Kolmogorov-Smirnov test of normality is non-significant ($D(235) = .036$, $p > .05$) for scores on the SWST, suggesting the data are not significantly different from a normal distribution. Taking these factors into consideration, this data will be treated as being normally distributed.

3.2 Descriptive Statistics

3.2.1 Spelling Self-Efficacy Measure Revised (SSEM^{R}) Descriptive Statistics

Spelling Self-Efficacy Measure questionnaires were returned from 460 children. From this sample, nine questionnaires were removed due to participants not answering any items, answering items in a marked pattern formation (for example diagonally across the pages), or marking the same number for every question including the two example items. The total number of SSEM questionnaires used for data entry was 451.

A number of children (n = 61) did not answer all items and so data was excluded listwise during some analysis procedures. In addition, some participants (n = 51) did not answer Item 6, *'I can learn spellings for a spelling test at school'*, many writing

'we do not do spelling tests' above the question. Despite this, there was still a large number of valid participants (*N* = 390).

Each item on the SSEM^{R} had a minimum statistic of 0 and a maximum statistic of 10, demonstrating responses within the confines of the scale. The mode for each item was either 0, 5 or 10 and medians ranged from 4 to 10 (Appendix A18).

3.2.2 Single Word Spelling Test (SWST) Descriptive Statistics

There were 237 SWST answer sheets returned however two were removed from the analysis due to no visible attempt of completion. Standard scores were calculated for each test paper in order to allow for comparison between age groups. SWST standard scores (*n* = 235) ranged from 69 to 131 with a mean score of 96.01 (*SD* = 14.35) (Appendix A19). These scores are similar to the statistical norms provided in the SWST administration manual (*M* = 100.00; *SD* = 15.00) (Sacre & Masterson, 2000).

3.3 Validity of the Spelling Self-Efficacy Measure Revised (SSEM^{R})

3.3.1 Evidence from the Internal Structure: Principal Component Analysis

To examine the underlying factor structure, a principal component analysis (PCA) was used. The PCA followed Kaiser's recommendation of eigenvalues over 1 and a direct oblimin rotation was chosen, as one can assume the components will correlate. The SPSS output for this analysis is included in Appendix A20.

After controlling for missing variables by excluding items listwise, the correlation matrix indicated that the data (*N* = 390) gathered from the SSEM^{R} correlated well but not perfectly, ideal for PCA. No variables were removed for poor convergence scores (below 0.4) and there were no correlation coefficients greater than .661. Each item was significant ($p < .001$), meaning there was no need to consider eliminating any additional items at this stage.

The determinant of the correlation matrix (4.679E-006) was smaller than the necessary value of .00001 and so multicollinearity may pose a problem for this data. As mentioned in the discussion section of this paper, multicollinearity does not cause problems during PCA however it might for a traditional factor analysis. The partial correlations between variables on the anti-image correlation matrix were small and therefore indicative of a good analysis (Field, 2005). Bartlett's Test of Sphericity was significant for these data ($\chi^2(253) = 4669.698$, $p < .001$).

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for these data (.944) was "superb" according to Field's (2005) criteria. The KMO values reported within the anti-image matrices table for individual variables were all above .9 with the exception of Item 5, which was .886. This suggests that correlation patterns are compact and so the PCA should produce reliable components.

The scree plot showed four components as having eigenvalues greater than 1. As the sample sized exceeded 250 and the average communality after extraction was 0.6, Kaiser's criterion can be accepted as accurate. The model extracted four components with eigenvalues of above 1 that cumulatively accounted for 59.85% of the variance (see Table 3.1). In order to assess the fit of the model, the proportion of residuals greater than .05 should be less than 50.00%. The reproduced correlations table showed 80 (31.0%) non-redundant residuals with absolute values greater than 0.05.

Table 3.1: Total Variance Explained from PCA

Component	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	10.18	44.26	44.26
2	1.34	5.82	50.09
3	1.20	5.21	55.30
4	1.05	4.55	59.85

The pattern matrix contains the component loadings for the direct oblimin oblique rotation with Kaiser normalisation. This matrix shows four components with Item 6 not loading onto any. Item 6 was therefore deleted.

Item 22 loaded onto both Component 1 and 2. The items in Component 1 appeared to relate generally to the confidence and resilience of learners. Items in Component 2 seemed to be more about the help and support required from others. Component 3 was to do with children's belief in their phonological abilities and Component 4 related to the positivity of learners. Due to the nature of these groupings, it was decided to load Item 22 (*I can understand how to spell lots of long words at school*) onto Component 2 rather than Component 1. Item 17 (*I can learn to spell without any help from my friends at school*) fitted logically into Factor 2 and so was also moved. The four factors were named as shown in Table 3.2.

Table 3.2: Component Names and Items

Component	Component Name	Items
Component 1	Learner Confidence & Resilience	16, 17, 18, 20, 21, 23
Component 2	Learner Independence and Optimism in Abilities	1, 2, 11, 14, 15, 22
Component 3	Belief in Phonological Awareness	3, 4, 7, 9, 12, 19
Component 4	Learner Positivity	5, 8, 10, 13

As predicted from the structure matrix, the components were not independent from each other. The component correlation matrix demonstrated that each component was interrelated to some degree. This can be explained by each component exploring a different aspect of the proposed spelling self-efficacy construct.

3.4 Internal Reliability of the Spelling Self-Efficacy Measure Revised (SSEM^{R})

3.4.1 Inter-Item Correlations

Field (2005, p. 640) states that if items are measuring "the same underlying dimension(s)", they should significantly correlate with each other. The SSEM^{R} has provided interval level data although parametric test assumptions cannot be satisfied, as the data are not normally distributed. A Spearman's Rho correlation coefficient was therefore chosen.

Analysis of the correlation matrix suggests that all items on the SSEM^R significantly correlate with each other item on the SSEM^R (p (two tailed) <.01). Moreover, no items on the SSEM^R correlate too highly (where R_s > .9) with other items. It can therefore be assumed that the items on the SSEM^R are all measuring the same underlying dimension and no items need to be excluded.

3.4.2 Cronbach's Alpha (Internal Reliability Coefficient)

To assess the internal consistency of the SSEM^R, Cronbach's alpha (∝) was computed for each subscale and for the SSEM^R as a whole. An alpha of above 0.8 is generally accepted for research purposes (Field, 2005) although Kline (1999) suggests that a cut-off point of 0.7 is more appropriate for ability tests. Nunnally and Bernstein (1994) however assert that a reliability coefficient above 0.90 is required for tests if important decisions are to be made for an individual based on the test result. A mean inter-item correlation between 0.15 and 0.20 is recommended for broad constructs, and between 0.40 and 0.50 for more narrow constructs (Clark & Watson, 1995).

Cronbach's alpha for the whole scale (excluding Item 6) indicates a reliable scale (∝ = .935) (Appendix A21). The analysis suggests that the alpha would not increase by deleting any of the items. The mean inter-item correlation is 0.404.

The reliability was then assessed for each component as identified in the principal components analysis (Table 3.3) (Appendix A22). Each of the four components had an alpha of above 0.8 and a mean inter-item correlation between 0.40 and 0.50, in line with the recommendations presented above.

Table 3.3: Summary of Cronbach's Alpha Values

Component	Component Name	Cronbach's Alpha	Mean Inter-Item Correlation
1	Learner Confidence & Resilience	.854	.497
2	Learner Independence and Optimism in Abilities	.854	.499
3	Belief in Phonological Awareness	.830	.450
4	Learner Positivity	.802	.511

3.5 Final Proposed Component Structure

The decision was made to delete Item 6 based on recommendations from the principal components analysis (PCA). Item 21 was also removed from the SSEM^{R} as it did not fit within any of the proposed components, and I was not happy that the item was specific enough to fit with Bandura's (2006) criteria for the construction of self-efficacy measures. A second PCA was completed (Appendix A23) which extracted three components. Item 20 was not loaded onto any of the components and, in reflection; I did not feel the item explored self-efficacy in line with the accepted definition for this study (Bandura, 1977a).

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for these data in the final proposed structure (.938) was once again "superb" according to Field's (2005) criteria. Bartlett's Test of Sphericity was significant for these data ($\chi^2(210) = 4563.625$, $p < .001$). Cronbach's alpha for all items on the SSEM^{R} was excellent ($\propto = .926$) and no items were suggested for deletion (Appendix A24). Analysis of the skewness and kurtosis indicates that the scores within each component and the total SSEM^{R} scores are not normally distributed.

The new model is thus presented in Table 3.4 with descriptions of each component summarised in Table 3.5. The wording of each item can be found in Appendix A25.

Table 3.4: Final PCA Extraction of Components and Coefficient Alpha

Component	Component Name	Items	Cronbach's Alpha
Component 1	Belief in Phonological Awareness	3, 4, 7, 9, 12, 19	.830
Component 2	Learner Independence and Optimism in Abilities	1, 2, 11, 14, 15, 17, 22	.869
Component 3	Learner Confidence & Resilience	5, 8, 10, 13, 16, 18, 23	.852

Table 3.5: Descriptions of Each Component

Component	Description
Phonological Awareness	The belief a child or young person has in their capability to understand phonics and use phonic strategies to help learn to spell.
Learner Independence and Optimism	The belief a child or young person has in their capability to be an independent speller and remain optimistic about their learning abilities.
Learner Confidence and Resilience	The belief a child or young person has in their capability to remain confident about learning to spell and resilient when learning becomes challenging.

3.5.1 Validation of Test Content

In order to minimise researcher bias in naming the factors, three educational psychology colleagues were asked to independently assign each item to one of the three components. They were each given the description of the component (Table 3.5) and asked three questions:

1. Does the item set out to measure a specific judgement of capability, i.e. it does not measure a general judgement of self-worth?
2. Does the item present a suitable degree of challenge, i.e. every participant would not tick 10 out of 10 for 'I am certain I can do that'?
3. Please indicate in which of the three components the item best fits

Each item was perceived by colleagues as being specific and presenting with a suitable degree of challenge. One comment made was about Item 12 not being age appropriate for older children.

Item 12: When I am learning to spell at school, I can recognise which words sound the same at the beginning, for example the words 'shop' and 'shell' have the same /sh/ sound at the beginning

The descriptive statistics indicate 65.30% of participants rated themselves as 10 for Item 12. This percentage was stable across children of all ages and so will need further consideration if the SSEM^{R} is to undergo further validation in future research.

Colleagues commented that there was a degree of similarity between the descriptors of Components 2 and 3. All three colleagues wondered whether Items 10, 13 and 16, in Component 3, fitted better into Component 2. The subjectivity of naming components is characteristic of factor analytic methods (Field, 2005). The descriptors perhaps need refinement based on further research.

3.6 Test-Retest Reliability

Participants (*n* = 30) from LA3 were asked to complete the SSEM^{R} twice with a period of 10 days between testing. Data from both testing times were collected from 24 participants. As the data did not meet parametric assumptions of normality, a Spearman's Rho was completed. All items except Item 6 were significantly correlated between times (Appendix A26). It has been previously recommended, through the PCA, that Item 6 should be removed from the SSEM^{R}.

A Spearman's Rho correlation was also performed on the total SSEM^{R} score and on the three component totals from Time 1 and Time 2. All were significantly positively correlated (Table 3.6).

Table 3.6: Correlations from Time 1 to Time 2

Subscale	Test		Retest		r_s
	Mean (*n* = 30)	SD	Mean (*n* = 24)	SD	(*n* = 24)
Total SSEM^R	154.63	31.50	167.71	5.41	.908**
1. Belief in Phonological Awareness	54.20	7.94	56.04	1.52	.732**
2. Learner Independence and Optimism in Abilities	44.23	15.38	51.88	2.52	.933**
3. Learner Confidence & Resilience	56.20	10.55	59.79	1.98	.913**

** Correlation is significant at the 0.01 level (2-tailed)

3.7 Correlations between SSEM^R and Other Variables

3.7.1 SSEM^R and Spelling Ability Correlations

Standard scores from the SWST correlated significantly with total scores from the SSEM^R, and each component on the SSEM^R (Figure 3.1) (Appendix A27).

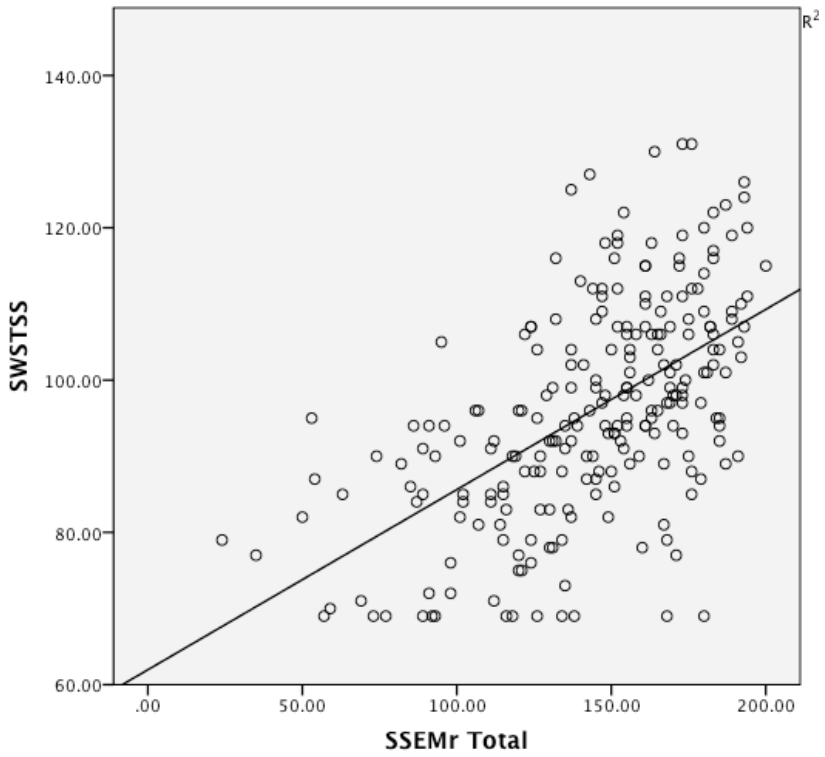
The correlation coefficient squared (R^2) "is a measure of the amount of variability in one variable that is explained by the other" (Field, p.128). Table 3.7 shows the component correlations with the SWST-SS and therefore the variance that scores can explain on the SWST-SS.

Table 3.7: Component Correlations with SWSTSS

	R	R^2	Variance
SSEM^R Total	.581**	.338	33.8%
Component 1	.544**	.296	29.6%
Component 2	.508**	.258	25.8%
Component 3	.459**	.211	21.1%

** Correlation is significant at the 0.01 level (2-tailed)

Figure 3.1: Scatter Chart of Correlations between the SSEM^{R} (Total Scores) and the SWST (Standard Scores)



3.7.2 SSEM^{R} and Special Educational Needs

Each participating school was asked to identify which children in the sample (using anonymised participant codes) were on the school's Special Educational Needs (SEN) Code of Practice register. Schools were also asked to identify children who were perceived by the teacher to have difficulties with literacy, based on assessment data, access to additional literacy support, and progress as measured by National Curriculum levels.

SEN data was given for 265 children out of the total sample (*N* = 451). Of these, 203 (76.6%) children were identified as having no SEN and 62 (23.4%) were identified as having SEN. Of these children, 5 had a Statement of SEN (coded ST), 34 were at School Action Plus (coded SAP) and 23 were at School Action (SA). This overall figure

is slightly higher than the most recent national figures. In July 2012, the Department for Education (DfE, 2012c) reported there were 19.8% of children with SEN.

As the data did not meet parametric assumptions, a Mann-Whitney test was used to explore statistical differences between scores on the SSEM^{R} given by children with SEN and by children without SEN. The Mann-Whitney test (Appendix A28) shows a significant (two-tailed) difference between the two groups (U = 3022.55, p < .001). There is also a significant (two-tailed) difference between the overall scores on the SSEM^{R} for children with literacy difficulties compared to children without literacy difficulties (U = 1096.000, p <. 001).

A Spearman's Rho was carried out to explore correlations between SEN and scores given on the SSEM^{R}. SEN was coded 0 (no SEN), 1 (School Action), 2 (School Action Plus) or 3 (Statement of Special Educational Needs). There were significant negative correlations between SEN and overall score on the SSEM^{R} (r_s= -.381, p (2-tailed) < .01), and between SEN and SWST standard score (r_s= -.423, p (2-tailed) < .01). These correlations suggest children with a higher degree of SEN scored lower overall on both the SSEM^{R} and the SWST.

3.7.3 SSEM^{R} and Gender

The Mann-Whitney test (Appendix A29) is non-significant (two-tailed) for the scores given by males to those given by females. Both groups report comparable scores overall on the SSEM^{R} (U = 24854.00, *ns*) and the SWST (U = 5978.00, *ns*). However, the Mann-Whitney test does suggest there is a statistically significant difference between scores given by males and scores given by females on Component 3 (Learner Confidence and Resilience) (U = 22686.50, p < .05).

3.7.4 SSEM^{R} and Age

A Spearman's Rho (Appendix A30) shows a significant positive correlation between age and scores on Component 1 (r_s = .100, p (2-tailed) < .05) and scores on Component 3 (r_s = .093, p (2-tailed) < .05). Significant correlations were not found

between overall score on SSEM^{R} and age, or between scores on Component 2 and age.

4.0 Summary of Findings

The results from this study suggest the following:

- The scores gained on the SSEM^{R} are statistically reliable and it can be concluded that the SSEM^{R} is a valid instrument for measuring spelling self-efficacy, although results cannot be generalised outside this sample without caution.
- Children's scores on the SSEM^{R} are significantly positively correlated with their attainment on a single-word spelling test.
- Children with additional educational needs were significantly more likely to score lower on the SSEM^{R} than children without SEN.
- Whilst statistical analysis demonstrated that on the SSEM^{R} both males and females reported comparable scores, there was a statistically significant difference between scores given by males and scores given by females on Component 3 (Learner Confidence and Resilience) of the SSEM^{R}.
- Age was not a significant predictor of overall score on the SSEM^{R}.

5.0 Discussion

The construct of spelling self-efficacy has been explored in this paper through the construction and testing of the Spelling Self-Efficacy Measure (SSEM^{R}). The SSEM^{R} has been shown to be statistically reliable and valid, although issues of generalisation will be explored further in this discussion.

5.1 Reliability of SSEM^{R}

The scores gained on the SSEM^{R} have been shown to be statistically reliable through analysis using Cronbach's alpha and test-retest reliability coefficients. Nunnally (1970, p. 127) states that although there is not a definite rule about how high a test's reliability coefficient should be, he is "suspicious of a test that has a coefficient under .80". Nunnally (1967, p. 211) states that coefficient alpha "provides a good estimate of reliability in most situations" and that it should always be applied when developing new instruments to measure constructs. Cronbach's alpha is a well cited and frequently used measure of internal consistency (Field, 2005; Spector, 1992) and so it was used as part of the reliability analysis in both the pilot and the SSEM^{R}.

However, some researchers have suggested that reliability coefficient alpha estimates are not always robust to non-normally distributed data (Sheng & Sheng, 2012). The data for Component 1, Component 3 and the total SSEM^{R} are leptokurtic and so alpha estimates may have been over-estimated by the analysis procedure. The chance of bias is reduced with a large sample size and so this question could be further explored in future validation of the SSEM^{R} using larger validation samples.

Whilst the test-retest method of estimating reliability is widely used and is not affected by non-normal data distribution, problems exist with this method and Nunnally (1967) does not recommend its use to estimate reliability under certain circumstances. Nunnally warns of practice effects whereby participants may remember and replicate their responses in the second testing. Participants may also make similar guesses on items they are unsure about. To counter these issues, Nunnally argues that test-retest should only be used when there are a high number of items or there is a significant period between testing.

For the purpose of this research, it was neither desired nor practical to have a large number of items or a six-month gap between testing as suggested by Nunnally (1967), or a three-month gap as suggested by Kline (2000). The sample used for test-retest were a Year 6 class, soon to start a focused period of revision for Key

Stage 2 SATS and the English Grammar, Punctuation and Spelling Test (Standards & Testing Agency, 2012). Bandura (Bandura, 1994) affirms that mastery of cognitive skills are a prime source of self-efficacy beliefs. I would therefore not have been able to control for changes in responses on the SSEM^{R} based on revisions to children's self-efficacy during this revision period. Furthermore, Kline (2000) suggests a minimum number of 100 participants when completing test-retest reliability. This was not possible due to the time restraints of this research, although it is a consideration for future validation of the SSEM^{R}.

If children's scores on the SSEM^{R} fluctuate too much over time, it could be argued that the measure is not a reliable tool to predict behaviour (Nunnally, 1970). For this reason, further research could evaluate the usefulness of the SSEM^{R} in informing and measuring effectiveness of intervention. Further research could also investigate correlations between the SSEM^{R} and other measures of spelling self-efficacy that have been discussed in the literature (for example, Ranking, et al., 1994) to assess parallel-form reliability (P. Kline, 2000).

5.2 Validity of SSEM^{R}

A measure needs to be both reliable and valid before it is used with the target population (Nunnally, 1970; Robson, 2002). Spector (1992) states that validity cannot be proven within the social sciences, however evidence can be gained to either support or refute the notion. Evidence for validity in this study was gained using the standards set out by the American Educational Research Association (AERA, et al., 1999).

This paper focused specifically on two of these standards, the Internal Structure discussed here and Relationships with Other Variables as discussed in Section 4.3. No related measures of spelling self-efficacy were used to compare data gained by the SSEM^{R}. As discussed in the literature review, there are very few studies in the literature that look specifically at spelling self-efficacy, many preferring to look at

mathematics. I therefore did not have access to an alternative measure that had previously been tested for validity and reliability on a school-aged sample.

5.2.1 Evidence from the Internal Structure

To examine the underlying component structure, a principal component analysis (PCA) was completed. PCA allows researchers to reduce "a large number of variables down to a smaller number of components" (Tabachnick & Fidell, 2001, p. 612) through analysing all of the variance in the observed variables. Similar studies have used PCA as a chosen analysis method (Ranking, et al., 1994)

Similar studies have used PCA as a chosen analysis method (Ranking, et al., 1994), although there is debate between researchers about the benefits and disadvantages of using PCA over factor analytic methods (Field, 2005; Tabachnick & Fidell, 2001). It is generally accepted that PCA can provide a great deal of information to a researcher about the nature of factors, and this is a useful 'first step' in factor analysis (Tabachnick & Fidell, 2001). Whilst factor analysis (FA) only analyses shared variance, PCA is a psychometrically sound analysis that "summarises patterns of correlations among observed variables, to reduce a large number of observed variables to a smaller number of factors" (Tabachnick & Fidell, 2001, p. 582).

It is likely that within the data gathered from the SSEM^{R}, two or more variables will be very closely linearly related due to the nature of the construct being assessed. This may pose the problem of multicollinearity during analysis. Multicollinearity does not matter for PCA, however it can cause problems for FA (Tabachnick & Fidell, 2001). This was another reason for choosing PCA over FA.

PCA uses the Pearson correlation coefficient, which assumes data meets assumptions for parametric tests. Descriptive statistics showed that the data did not meet parametric assumptions due to skewness, kurtosis and a non-normal distribution. SPSS does not have an option to use a non-parametric test, for example a Spearman correlation, within the PCA. However, Norman (2010, p. 630) reports

research to support his finding that the "Pearson correlation is robust with respect to skewness and nonnormality… [it] is extremely robust with respect to violations of assumptions".

Field (2005) highlights that data gained from a PCA should be interpreted carefully and used to guide the researcher to make conclusions. There were some key decisions to make during the PCA, including whether to go ahead and delete Item 6, whether to load Item 22 onto Component 1 or 2, and what to name each component. In order to minimise researcher bias, colleagues were asked to assign items to components, without being aware of the PCA findings.

Tabachnick and Fidell (2001) argue that FA should be used if creating a theoretical model based on underlying constructs. They suggest that PCA purely gives an empirical summary of the data set. Researchers have claimed that factor analysis generates very similar solutions to PCA (Guadagnoli & Velicer, 1988) although Stevens (1992) suggests this is only true of analyses using 30 or more variables with communalities between variables of 0.7 or higher. This analysis comprised only 23 variables with varying communalities. Hooper (2013) suggests that to analyse common variance, principal axis factoring (PFA) should be used. PFA requires multivariate normality, although Hooper states that this is not always detrimental to the analysis. The use of PCA also has an impact on the ability to generalise results outside of the sample group, especially due to the non-normal distribution of this data set. Field (2005) suggests that although PCA is a psychometrically sound procedure, researchers need to analyse additional samples for the same factor structure in order to generalise.

5.2.2 Normality and Distribution of Data

A large participant sample was used in this study (N = 451) to meet requirements for a factor analysis, however the data set was not normally distributed. Field (2005) states that it is important to check that variables have roughly a normal distribution before carrying out a PCA, especially if wanting to generalise findings. However, this

is often not the case in test construction and validation and there was no theoretical expectation of a normal distribution for this study.

> Modern parametric statistical methods like factor analysis… are all based on an assumption of normally distributed, interval-level data… [if] we have to prove that our data are exactly normally distributed, then we can effectively trash about 75% of our research on educational… assessment"
>
> Norman (2010, p. 627)

Bandura (2006) discusses the importance of ensuring each efficacy item has sufficient difficulty and challenge to ensure that items differentiate among respondents. Further analysis of the items on a larger sample would be useful in exploring whether items contain a sufficient degree of difficulty and challenge in order to explain the high levels of skewness and kurtosis.

The data were transformed although little difference was made to the distribution. The data were therefore left in their original form. Factor analytic techniques are often used to analyse data that are highly skewed and kurtotic (Kaplan & Muthén, 1985) and Tabachnick & Fidell (2001) argue that normally distributed data is desirable although not essential for factor analysis or principal components analysis. Nevertheless, findings cannot be generalised from this study without caution. Data analysis suggested a significant relationship between spelling self-efficacy and spelling ability. This supports findings from previous studies (Ranking, et al., 1993) and so I am confident that similar results would be found if the study was repeated on a different sample. This provides a clear rationale for a further standardisation of the SSEM^{R} on a representative sample.

5.3 Relationships with Other Variables

5.3.1 Spelling Ability

This study found significant positive correlations between scores on the SSEM^{R} and spelling ability, supporting existing research as outlined in the literature review

(Jones, et al., 2012; Ranking, et al., 1993). The correlation analysis suggested that scores on the SSEM^{R} accounted for up to 33.8% of the variance in scores on the single-word spelling test. This is higher than has been previously estimated. Multon, Brown and Lent (1991) found that up to 14% of the variance in academic performance could be accounted for by self-efficacy judgements. The model proposed by Ranking et al. (1993) suggests that in addition to perceived efficacy beliefs, spelling outcome expectancies also contribute to overall spelling performance. Future research could explore this area to further understand the variance in academic performance accounted for by both perceived efficacy judgements and outcome expectancies.

Despite research presented throughout this study proposing links between self-efficacy and academic achievement (Pajares, 1996; Schunk, 1991; Zimmerman, et al., 1992), Bandura (1997) has warned against attempting to predict academic achievement based solely on children's self-efficacy beliefs. Nevertheless, Lane, Lane and Kyprianou (2004) suggest that there is some usefulness in using self-efficacy measures in academic settings to help predict academic performance. Norwich (1987) states that a relationship between self-efficacy and task performance is more complex than a quantitative study can explain. Regardless of these issues, this thesis aimed to construct and evaluate a quantitative measure that could be used to inform high quality personalised literacy intervention. Significant correlations were found between achievement and self-efficacy in this study although no direction of causality was suggested from the findings. Future research could further explore the complex interplay between spelling efficacy beliefs and academic success across the curriculum.

5.3.2 Special Educational Needs

The proportion of children in this sample identified as having special educational needs (SEN) was 23.4 per cent, which is slightly higher than the national figure of 19.8 per cent reported by the DfE (2012c). A significant difference in SSEM^{R} scores

was found between children with either SEN or literacy difficulties and children without.

The research design was carefully planned so that children with SEN, who may find either the concept or the content of the SSEM^{R} difficult to understand, were able to complete the SSEM^{R} as easily as possible. However, although teachers were asked to read the items aloud and direct support to children with literacy needs, it can be expected that some children within this group may still have struggled to understand and complete the SSEM^{R} accurately. The vision for the use of the SSEM^{R} is for an adult to work individually with a child, ensuring they understand what is expected of them.

5.3.3 Age

There were no significant differences in overall spelling self-efficacy across ages or school year groups. Nevertheless, small but significant correlations were found between age and factor scores on Component 1 *Belief in Phonological Awareness* and Component 3 *Learner Confidence and Resilience*. This finding links with previous research that has suggested spelling self-efficacy remains constant across school year groups (Ranking, et al., 1993). Conversely, Pajares, Valiante and Cheong (2007) found that self-efficacy in writing decreased with age, contradicting suggestions that perceived efficacy beliefs would rise with increased academic competence. Younger children overestimating their capabilities could explain this finding, although further research into this area would be useful with a valid and reliable self-efficacy measure such as the SSEM^{R}.

Holden, Moncher, Schinke and Barker (1990, p. 1044) state “social cognitive theory predicts that self-efficacy estimates will decline in predictive strength over time”. In addition, researchers have suggested that self-efficacy can be used to predict test scores in the short term, but not more general achievement over time (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006). The SSEM^{R} could be used as a measure to contribute to research in this area, particularly how efficacy beliefs develop over

time in response to personalised learning opportunities and refined literacy interventions. Further research is also needed to extend the age range of the SSEM^{R}, in particular for ensuring all items are age appropriate and relevant to different age groups.

5.3.4 Gender

Gender was the final variable explored in relation to scores on the SSEM^{R}. There were no significant differences on overall SSEM^{R} scores, although a statistically significant difference was found between scores given by males and scores given by females on Component 3 (Learner Confidence and Resilience) of the SSEM^{R}. I wonder whether this gender difference could be interpreted in light of national figures that suggest males typically underachieve in literacy when compared to female peers (National Literacy Trust, 2013). If females are perceived to do better when learning to spell, this may have an impact on males' efficacy beliefs.

There have been mixed and inconclusive findings in the literature in regards to gender differences in self-efficacy beliefs (Bong, 1997; Pajares, 1997). In addition, Pajares and Valiante (1999) reaffirm previous claims in the literature (for example, Noddings, 1996) that there may be gender differences in the metric used by children to provide confidence judgements. Further analysis of gender differences in efficacy judgements was not possible within the scope of this research. Future research could look at differences between genders in their responses to items on the SSEM^{R}, and analysis could take into account qualitative data gained from conversations with participants about their rationale for choosing rating scores.

5.4 Discussion of Methods

5.4.1 Data Gathering Methods

The original research plan had proposed to gain data through the use of Internet-based questionnaires. Due to the number of participants required for this study, it was not practical to ask each class to complete the SSEM^{R} online as it might have had

a detrimental impact upon the response rate. Using an Internet-based data gathering technique may have, in part, countered any issues of inconsistency between teachers giving instructions and supporting their class in completing the SSEM. A computer application could be interactive and further minimise the amount of reading. Further research could look at how the SSEM^{R} could be made into an interactive 'app' that would read items to children and make the questionnaire more visual so that they could complete it unaided. This could also be used as an on going assessment and monitoring tool.

Paper questionnaires also require the researcher to manually input data to a computer. I ensured that I completed this task myself to ensure consistency, and so that I could carry out a number of checks on the raw data before completing further analysis. This ensured that any risk of making mistakes was minimised. I was also able to get to know the data and see initial patterns in responses.

A summated-rating scale was used as suggested by Bandura (2006), however the decision was made to reduce this from a 0-100 scale to an eleven point scale on the basis that children in lower Key Stage 2 may not all understand the longer scale. Tymms (2012) suggests that there should be an odd number of possible responses so that respondents should be allowed to "sit on the fence" and not be forced into making a decision. However, he warns that any more than 7 possible responses on a scale may be problematic. Further research could compare different numbers of possible responses, and even look at using smiley faces for younger children. Additional research would be useful in exploring whether younger children understand the concept of rating scales. In the results section it was highlighted that the mode average for each item was 0, 5 or 10. Children not understanding the increments on the scale could explain this, relying solely on the qualitative descriptors underneath these three scale points.

Participant error, for example tiredness or environmental effects, can affect a child's answers on a rating scale (Robson, 2002). I could not control for the time of day or

lesson in which children completed the SSEM^{R} and further research could explore these effects. I can envisage that participants may rate themselves differently depending on the lesson preceding the rating, for example if they have just had their marks from a weekly spelling test. A control was in place for social desirability effects as responses were anonymous and teachers were asked not to look at children's answers before returning to the researcher. Children were made aware of this anonymity during the research briefing.

5.5 Application of SSEM^{R} and Implications for Practice

The overarching aim of this research project was to construct a useful measure of spelling self-efficacy in order to help plan and deliver child-centred literacy interventions. Research has been presented throughout the thesis to support the link between achievement and self-efficacy, although literacy interventions are too often focused on skill mastery rather than increasing efficacy.

Bandura (1977a, 1997) proposes that there are four sources of self-efficacy: (1) mastery experiences or performance accomplishments; (2) vicarious learning; (3) social or verbal persuasion and (4) physiological factors such as emotional arousal. Pajares (1997) discusses the self-enhancement model of academic achievement (Calsyn & Kenny, 1977) in relation to self-efficacy. The self-enhancement model asserts schools should focus on building children's perceptions of their competence and self-worth in order to increase their achievement. From a social cognitive perspective, Pajares suggests that schools should use well-planned mastery experiences to raise competence and confidence whilst also drawing upon other sources of self-efficacy beliefs (vicarious learning and verbal persuasion, Bandura, 1977a) in order to raise achievement further. My vision is that a high quality literacy intervention could be planned for a child, rooted in self-efficacy theory. Whilst research exploring the relationship between efficacy beliefs and achievement does not indicate the direction of causality, it can be theorised that by raising efficacy beliefs, capacity to achieve will also increase.

In his review of literacy interventions, Brooks (2013) mentions only four schemes that have a focus on building self-confidence or self-esteem. The majority focus on increasing mastery of literacy skills. Although as mastery increases, self-efficacy should also increase, the argument of this thesis is to approach interventions from a more balanced perspective. As children's interpretation of their performance is one of the most influential sources of self-efficacy (Bandura, 1997), interventions should be designed that that focus both on skill mastery, but also explicitly raising a child's belief in their capabilities. Use of the SSEM^{R} would allow for interventions to be child focused and needs led.

The SSEM^{R} is designed to be a conversational tool as well as a rating scale, and could aid a child in reflecting on their capabilities with an adult. Bandura (1997) also argues that efficacy beliefs can impact on future goals, aspirations and perceptions of obstacles to success. Further longitudinal research could explore the longer-term impact of raising efficacy beliefs on a child's attitude towards literacy throughout their schooling. There was a brief discussion in Paper 1 regarding the validity of the SSEM^{R} in relation to Kelly's assertion that a theory's validity must also be assessed in terms of its usefulness (Fransella, 1995). Whilst gathering the data for this thesis, I had conversations with teachers as to whether or not they felt the SSEM^{R} might be a useful tool to use when planning support. Teachers were generally positive about the usefulness of the SSEM^{R} although I feel this is an important consideration to further research before considering wider distribution of the scale.

A model could be designed for literacy intervention, focusing on the key constructs that have been shown in research to promote self-efficacy (see literature review for a more detailed explanation of these) including:

- Specific goal setting
- Feedback about prior performance
- Collaborative learning environments
- Learning skills to mastery through instructional models

- Structuring success-possible situations
- Observational learning
- Modelling

5.6 Next Steps and Further Research

Findings from this study suggest a significant relationship between spelling self-efficacy (SSE) and spelling ability. This finding is in line with previous studies (Jones, et al., 2012; Ranking, et al., 1993). It would be interesting to further explore the model proposed by Ranking et al. (1994) to understand the variance that self-efficacy can account for in spelling ability as well as achievement in other areas of literacy development. It would be useful to further this study in order to assess the SSEM^{R} against other measures within the domain of spelling beliefs. This may also allow for further validation to take place with a larger and more representative standardisation sample. Further sampling and additional item analysis may allow for some items to be amended, thus increasing the possibility of gaining normally distributed data. This may allow for generalisation to the wider population.

There are researchers who may disagree with the significance this research places on self-efficacy in designing interventions at school. Smith et al. (1990) argue that while self-efficacy is an important factor when understanding academic performance and test anxiety, cognitive-attentional factors such as negative thoughts and underlying concerns are relatively more significant. This thesis suggests that, within this sample, self-efficacy beliefs can account for up to 33.8% variance on a test of spelling ability. Further research in this area would be beneficial in order to understand firstly the reliability of this claim, but also to explore what other variables may account for variance in scores on a spelling test.

I feel the causal view that high self-efficacy can lead to high achievement due to increased task persistence and motivation is too simplistic. I do, however, feel that self-efficacy is an important and valid factor in increasing engagement, motivation and overall achievement. As mentioned earlier in the discussion, this thesis was

solely focused on the construction and validation of a quantitative measure of spelling self-efficacy. Further research could develop a qualitative element to exploring the nature of SSE and how it influences children's achievement and mastery of skills within literacy lessons. It would also be interesting to develop the SSEM^{R} as a reading self-efficacy measure, and explore similarities and differences in how children scored on each instrument.

5.7 Journey of Self as a Researcher

When I started this professional doctorate programme in September 2010, I had a wide range of interests that I wanted to cover in my thesis. It took a long time to decide specifically on my research aims and research questions, knowing that spelling and self-efficacy are two areas covered extensively in psychological and educational literature. It was important for me to choose a topic that would have an impact on my professional work as an educational psychologist, as well as satisfying the rigorous demands of a doctoral thesis. The findings outlined in this thesis have highlighted to me the importance of fully understanding a child's literacy needs before planning or delivering interventions at school. I have used the SSEM with children referred to the educational psychology service, and have found it to be a fascinating consultation tool when joint problem-solving and planning literacy support. I feel I have acquired a great deal of new skills and look forward to extending this project over the next few years.

Appendix

A1 Ethical Approval

Certificate of Ethical Research Approval

Doctorate in Educational, Child and Community Psychology: Thesis

To activate this certificate you need to first sign it yourself, and then have it signed by your supervisor and finally by the Chair of the School's Ethics Committee.

For further information on ethical educational research access the guidelines on the BERA web site: http://www.bera.ac.uk/publications/guidelines/ and view the School's statement on the GSE student access on-line documents.

Your name: William Shield

Your student no: 600039322

Return address for this certificate: Top Floor Flat, 6 Rodney Place, Clifton Village, Bristol, BS8 4HY

Degree/Programme of Study: Doctorate in Educational, Child and Community Psychology

Project Supervisor(s): Andrew Richards, Margie Tunbridge

Your email address: wes201@exeter.ac.uk

Tel: 07834 548409

I hereby certify that I will abide by the details given overleaf and that I undertake in my doctoral thesis research to respect the dignity and privacy of those participating in this research.

I confirm that if my research should change radically, I will complete a further form.

Signed:  **Date:** 17th April 2012

Certificate of Ethical Research Approval

Student Number: 600039322

Title of your project:

Spelling Self-Efficacy: A Spelling Self-Efficacy Scale based on Personal Constructs of Children and Young People

Paper 1: The construction of a scale to measure spelling self-efficacy in children and young people based on an exploration into the personal constructs of children and young people about learning to spell.

Paper 2: The validation and reliability of the constructed spelling self-efficacy scale.

Brief description of your research project:

This piece of research sets out to explore the personal constructs of children and young people (CYP) in relation to their belief in their ability to learn how to spell.

The main research objective for Paper 1 is to use personal construct psychology (PCP) to elicit views of CYP across a range of ages and schools. This qualitative data will inform a series of statements about spelling self-efficacy, which will become the basis for a rating scale (Spelling Self-Efficacy Scale, SSES). This scale will then be sampled on the same group of CYP for refinement.

Paper 2 will measure validity and reliability of the SSES, and look for correlations with single-word spelling ability.

Give details of the participants in this research (giving ages of any children and/or young people involved):

- Paper 1 (Phase 1: PCP) (Phase 2: SSES Piloting)
    - Approximately 50 children from a number of different primary / secondary schools in Year 3, Year 5, Year 8 and Year 10. These schools will be located in Devon, Bristol, South Gloucestershire and Stoke-on-Trent.
- Paper 2
    - Approximately 1000 CYP across all age ranges in schools located in Devon, Bristol, South Gloucestershire and Stoke-on-Trent.

Give details (with special reference to any children or those with special needs) regarding the ethical issues of:

I will be following the Code of Ethics and Conduct set out by the British Psychological Society (BPS, 2006). Issues regarding informed consent, anonymity and confidentiality will be carefully considered as detailed below.

Informed Consent:
In Paper 1 it will be essential to obtain informed consent from the parent(s) or carer(s) for child participants. Records of when, how and from whom consent was obtained, will be recorded. I will ensure the children participate in the consent process and ensure that they are aware of what that will involve.

In Paper 2 I will use an opt-out method due to the number of children and young people (n=1000 approx) involved in the study. I will seek permission from head teachers on behalf of the students in their schools. I aim for whole classes / schools to complete the rating scale under the direction of the class teacher (who will have a full brief about the nature of the research) and I. Prior to asking children to complete the scales, information sheets and opt-out forms will be sent to parents with my full contact details (see attached). The research will be explained in age-appropriate language to the participants and they will be given the option to not take part or to withdraw at any stage.

I will carefully consider what steps will need to be made to ensure all CYP have a full understanding of the research and their involvement. Participants will also be made aware of how the research findings will be used. Participants will be reminded that they have the right to withdraw from the research at any given time and that data related to them will be destroyed once the final thesis has been approved.

Anonymity and Confidentiality:
Records of the data collected (including transcripts of interviews, focus group notes, and quantitative data) will be stored in a secure and safe place. Electronic information will be stored on a computer with a username and password and with recognised virus protection. Any information on paper will be locked in a secure and unmarked filing cabinet. Information will be coded to ensure anonymity and participants will remain anonymous in the write-up of the research. At the end of the research, collected written information will be shredded and destroyed and any electronic data will be securely deleted.

Give details of the methods to be used for data collection and analysis and how you would ensure they do not cause any harm, detriment or unreasonable stress:

Method of data collection: Semi-structured interviews with children (using PCP and solution-focused methods); focus groups with children; and constructed rating scales given to CYP to complete.

- Gaining informed consent from the participant (if child – consent to be gained from parent(s)/carer(s), headteacher, and child – see notes above). Consider a child's understanding of informed consent and differentiate the brief/debrief/consent form appropriately.

- Making it clear that the participant can withdraw at any time, and what this means.
- Ensure participants feel comfortable and at ease during the interviews and focus groups e.g. problem free talk to start.
- Ensure participants have a clear understanding of the nature of the research and how it will be used.
- Ensuring participant is happy with the use of any electronic audio recording equipment used to use to record their views.
- Ensure the participant has a clear understanding of what 'confidential' means, whilst also recognising appropriate safeguarding and child protection policies around 'secrets' and disclosures.
- Ensuring the researcher is aware of and follows safeguarding and child protection procedures to ensure his safety.
- Sensitive questioning, e.g. if child is displaying distress, interviewer to give child option to opt out/continue, or to make the decision to terminate the session and ensure the child has suitable support from trusted adults.
- Participants to receive a letter at the end of the project explaining the process/findings.

Give details of any other ethical issues which may arise from this project (e.g. secure storage of videos/recorded interviews/photos/completed questionnaires or special arrangements made for participants with special needs etc.):

- It will be important to store all of the data securely because it will contain personal details of participants including dates of birth, achievement data, school, etc. Only the researcher will hold and be able to access the data and personal details will be destroyed at the earliest opportunity once the data has been analysed and conclusion drawn. No individual children will be identifiable except to the me.
- Audio from the interviews and focus groups will be digitally recorded with the participants' permission. Copies of the recordings will be securely stored on a password-protected computer that only the I will have access to. Once the data has been transcribed, the original recordings will be destroyed. Any written transcripts will be securely stored on a password-protected computer, also accessible solely by me. Once the research has been completed, all raw data will be destroyed.

- I will liaise closely with the school staff, the child and their parent(s)/carer(s) to ensure that appropriate adaptations are made for participants with additional needs e.g. alternative modes of communication. If it is felt by the parent(s)/carer(s), the school, the child or the researchers that they are not emotionally or physically able to participate then the child will be excluded from the research.

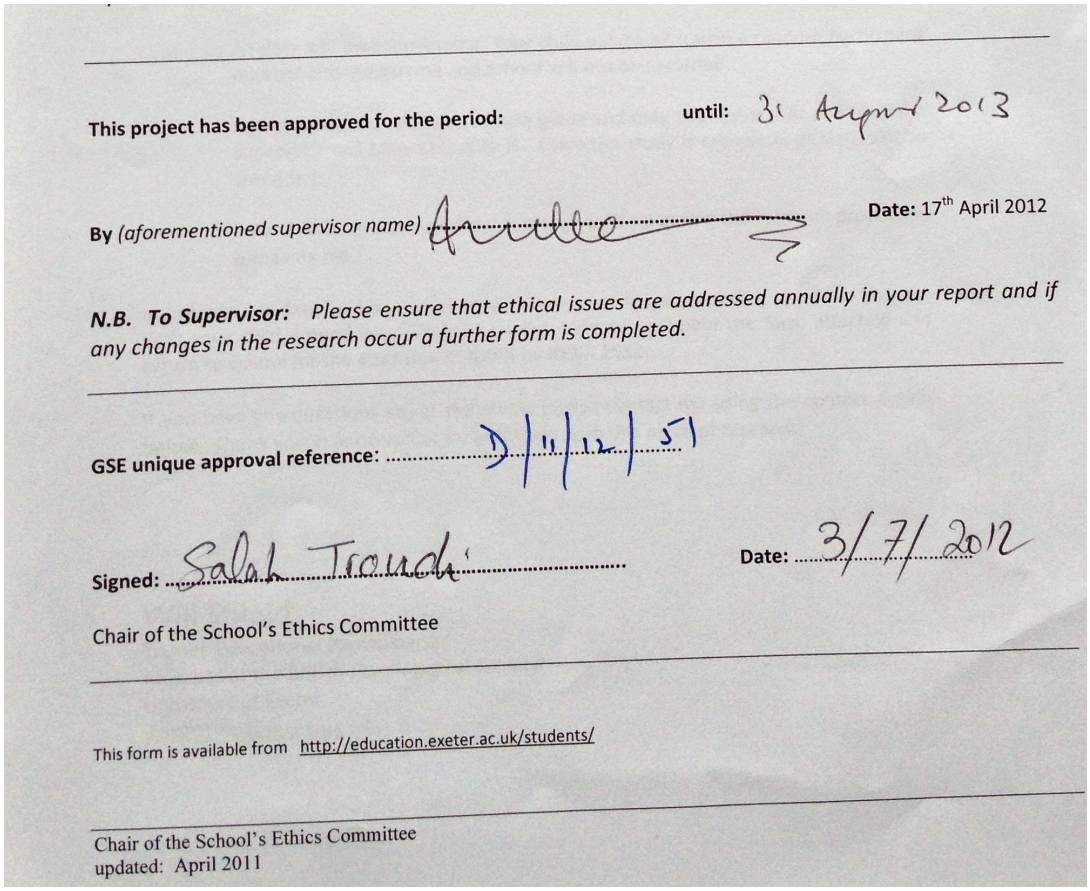
Give details of any exceptional factors, which may raise ethical issues (e.g. potential political or ideological conflicts which may pose danger or harm to participants):

An information brief will be provided at the beginning of the research to all participants, and it will be stressed that participation is entirely voluntary and participation can be withdrawn at anytime. The participants will also be provided with a full debrief and provide additional time to answer any of their concerns or questions.

Due to the nature of the research, data collection may flag up previously unidentified needs (e.g. educational, literacy, emotional, language, etc.). Any findings will be shared with the school and the parent(s)/carer(s) in the most suitable manner to ensure that these needs can be addressed.

***This form should now be printed out**, signed by you on the first page and sent to your supervisor to sign. Your supervisor will forward this document to the School's **Research Support Office** for the Chair of the School's Ethics Committee to countersign. A unique approval reference will be added and this certificate will be returned to you to be included at the back of your dissertation/thesis.*

***N.B**. You should not start the fieldwork part of the project until you have the signature of your supervisor.*



This project has been approved for the period: until: 31 August 2013

By *(aforementioned supervisor name)* ..... Date: 17th April 2012

N.B. To Supervisor: *Please ensure that ethical issues are addressed annually in your report and if any changes in the research occur a further form is completed.*

GSE unique approval reference: D/11/12/51

Signed: Salah Troudi..... Date: 3/7/2012

Chair of the School's Ethics Committee

This form is available from http://education.exeter.ac.uk/students/

Chair of the School's Ethics Committee
updated: April 2011

A2 Literature Review

This literature review has been marked and is not to form part of the thesis examination. It is included here for completeness.

Introduction

This literature review will critically explore the concept of self-efficacy and, in particular, the impact it has on students' learning at school. I will discuss how self-efficacy develops and how this relates to aspects of learning such as motivation, engagement and overall achievement. I will debate the complexities of defining and measuring self-efficacy beliefs and finally draw conclusions from the literature to provide a justification for my research project.

Literature Review Search Terms

This literature review was carried out using online academic search engines, personal books and targeted searches in journals specific to the subject of educational and child psychology. There was much overlap between the domains of psychological and educational research and so I was careful to search in both of these areas.

I relied primarily on the online academic search engines PsycINFO and PsycARTICLES, however also used EBSCO EJS, Education Research Complete, Ingentaconnect, ScienceDirect, ERIC Plus Text and Google Scholar. Table LR1 summarises the key search terms and results I found using PsycINFO and PsycARTICLES, searching across all available years up to 2012.

Table LR1: Search terms and number of articles found on PsycARTICLES / PsycINFO.

Search Terms	Number of Articles Found	
	PsycINFO	PsycARTICLES
Self-Efficacy	21375	1166
Self-Efficacy + Learning	3341	189
Self-Efficacy + Spelling	23	0
Self-Efficacy + Reading	440	14
Self-Efficacy + Writing	280	11
Self-Efficacy + Literacy	258	2
Self-Efficacy + Mathematics (including arithmetic as a search term)	675	52

As demonstrated by my literature search, self-efficacy is a heavily researched area. Many more studies have been completed looking at self-efficacy in mathematics than self-efficacy in spelling.

What is Self-Efficacy?

Bandura (1977a) introduced the construct of self-efficacy within his social learning theory (Bandura, 1977b) and social cognitive theory (Bandura, 1986). He suggests self-efficacy is the belief a person holds about their ability to successfully complete a given task or behaviour in a particular context. Self-efficacy beliefs are personal judgements that significantly influence an individual's choice of task or activity, their persistence and ultimately the success of their performance (Bandura, 1986).

Social learning theory (Bandura, 1977b) expands the behaviourist principles of reinforcement (Skinner, 1938) to include a focus on vicarious learning through modelling. The notion of human agency (how individuals influence their own thoughts, motivations and behaviour) is central to social learning theory (Smith, et al., 1990). Social learning theory suggests a reciprocal causal relationship between behaviours, environmental and personal factors (Bandura, 1977b). Self-efficacy

judgements (a personal factor) can therefore be conceptualised as, "mediating the interaction between behaviour and environmental factors" (Norwich, 1987, p. 384).

Self-efficacy is integral to Bandura's social cognitive theory (Bandura, 1986). This theory considers the impact that cognitive factors, such as perceptions, beliefs and expectations, might have on an individual's capacity to learn. Central to Bandura's social cognitive theory is the notion of a self-system, enabling individuals a certain degree of control over their thoughts, feelings, motivations and actions. Bandura illustrates the construct of self-efficacy within his social cognitive theory. He suggests that individuals reflect on their experiences of both success and failure to form beliefs about how likely they are to succeed in the future. Bandura argues that "self-efficacy beliefs determine how people feel, think, motivate themselves and behave" (Bandura, 1994, p. 71). Bandura (1977a) advocates that after repeated success, occasional failure will not have a significant impact on a child's perception of their ability.

Pajares (1997, para. 8) summarises the cyclic process of how these self-efficacy beliefs are created and used:

- Individual engages in a behaviour
- Individual interprets the results of their actions
- Individual uses these interpretations to create and develop beliefs about their capability to engage in subsequent behaviours in similar domains
- Individual behaviours in line with the beliefs created

Bandura (1994) suggests that individuals with a high sense of self-efficacy will be motivated to complete difficult tasks, viewing them as challenges rather than threats. Individuals will be committed to achieving personal goals and targets, and be resilient in approaching new situations. They will attribute failure to "insufficient effort or deficient knowledge and skills which are acquirable" (1994, p. 71), which will act as motivation to increase the effort taken to complete a task. An individual

with low self-efficacy will avoid challenging tasks and refuse to sustain effort in completing them, focusing on what they cannot do rather than what they have the potential to do. They may also hold low aspirations and finding it difficult to rebuild their sense of self-efficacy after failure (Bandura, 1994).

Pajares (1997) argues that there are difficulties in defining self-efficacy, particularly due to the lack of understanding about differences or similarities between self-efficacy and other expectancy beliefs such as task-specific self-concept, perceptions of task difficulty or competence and general task confidence. While self-concept relates to an individual's general "knowledge and beliefs about themselves, their ideas, feeling attitudes and expectations" (Woolfolk, Hughes, & Walkup, 2008, p. 105), self-efficacy is concerned with perceptions held about an individual's ability to perform a given action in a specific context (Schunk, 1991). Pajares suggests that "self-concept judgements can be domain-specific but are not task-specific" and suggests that they are "more general and less sensitive to context" (Pajares, 1997, Expectancy Constructs, para.4). Bong and Clark (Bong & Clark, 1999) argue that self-concept is influenced by social comparison and cognitive and affective judgements about the self. They state that self-efficacy is not influenced by social comparison.

Researchers have suggested that the term 'self-efficacy' is often interchanged with 'self-concept' in literature, however researchers have stated there is a distinct conceptual difference (Marsh, 1990; Pajares, 1996) as self-efficacy beliefs are context specific (Bandura, 1977a; Schunk, 1990). Bandura (1981) and Norwich (1987) contend that self-efficacy cannot be reliably predicted by self-concept variables, although Bong and Skaalvik suggest "self-efficacy acts as an active precursor of self-concept development" (Bong & Skaalvik, 2003, p. 1).

Sources of Self-Efficacy

Bandura (1977a, 1997) proposes that there are four sources of self-efficacy: (1) mastery experiences or performance accomplishments; (2) vicarious learning; (3) social or verbal persuasion and (4) physiological factors such as emotional arousal. These will be explained in more detail below. Bandura argues that information

received through these four sources do not directly translate into efficacy beliefs, as self-efficacy is an inferential process. Individuals cognitively appraise information from these sources and assess them in the context of personal, environmental and behavioural factors (Norwich, 1987; Pajares, 1997). An example from the literature of how an individual may increase their self-efficacy in each of these domains is given below:

> An individual who possesses relatively low self-efficacy for changing the oil tin their car can increase her or his self-efficacy related to the task by participating firsthand in related tasks (performance accomplishments), watching other successfully change the oil in their cars (vicarious learning), receiving encouragement and support from others (verbal persuasion), and by decreasing the amount of anxiety experienced when engaging in the task (emotional arousal).
>
> (Luzzo, Hasper, Albert, Bibby, & Martinelli, 1999, p. 233)

Mastery experiences are the most effective ways of building a strong sense of self-efficacy (Bandura, 1977a). These are our own direct experiences of success and failure, and can encourage people to "persevere in the face of adversity and quickly rebound from setbacks" (Bandura, 1994, p. 72). During learning, children will monitor their progress in line with goals set by themselves or others (Pajares, 1997). Their self-efficacy beliefs will be modified as goals are attained (Schunk & Pajares, 2004).

Vicarious experiences are "accomplishments that are modelled by someone else" (Woolfolk, et al., 2008, p. 401). Bandura (1994) describes how observing similar people succeed in a task will enable individuals to feel that they also have the necessary capabilities. The observer's perceived similarity to the models will influence their self-efficacy beliefs, i.e. the more similar they feel to the model, the more their perceived self-efficacy will be influenced by the models' behaviour and produced results.

Social persuasion, for example verbal encouragement or specific performance feedback, will increase an individual's motivation and effort to complete a task,

encouraging them to try new strategies and explore further possibilities (Bandura, 1977a, 1997). In order to avoid disbelief, verbal encouragement must be realistic and validated by an individual's future achievement or performance on a task (Bandura, 1994). Arousal and mood state during learning experiences can impact on self-efficacy, for example being excited can increase efficacy whereas being anxious or worried can lower efficacy (Bandura, 1997).

Self-Efficacy at School

Bandura (1994) views school as the primary setting in which children develop self-efficacy beliefs about learning through mastering cognitive skills. At school, self-efficacy beliefs will influence the choices children make about learning activities to engage in, the effort put in to completing these tasks, how long to persevere when challenged and the degree of anxiety or confidence they will experience (Bandura, 1986). Schunk and Pajares (2004) discuss self-efficacy in a learning context, suggesting that children are more likely to engage in learning when they have high self-efficacy beliefs for learning skills.

Research exploring the reciprocal influence between the school environment and children's efficacy beliefs and behaviours has suggested that factors such as the types of questions asked by teachers, teachers' perceptions of students' self-efficacy and feedback given to students can all influence a child's self-efficacy (Schunk, 1995; Zimmerman & Paulson, 1995). Schunk and Pajares (2004, p. 118) propose that children with high self-efficacy will be more motivated to "create learning environments that are conducive for studying by setting up study routines and eliminating distractions".

Self-efficacy is a motivational belief and children's engagement and motivation will be affected by their perceptions of ability to succeed (Pajares, 1997). Children with high self-efficacy are likely to choose more challenging tasks and remain engaged for longer (Wadsworth, et al., 2007). McCarthy, Meier and Rinderer (1985) state that "individuals will perform a task successfully if they know what behaviours will produce desired outcomes *and* if they evaluate themselves as capable of performing

the necessary behaviours" (p. 466). Therefore, a child might know what to do and how to do it, but will be unable to if they lack the belief that they can do it.

Self-efficacy can impact on children's level of motivation (Miltiadou & Savenye, 2003; Zimmerman, Bandura, & Martinez-Pons, 1992). As mentioned above, self-efficacy is related to an individual's choice of activity, the motivation to start the task, and the effort sustained during the task (Bandura, 1977a), which will in turn impact upon overall achievement (Bandura, 1997). Norwich writes, "because self-efficacy judgements are assumed to have motivational effects, they are considered to be relevant to children's academic achievement" (Norwich, 1987, p. 384).

Bandura and Locke (2003) suggest that self-efficacy may negatively correlate with the resources an individual allocates to a task. In line with this claim, Vancouver and Kendall (2006) found that low self-efficacy may increase a learner's motivation to complete a task, proposing instead that they might carefully plan to increase their resources and spend more time working on the task. Similarly, Schunk and Pajares (2004) assert that high self-efficacy may have a negative impact on effort and persistence as students need to expend less effort as skills and self-efficacy develop. In must be noted, however, that Vancouver and Kendall's methodology relied on only a few naturalistic observations of a small number of participants (n = 63). Female participants were over-represented (79%) and all participants were on an undergraduate psychology course. This has implications for generalising claims across the wider population.

Research has shown that if a student has high self-efficacy, they are more likely to engage well with a learning task, be resilient and persist until it is completed (Schunk, 1981). Along with high self-efficacy, a child must have the requisite skills and knowledge to successfully complete a task (Schunk & Zimmerman, 1997). Brackney and Karabenick (1995, p. 456) view motivation as a "function of students' expectations of obtaining valid outcomes". They emphasise the roles that

expectancy of success and self-efficacy play in motivation, suggesting that highly motivated students feel capable to succeed on tasks they consider valuable.

An individual's perception of their academic capability can impact on their motivation (Bandura, 1982; Schunk, 1985) and therefore effort (Long, 2000; Norwich, 1987). Schunk (1985) suggested that children with a low sense of academic self-efficacy might avoid tasks, or not spend as much time attempting to learn new skills and acquire new knowledge. Long (2000, p. 119) highlighted that "success tends to generate higher expectations and a more positive self-concept, leading to increased motivation, effort and success". It is for these reasons that several researchers have suggested a link between self-efficacy, motivation and achievement in educational settings (Pajares, 1996; Prat-Sala & Redford, 2012; Schunk, 1985, 1991; Schunk & Swartz, 1993)

Numerous research studies suggest a link between learners' academic self-efficacy beliefs and overall academic performance (Chemers, Hu, & Garcia, 2001; Gore, 2006; Hanchon Graham, 2000; Lane, Lane, & Kyprianou, 2004; Ley & Young, 2001; Pajares, 1996, 1997; Phan, 2011; Prat-Sala & Redford, 2012; Schunk, 1985, 1991; Zimmerman, et al., 1992). Some research is more sceptical about making causal connections between self-efficacy and achievement. Lane and Lane (2001) explored the impact that self-efficacy has in an academic setting and concluded that efficacy beliefs have only some predictive usefulness. The researchers used a small undergraduate participant sample (n = 76) so generalisation across settings, particularly schools, is problematic. Smith et al. (1990) argue that although self-efficacy is an important factor when understanding academic performance and test anxiety, cognitive-attentional factors such as negative thoughts and underlying concerns are relatively more significant. Brackney and Karabenick (1995) suggest that self-efficacy, metacognition and effort regulation are the most powerful predictors of academic success. Much of the research around self-efficacy and achievement is related to the influence of efficacy beliefs on academic goals and,

indirectly, their overall academic achievement (Zimmerman, et al., 1992; Zimmerman & Kitsantas, 2007).

Bandura (1977a) asserts that other factors, such as skills and incentives, must also be present for self-efficacy to influence future achievement. Similarly, Schunk (1981) demonstrates that perceived efficacy is an accurate predictor of performance in mathematics, however "factors other than self-efficacy and persistence can predict children's achievements" (p. 102). He concludes that "children's self-perceptions of their capabilities have an important effect on their subsequent achievements" (Schunk, 1981, p. 104). Norwich (1987) critiques Schunk's simple bivariate research design, suggesting that prior self-efficacy and task performance were not considered by his research. I feel that Schunk's claims must be generalised with caution as he used a small participant sample (n = 56) who were all classified as predominantly middle-class. However, Schunk's later research with different participant groups has demonstrated similar findings (Schunk, 1985, 1991, 2004; Schunk & Swartz, 1993).

Self-efficacy is a problematic concept to research, as you cannot control the context within a laboratory setting and control other variables (Schunk & Pajares, 2004). Norwich (1987) followed a repeated measures design to explore the relationship between achievement in mathematics and self-efficacy. Using a hierarchical regression analysis of data from 72 children between the ages of 9 and 10 years old, Norwich concluded that despite a moderate correlation between self-efficacy and mathematics achievement, "results of the study lend one to doubt that there is a simple relation between self-efficacy and task performance in the field of mathematics learning" (Norwich, 1987, p. 384).

In line with Norwich's research, I feel the causal view that high self-efficacy can lead to high achievement due to increased task persistence and motivation is too simplistic. I do, however, feel that self-efficacy is an important and valid factor in increasing engagement, motivation and overall achievement. Further research is needed to explore the potential impact on achievement and learning when too

much self-efficacy results in overconfidence and inaccurate self-perceptions (Schunk & Pajares, 2004). In an attempt to synthesise the large field of research into self-efficacy and academic achievement, I will now present a selection of findings from meta-analyses.

Multon, Brown and Lent's (1991) meta-analysis is widely cited in self-efficacy literature. They examined the effect of self-efficacy on academic performance and persistence in 36 studies, estimating effect sizes of .38 and .34 respectively. The analysis suggested that "self-efficacy beliefs account for approximately 14% of the variance in students' academic performance and approximately 12% of the variance in their academic persistence" (Multon, et al., 1991, p. 34). Hattie (2009) estimated a slightly higher effect size (*d*=.43) for self-efficacy as a predictor of achievement. Hattie suggests that achievement is most likely to be increased when children "possess high, rather than low, efficacy towards learning" (Hattie, 2009, p. 47). It is worth considering that the data collected in Multon, Brown and Lent's meta-analysis was primarily from elementary schools although more recent studies (such as Lane & Lane, 2001; Prat-Sala & Redford, 2012; Vancouver & Kendall, 2006) have tended to use undergraduate samples.

Holden, Moncher, Schinke and Barker (1990) estimated a mean effect size of .334 of rated self-efficacy on future behaviour in children and adolescents in their meta-analysis. The authors clearly stated their inclusion criteria and used 25 relevant articles with 26 relevant effect sizes found in the psychological literature published between 1977 and March 1989. Although only 25 studies were included in this analysis, it can be argued that using small sample sizes in meta-analyses is unlikely to skew the overall estimates of the variation of the correlation (Hunter & Schmidt, 1990) and I could see no evidence of any publication bias.

In a recent meta-analysis exploring which psychosocial and study skills factors predict college outcomes, Robbins et al. (2004) found that out of 109 studies, academic self-efficacy had the highest effect size (.496) for academic achievement.

However, this study applied the following construct definition of academic self-efficacy: "self-evaluation of one's ability and/or chances for success in the academic environment". It could be argued that this definition is not specific enough, i.e. it is not in reference to a determined task in a particular context (Bandura, 1977a). Robbins et al. (2004, p. 276) noted that there is a "disparate quality of empirical studies" across the domains of educational and psychological research and, therefore, had to use a broad inclusion criteria in their analysis. The authors also recognise some possible publication bias, as they did not include any unpublished studies.

Hattie (2009) warns that although meta-analyses can be useful, the methodology is problematic. Meta-analyses compare findings from different studies, however Hattie cites a common criticism that "no two things can be compared unless they are the same" (2009, p. 10). Hattie also warns that effect sizes should not be applied and generalised without careful interpretation and consideration. In addition, we must be aware that research exploring the relationship between efficacy beliefs and achievement does not indicate causality, i.e. does high self-efficacy contribute to, or is it a result of, success and achievement. Pajares (1996) suggests that "because of the reciprocal nature of human motivation and behaviour, it is unlikely that such a question can be resolved" (Pajares, 1996, p. 566).

Promoting Self-Efficacy

Constructs that have been shown in research to promote self-efficacy include providing specific goal setting and feedback about prior performance (Hattie & Timperley, 2007; Schunk, 1982, 1985, 1990), collaborative learning environments (Dunlap, 2005), and learning skills to mastery through instructional models (Bandura, 1977a, 1982, 1997; McCarthy, et al., 1985; Pajares, 1996; Schunk, 1985). Schunk (2003) argues that a child does not need very high self-efficacy for effective learning, although self-efficacy needs to be high enough to keep a child engaged in their learning.

Self-efficacy judgements are "powerful determinants of, yet are also determined by, human cognition, affect and behaviour" (Berry, 1989, p. 683). Bandura (1994) highlights the importance of structuring success-possible situations for children to build their self-efficacy, helping them to avoid constant failure. Pajares (1996) argues that learning will be most effective when an individual's self-efficacy beliefs are slightly overestimated as this will increase persistence and effort.

Schunk (1982, 1985) reports research to suggest that self-efficacy is dependent on causal ascriptions. He states that if a child is able to maintain the belief that external circumstances around a task will remain similar, they will be able to attribute prior success to relatively stable causes such as high ability or low task difficulty. These expectancies of future success will encourage a child to remain motivated and engage in future learning.

Schunk (2004) also suggests that observational learning through modelling is more effective when a learner has a high level of self-efficacy, i.e. their belief that they are able to learn to perform the modelled behaviour. Schunk (1981) also claims that although all styles of teaching increase a student's self-efficacy, modelling did not increase self-efficacy significantly more than didactic instruction. He concluded that children should have instruction along with opportunities to practice in a safe environment where they can experience success. This will lead to increased self-efficacy, motivation and persistence.

Self-Efficacy and Spelling

Relatively few studies have explored the relationship between spelling and motivational or belief variables such as self-efficacy (Ranking, et al., 1994). My search of the literature suggested that much self-efficacy research in the domain of educational psychology is in relation to motivation, engagement and achievement. Many of these studies use mathematics although I have identified three key studies in the literature, specifically looking at self-efficacy and spelling.

Ranking, Bruning, Timme, & Katkanant (1993) examined self-efficacy beliefs about writing and spelling and proposed a causal model in which perceptions of self-efficacy in spelling would have both direct and indirect effects on spelling and writing ability (Figure LR1).

Figure LR1: Proposed causal model from Ranking, et al. (1993, p. 158)

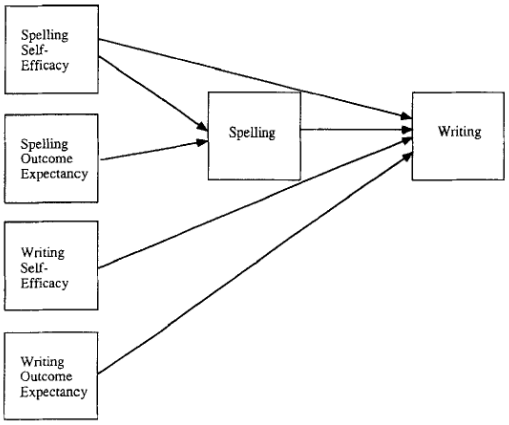


Figure 1. Proposed causal model

The authors tested their model on a large sample of undergraduate students (n = 258) and found that *Spelling Self-Efficacy* was significantly positively correlated to performance in both a spelling test ($p < .001$) and a written essay ($p < .001$). While this model has not been tested across populations or on a larger sample, it provides support for previous studies linking self-efficacy with achievement (Schunk, 1981; Vancouver & Kendall, 2006; Wadsworth, et al., 2007; Zimmerman, et al., 1992), with a particular focus on spelling self-efficacy.

Ranking, Bruning and Timme (1994) furthered the previous study (Ranking, et al., 1993), looking in more detail at the relationships between spelling performance and self-efficacy across a range of age groups. The researchers used a large sample (n = 687) however all children were from the same school district. They created a self-efficacy measured based on previous studies (Ranking, et al., 1993; Shell, Murphy, & Bruning, 1989) and found it to have high reliability using Cronbach's alpha. However, it appears no attempt was made to validate the scale. The scale was a self-report measure and the authors make no comment about if this was differentiated for any children with a low reading ability or other barriers to learning.

The authors created a 5-point Likert-type scale although more recently Bandura (2006) has recommended the use of scales from 0 – 100 for increased reliability and accuracy.

Ranking et al. (1994) found that spelling self-efficacy remained relatively constant and it was the strongest predictor of spelling performance across all school years groups. Interestingly, the findings demonstrated that children with the highest spelling ability attributed good spelling performance to effort rather than ability. The authors concluded that "attributions for good spelling are most likely to produce maximum growth in spelling performance" (Ranking, et al., 1994, p. 213).

Ranking et al. (1994) suggest that weekly spelling tests provide children with regular feedback about their ability. This links with Bandura's (1977a) suggestion that self-efficacy beliefs develop through mastery learning experiences and self-judgements of performances, however Ranking et al. warn that children may therefore interpret a spelling test mark as an absolute judgment of their spelling ability. This supports previous claims that "children rapidly develop images of themselves as 'good' or 'poor' spellers… the self-image from Grade 2 onward is derived mainly from feedback from spelling tests" (Downing, DeStefano, Rich, & Bell, 1984, p. 194)

The third study I feel is key to the area of self-efficacy and spelling is Jones, Varberg, Manger, Eikeland, & Asbjørnsen (2012) who examined the reading and writing self-efficacy of Norweigan prisoners. This research found self-efficacy beliefs to be indicative of participant's education level and spelling test performance, suggesting that an "assessment of self-efficacy in reading and writing should be included in a screening procedure of reading and spelling difficulties" (Jones, et al., 2012). There was a high drop out of participants in the study (36.6%) due to both individual and systems level factors and so results may have been biased towards individuals with weak literacy (may avoid test situations) or those very good at reading (may have seen it unnecessary to participate). Jones et al. warn that their claims should not be generalised to a non-prisoner population. However, their conclusions link to

previous claims made by Ranking, at al. (1993) that it may be useful to measure spelling self-efficacy as an indication of a child's development as a competent speller and writer.

Self-Efficacy Measures

There are a number of self-efficacy measures described in the literature, for example the Self-Efficacy for Learning Form (Zimmerman & Kitsantas, 2007), the General Self-Efficacy Scale (Sherer, et al., 1982), the Academic Self-Efficacy Scale (Wood & Locke, 1987), the Children's Perceived Self-Efficacy Scales (Bandura, 1990), and the Mathematics Self-Efficacy Scale (Lent, Lopez, & Bieschke, 1991). In addition, many researchers have created their own scales (Norwich, 1987). Bandura (2006) has written a guide for constructing self-efficacy scales in which he address the common conceptual and methodological issues. Some considerations include the use of the word can, a judgement of capability, rather than will, a statement of intent.

In my literature search, Bandura's (1989) Multidimensional Scales of Perceived Self-Efficacy (MSPSE) appeared to be the most widely cited measure of self-efficacy beliefs. It is a self-report measure aiming to assess self-efficacy across nine different domains:

- Self-Efficacy in Enlisting Social Resources
- Self-Efficacy for Academic Achievement
- Self-Efficacy for Self-Regulated Learning
- Self-Efficacy for Leisure Time Skills and Extracurricular Activities
- Self-Regulatory Efficacy to Resist Peer Pressure
- Self-Efficacy to Meet Others' Expectations
- Social Self-Efficacy
- Self-Assertive Efficacy
- Self-Efficacy for Enlisting Parental and Community Support

The MSPSE uses a 7-point Likert-type scale to measure an individual's perceived self-efficacy, although Bandura (2006) has more recently recommended the use of decile-based self-efficacy scales (from 0 – 100). Statements on the MSPSE ask

respondents to rate their level of capability in performing a given activity, for example “how well can you learn science” (Bandura, 1989, cited in Choi, et al., 2001, p. 4).

Miller, Coombs and Fuqua (1999) assessed the psychometric properties of the MSPSE. When considering the theoretical underpinnings to the MSPSE, they claimed that the subscale structure was in no way meaningful due to the task-specific nature of self-efficacy. The authors found significant differences in the content validity, the construct validity and the reliability between the subscales, although recognised that their participant sample may have implications for generalising their conclusions.

In contrast, Choi, Fuqua and Griffin (2001) examined the internal structure of scores from the MSPSE, using psychology undergraduate students (n = 651) from an American university. They concluded the MSPSE was aligned with theoretical assumptions and requires only minor revisions to be used reliably with undergraduate college students. Williams and Coombs (1996) also found the subtests to be sufficiently reliable in terms of internal consistency, although noted that further research is necessary to assess the stability of these factors across different samples and groups” (p. 9).

Ramkissoon (2004) carried out a confirmatory factor analysis design of the MSPSE, which demonstrated strong factorial validity for two of the subscales, *Self-Efficacy for Self-Regulated Learning* and *Self-Regulatory Efficacy to Resist Peer Pressure*. Ramkissoon found that concurrent validity was moderate for the subscales although questioned the cross-cultural validity of the scale, concluding that modifications were needed before it was used in a Jamaican setting. However, Ramkissoon relied on a sample of 192 undergraduate social science students at the University of the West Indies, which questions generalisation of his findings about the validity of the scale.

Measuring Self-Efficacy

Despite research presented above proposing links between self-efficacy and academic achievement (Pajares, 1996; Schunk, 1991; Zimmerman, et al., 1992), Bandura (1997) has warned against attempting to predict academic achievement based solely on children's self-efficacy beliefs. Nevertheless, Lane, Lane and Kyprianou (2004) suggest that there is some usefulness in using self-efficacy measures in academic settings to help predict academic performance. Holden, Moncher, Schinke and Barker (1990, p. 1044) state that "social cognitive theory predicts that self-efficacy estimates will decline in predictive strength over time". In addition, researchers have suggested that self-efficacy can be used to predict test scores in the short term, but not more general achievement over time (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006)

Pajares (1997) warns that assessments of self-efficacy beliefs often reflect "global or generalised attitudes about capabilities bearing slight or no resemblance" (1997, Assessing Self-Efficacy Beliefs, para. 1) to the specific task being analysed. Pajares states that it is essential for researchers to identify a criterial task to be assessed, and to avoid studying general judgements of confidence about the nature of the task. He writes about how researchers may assess a learner's self-efficacy of essay writing, highlighting that this task has many different dimensions that need to be considered. Pajares claims that to write an essay, an individual needs to have knowledge of many more specific skills, such as grammatical structure, punctuation, organisation of sentences and so on. In addition, learners will need confidence to write and to form letters. This suggests that it can be difficult to assess efficacy beliefs about a *specific* task in a *specific* context.

> Greater clarification [is needed] of the nature of self-efficacy… a definition of self-efficacy as a personal judgment of one's competence to execute course of action to deal with future situations or tasks does not provide a sufficiently clear basis for assessing self-efficacy… more theoretical clarity about the nature of self-efficacy and the use of designs and assessment methodologies that are appropriate to the complexity of theory on self-efficacy are needed.
>
> (Norwich, 1987, p. 387)

Bandura (1997) argues that many measures of self-efficacy are too general, frequently assessing general confidence levels and not specifying particular tasks or contexts. Pajares (1997) proposes that although many self-efficacy measures achieve high internal consistency through different phrasing of similar items, they require individual's to reflect on their perceived capabilities without a clear task in mind and so provide an assessment of the general domain.

Conclusions and Justification for Research

Self-efficacy is a complex construct that is well researched in both psychological and educational literature. There is a lot of research looking at self-efficacy and mathematics (Hanchon Graham, 2000; Kenney-Benson, et al., 2006; Luzzo, et al., 1999; Norwich, 1987; Wadsworth, et al., 2007) however, I found very little existing research exploring spelling and self-efficacy. Graham and Harris (1989a, 1989b) suggest that teaching strategies for writing stories to children with learning disabilities increased their self-efficacy beliefs. They also observed some generalisation of this efficacy to other settings. Meier, McCarthy and Schmeck (1984) found that self-efficacy beliefs about writing would predict success at the beginning of an intervention course but not towards the end of the course where students overestimated their performance.

Pajares (1997) discusses the self-enhancement model of academic achievement (Calsyn & Kenny, 1977) in relation to self-efficacy. The self-enhancement model asserts schools should focus on building children's perceptions of their competence and self-worth in order to increase their achievement. From a social cognitive perspective, Pajares suggests that schools should "focus upon the important task of raising competence and confidence through authentic mastery experiences" whilst also drawing upon other sources of self-efficacy beliefs (vicarious learning and verbal persuasion, Bandura, 1977a) in order to raise achievement further.

Bandura (Bandura, 1977a, 1997) proposes that enactive / personal attainments (actual experiences) are the most influential source of self-efficacy, and advocates

that self-efficacy is based on prior experience. A child learning to spell may therefore have low levels of self-efficacy after gaining consistently low marks in spelling tests. As discussed in the review of literature above, this may have adverse impacts upon his motivation, engagement, and confidence when tackling future spelling problems. If the same child had experienced success and mastery of skills when learning to spell, his self-efficacy beliefs may be elevated, and he may feel more able to engage with literacy learning.

In my professional experience, I have observed fantastic teaching practice in schools with children who find spelling difficult or tricky. I have seen differentiated classroom schemes of work, small group interventions and one-to-one support. However some children still fail to make progress. This literature review has explored claims that there is a positive link between children's academic performance and efficacy beliefs in relation to motivation, persistence, effort and engagement. This has left me wondering whether we need to understand more about a child's perceptions of their own ability before subjecting them to intensive teaching interventions that, while often for the best intentions, can increase their anxiety levels and their risk of experiencing failure.

Klassen (2002) suggests that teachers may find it useful to use self-efficacy scales with children who have learning disabilities. Use of these scales may give further insight into the children's perceptions and efficacy beliefs. However, Klassen (2008) also reviewed a number of studies and concluded that children with learning disabilities may over-estimate their spelling and writing performance and have optimistic academic self-beliefs. This has implications for relying solely on measures of efficacy beliefs to predict performance, engagement and future achievement.

I feel that these studies indicate a need for teachers to be explicitly aware of sources of self-efficacy beliefs, and how they can further support this development in their students. I believe my study will allow the child's voice to be heard and listened to when planning support for their spelling and literacy.

A3 Online Survey

My name is Will and I am completing some research as part of my Doctorate in Educational and Child Psychology at Exeter University. I would be really grateful if you could take 2 minutes of your time to complete this short questionnaire. All responses are confidential and will remain anonymous. You may withdraw your participation in this study at any time by e-mailing me with the date/time you completed the questionnaire. If you wish to contact me for any further information, please e-mail me at wes201@exeter.ac.uk

Many thanks,

Will Shield
DEdPsy Exeter University

* Required

In which type of school do you teach? *

- ◯ Mainstream Primary School
- ◯ Special School (Primary)
- ◯ Other: ____

What year group do you teach? *

Please select the group you spend most time with. Please focus your answers throughout this questionnaire on this group.

- ◯ EYFS
- ◯ Year 1
- ◯ Year 2
- ◯ Year 3
- ◯ Year 4
- ◯ Year 5
- ◯ Year 6
- ◯ Mixed Key Stage 1
- ◯ Mixed Key Stage 2
- ◯ Other: ____

Are there children in your class who are not making expected progress in literacy? *

Yes

Are there children in your class who are not making expected progress across the curriculum due to their difficulties with literacy? *

Yes

Are there children in your class who are not making expected progress across the curriculum due to their difficulties with spelling? *

Yes

Are there children in your class who struggle with learning how to spell? *

Yes

Do any children in your class have additional support to target their difficulties with spelling?

Please give brief details without mentioning individual children, e.g. 1:1 intervention for 10 mins a day

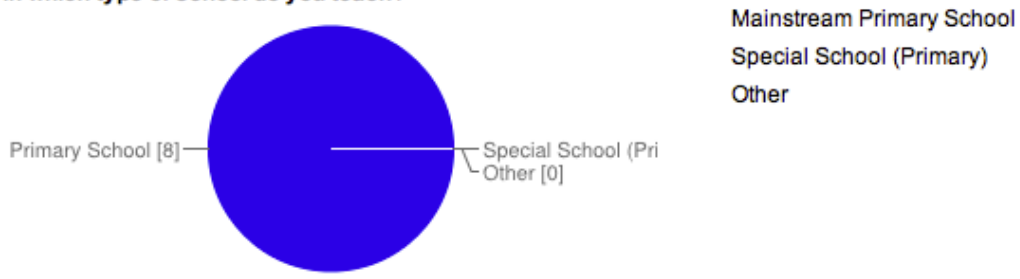
If any children in your class receive additional support for literacy, what is the focus of this intervention?

Please tick all that apply.

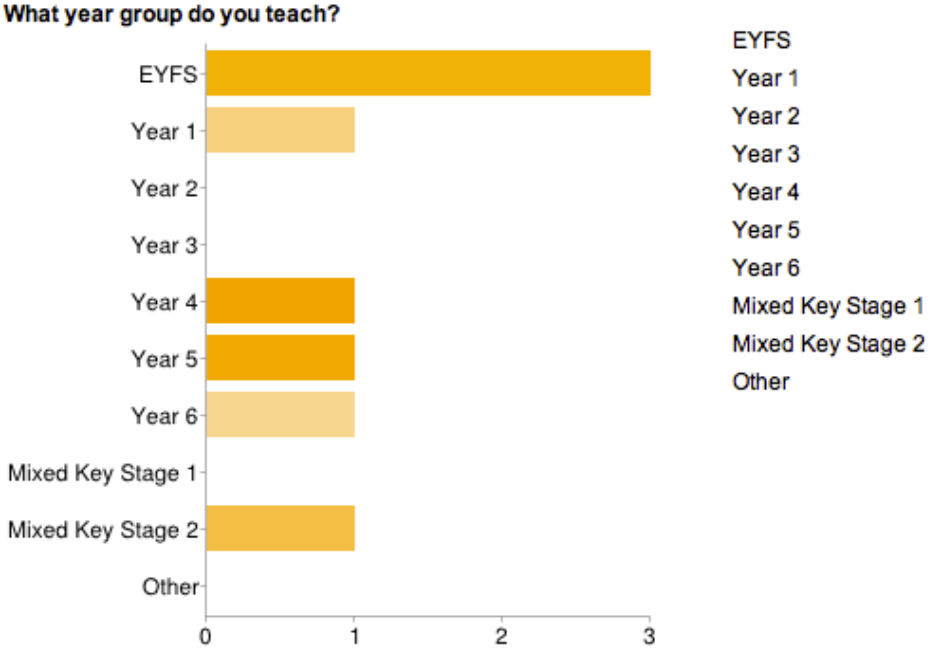
- [ ] Phonics
- [ ] Activities to increase phonological awareness
- [ ] Study skills
- [ ] Mentoring / coaching
- [ ] Activities to increase meta-cognition (thinking about their own learning)
- [ ] Social skills
- [ ] Handwriting
- [ ] Fine or gross motor skills
- [ ] Speaking and listening activities
- [ ] Spelling
- [ ] Individual reading
- [ ] Peer reading
- [ ] Reading to an adult
- [ ] Group reading
- [ ] Spelling tests
- [ ] How to make use of alternative recording strategies, e.g. using dictaphones / ICT
- [ ] Precision teaching
- [ ] Activities based on direct instruction, e.g. Toe-by-Toe
- [ ] Activities to increase children's belief in their own ability to learn how to spell
- [ ] Activities to increase children's belief in their own ability to learn how to read
- [ ] Pre-teaching of key words and vocabulary
- [ ] Other:

Thank you for taking the time to complete this questionnaire. Please leave any further comments in this box. If you would like me to contact you with further information about my study, please leave your e-mail address here.

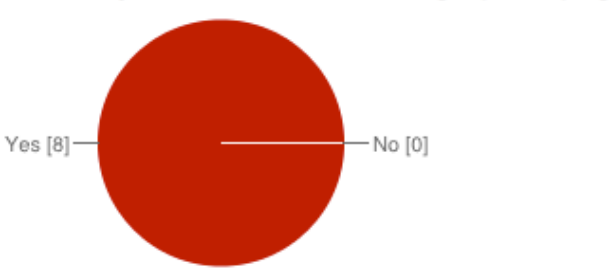
In which type of school do you teach?



What year group do you teach?

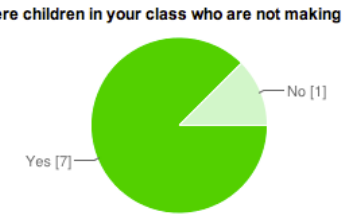


Are there children in your class who are not making expected progress in literacy?



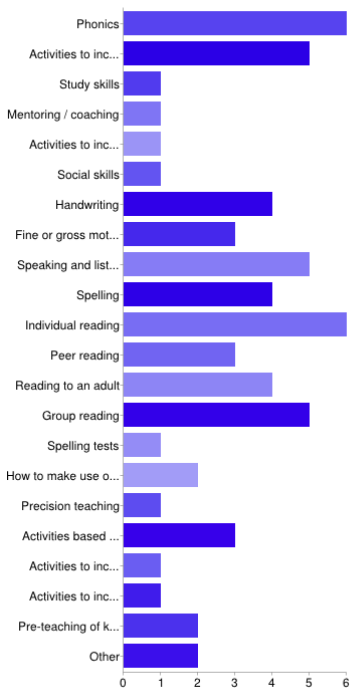
Are there children in your class who are not making expected progress across the curriculum due to their difficulties with literacy?

Are there children in your class who are not making expected progress across the curriculum due to their difficulties with spelling?



Are there children in your class who struggle with learning how to spell?

If any children in your class receive additional support for literacy, what is the focus of this intervention?



Phonics
Activities to increase phonological awareness
Study skills
Mentoring / coaching
Activities to increase meta-cognition (thinking about their own learning)
Social skills
Handwriting
Fine or gross motor skills
Speaking and listening activities
Spelling
Individual reading
Peer reading
Reading to an adult
Group reading
Spelling tests
How to make use of alternative recording strategies, e.g. using dictaphones / ICT
Precision teaching
Activities based on direct instruction, e.g. Toe-by-Toe
Activities to increase children's belief in their own ability to learn how to spell
Activities to increase children's belief in their own ability to learn how to read
Pre-teaching of key words and vocabulary
Other

People may select more than one checkbox, so percentages may add up to more than 100%.

A4 Parent Information Sheet and Consent Form (Phase 1)

UNIVERSITY OF EXETER

Research Information Sheet

My name is Will and I am completing a Doctorate in Educational, Child and Community Psychology at the University of Exeter.

The focus of my research is to explore what children and young people think about spelling, e.g. whether they like spelling, whether spelling is important to them, what the characteristics are of a 'good speller'. To do this, I am asking for your consent to work with your child for approximately 45 minutes during school time. During this hour I will talk to them about spelling and then give them a short single-word spelling test. I will also be asking the school for their most recent spelling and reading ages (if applicable).

The information I gain from this study will contribute to my overall research project, which is concerned with creating a 'spelling confidence' rating scale for children and young people.

- All data will be anonymous. Your child will be allocated a random participant number and their name and school will not be recorded.
- Raw data will be kept in a secure place and only the researcher and research supervisor will have access to it. Once the study is complete, all data will be shredded.
- Your child is able to withdraw at any given time during the research process by e-mailing me.

In order to use data held by the school (children's spelling and reading ages) and to meet with your child, I need your written consent. Please complete the form attached and return to school for the attention of **XXXX** by **XXXX 2012**.

If you have any questions about the study, please contact me using the contact details below. Thank you in anticipation for your help with this piece of research.

Will Shield
Trainee Educational Psychologist
Member of the British Psychological Society
University of Exeter
wes201@exeter.ac.uk

UNIVERSITY OF EXETER

Informed Consent Form

Child's Name: .....

Child's School: .....

- I have read the information sheet concerning the project and understand what it is about.
- I am happy for the researcher to work with my child at school at the given date and time.
- I am aware of how to contact the researcher if I have any further questions.
- I understand that I am free to request further information at any stage.

I know that:

- My child's participation in this project is entirely voluntary.
- My child is free to withdraw at any time without any disadvantage.
- Data will be stored securely and destroyed when it is no longer needed.
- The results of the project may be published but my anonymity will be preserved.

Parent / Carer Name: .....

Parent / Carer Signature: .....

Child Signature: .....

Date: ..... / ..... / 2012

Do you have any further questions, queries or feedback? Please contact:

Will Shield (Researcher): wes201@exeter.ac.uk
Andrew Richards (Research Supervisor): A.J.Richards@exeter.ac.uk
Margie Tunbridge (Research Supervisor): M.A.Tunbridge@exeter.ac.uk

A5 Parent Information Sheet and Consent Form Phase 2

Research Information Sheet

My name is Will and I am completing a Doctorate in Educational, Child and Community Psychology at the University of Exeter. I am currently on placement with the Educational Psychology Service in Stoke-on-Trent.

The focus of my research is to explore what children and young people think about spelling, e.g. whether they like spelling, whether spelling is important to them, and the judgements they make in their ability to learn how to spell at school.

I will be visiting XXX Primary School on Thursday 18th October and working with Year 4, 5 and 6 for approximately one hour. During this hour I will talk to the children about spelling and give them a short single-word spelling test.

The information I gain from this study will contribute to my overall research project, which is concerned with creating a 'spelling confidence' rating scale for children and young people.

- All data will be anonymous. Your child will be allocated a random participant number and their name and school will not be recorded.
- Raw data will be kept in a secure place and only the researcher and research supervisor will have access to it. Once the study is complete, all data will be shredded.
- You have the right to withdraw your child from this study at any given time during the research process (including after my visit to XXX School) by contacting me via e-mail (wes201@exeter.ac.uk).

If you have any questions about the study, please contact me using the contact details below. Thank you in anticipation for your co-operation with this piece of research.

Will Shield
Trainee Educational Psychologist
Member of the British Psychological Society
University of Exeter

Do you have any further questions, queries or feedback? Please contact:

Will Shield (Researcher):	wes201@exeter.ac.uk
Andrew Richards (Research Supervisor):	A.J.Richards@exeter.ac.uk
Margie Tunbridge (Research Supervisor):	M.A.Tunbridge@exeter.ac.uk

A6 Administration Instructions

UNIVERSITY OF EXETER

Spelling Research – Teacher Instructions

Firstly, a massive thank you for helping with my research project!

My name is Will and I am completing a Doctorate in Educational, Child and Community Psychology at the University of Exeter. I envisage that this questionnaire and spelling test should take no longer than 15-20 minutes.

Please follow the below instructions:

1. Introduce the class to the task: "We have been asked to help out with some research about what children think about spelling. I am going to ask you all some questions and I want you to answer them truthfully. Be as honest as you can, there are no right or wrong answers".

2. Hand out the questionnaires. Ask each child to write their gender, age and school carefully on the front of their sheet.

3. Explain the task: "In front of you, you can see a statement with the numbers 0-10 written underneath it. Underneath 0 it says '*I'm certain I cannot do that*', underneath 10 it says '*I'm certain I can do that*' and underneath 5 it says '*I think I can sometimes do that*'. I am going to read out each statement. They all start with 'I can…'. I want you to listen carefully and think really hard about what I say and then decide whether you think you can do it or not. Let's try the examples together. '*I can eat a whole bar of chocolate in less than 20 minutes*' I would score myself 10 because I think I am certain I can do that. '*I can run all the way to the North Pole without stopping*' I would score myself 0 because I'm certain I cannot do that".

4. Ensure that each child understands the task (give more examples if needed to ensure they understand the scale and that they can use any number between 0-10, not just 0/5/10. Please also ensure they understand the answer sheet.

5. Please read out each statement. Some children will want to go ahead at their own faster pace – that is fine! Some children will need more help than others to complete the questionnaire.

6. Please collect in all sheets, put in the A4 envelope and pop in the post back to me.

Thank you again for your help!

A7 Items Developed from Literature Search

General Spelling Self-Efficacy – belief in ability to learn to spell at school and at home	At school I can spell every word
	At home I can spell every word
	At school I can learn to spell every word
	At home I can learn to spell every word
	I can learn spellings for a spelling test at school
	I can learn spellings for a spelling test at home
	At school I can learn to spell all of the words in the dictionary
	At home I can learn to spell all of the words in the dictionary
	In a spelling test at school, I can get all of the answers correct
	In a spelling test at home, I can get all of the answers correct
	I can learn to spell all words when my teacher helps me at school
	I can learn to spell all words when an adult helps me at school
	I can learn to spell all words when my mum/dad/carer helps me at home
	I can learn to spell all words when my friends help me at school
	I can learn to spell all words without any help from my teacher at school
	I can learn to spell all words without any help from an adult at school
	I can learn to spell all words without any help from my mum/dad/carer at home
	I can learn to spell all words without any help from my friends at school
	I can learn to spell when my teacher helps me at school
	I can learn to spell when an adult helps me at school
	I can learn to spell when my mum/dad/carer helps me at home
	I can learn to spell when my friends help me at school
	I can learn to spell without any help from my teacher at school
	I can learn to spell without any help from an adult at school
	I can learn to spell without any help from my mum/dad/carer at home
	I can learn to spell without any help from my friends at school
	I can spell when my teacher helps me at school
	I can spell when an adult helps me at school
	I can spell when my mum/dad/carer helps me at home
	I can spell when my friends help me at school
	I can spell without any help from my teacher at school
	I can spell without any help from an adult at school
	I can spell without any help from my mum/dad/carer at home
	I can spell without any help from my friends at school

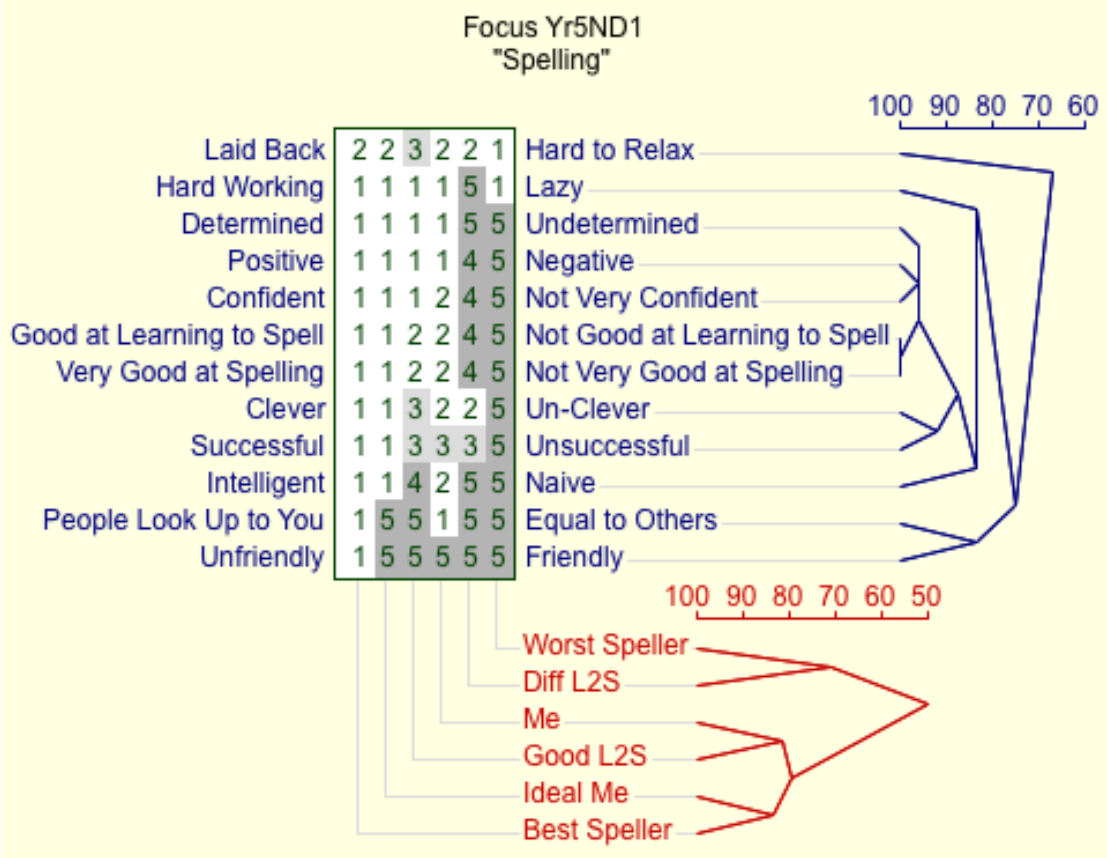
Phonological Knowledge	At school, **I can** hear the different sounds in short words for example in 'cat' there are three sounds /*c*/*a*/*t*/
	At school, **I can** hear the different sounds in long words for example in … there are … sounds ///
	At school, I **can spell** short 'tricky words' or 'sight words', for example "was" or "that"
	At school I **can learn to spell** short 'tricky words' or 'sight words', for example "was" or "that"
	At school, I **can spell** long 'tricky words' or 'sight words', for example "beautiful" or "shoulder"
	At school, I **can learn to spell** long 'tricky words' or 'sight words', for example "beautiful" or "shoulder"
	At school I **can spell** words that use different groups of letters for the same sound, for example the sound 'ay' can be written using the letters 'ay' like in "stay" or 'ai' like in "train"
	At school I **can learn to spell** words that use different groups of letters for the same sound, for example the sound 'ay' can be written using the letters 'ay' like in "stay" or 'ai' like in "train"
	When I am **learning to spell** at school, I can recognise which words sound the same at the end, for example out of the three words 'made', 'fight' and 'fade', the words 'made' and 'fade' have the same ending
	When I am **learning to spell** at school, I can recognise which words sound the same at the beginning, for example out of the three words 'shop', 'mat' and 'shell', the words 'shop' and 'shell' have the same ending
Letter Names / Sounds	At school I **can** write all of the letters in the alphabet correctly
	At school I **can** write all of the letters in the alphabet in the correct order
	At school I **can** tell someone what sound each letter represents, for example the letter 'e' sounds like /*eh*/ (elephant) and the letter 'p' sounds like /*puh*/ (party)
	If my teacher says a letter sound, I **can** correctly write the letter on a piece of paper
	At school I **can learn to** write all of the letters in the alphabet correctly
	At school I **can learn to** write all of the letters in the alphabet in the correct order
	At school I **can learn to** tell someone what sound each letter represents, for example the letter 'e' sounds like /*eh*/ (elephant) and the letter 'p' sounds like /*puh*/ (party)
	If my teacher says a letter sound, I **can learn to** correctly write the letter on a piece of paper

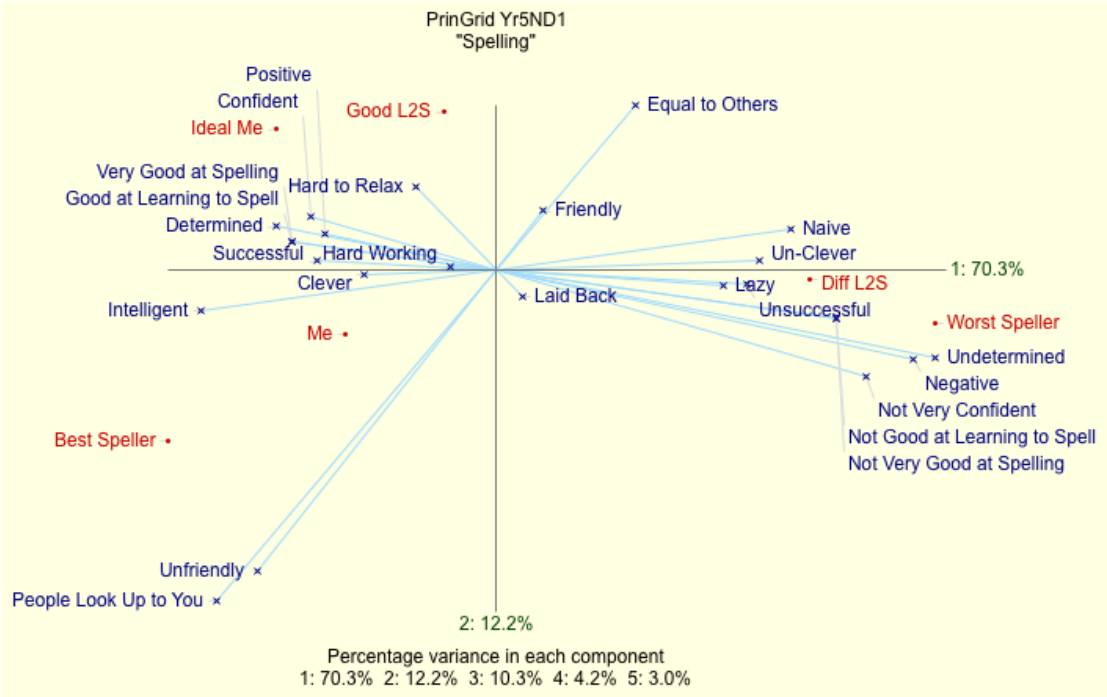
A8 Items Developed from Personal Constructs

Generated from PCP Analysis	I can be good at learning to spell at school
	I can be resilient when I am learning to spell at school
	I can push myself to the limits when I am learning to spell at school
	I can take risks when I am learning to spell at school
	I can be confident when trying to spell a difficult word
	I can stay positive about learning to spell, even when I make mistakes
	I can stay confident about learning to spell, even when I make mistakes
	I can use my initiative when learning to spell
	I can be enthusiastic about learning to spell
	I can be successful in other lessons at school because I can spell lots of words
	I can write with neat handwriting
	I can practice how to spell every day at school
	I can practice how to spell every day at home
	I can understand how to spell lots of big words
	I can learn to spell even if I am finding it difficult
	I can get better at learning to spell
	I can get better at learning to spell by working hard at school
	I can get better at learning to spell by working hard at home

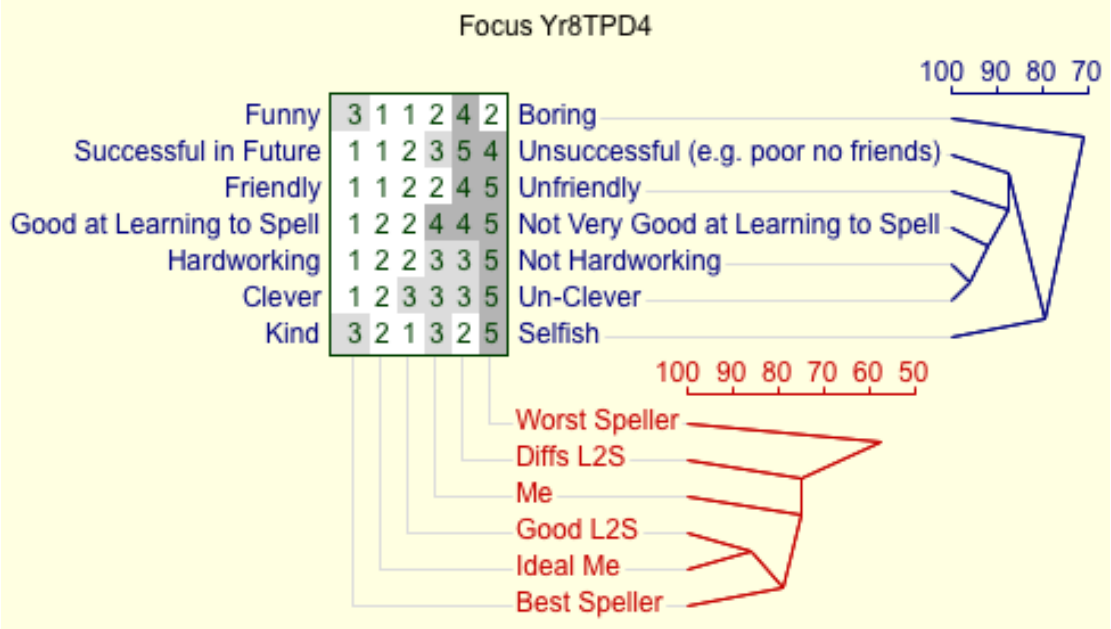
A9 Examples of Repertory Grids and Cluster Maps

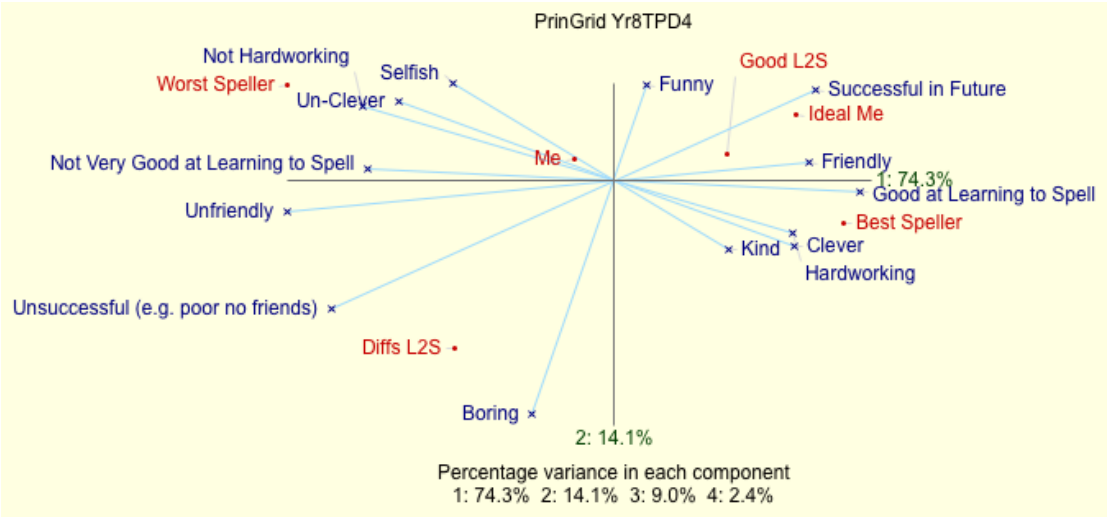
Year 5 child who is not perceived to have any difficulties learning to spell





Year 8 child who is perceived to have difficulties learning to spell





A10 Spelling Self-Efficacy Measure Items

6	At school, **I can** hear the different sounds in long words for example in Mississippi… there are … sounds ///
13	At school I **can spell** words that use different groups of letters for the same sound, for example the sound 'ay' can be written using the letters 'ay' like in "stay" or 'ai' like in "train"
15	When I am **learning to spell** at school, I can recognise which words sound the same at the end, for example out of the three words 'made', 'fight' and 'fade', the words 'made' and 'fade' have the same ending
16	When I am **learning to spell** at school, I can recognise which words sound the same at the beginning, for example out of the three words 'shop', 'mat' and 'shell', the words 'shop' and 'shell' have the same ending
22	At school I **can** tell someone what sound each letter represents, for example the letter 'e' sounds like */eh/* (elephant) and the letter 'p' sounds like */puh/* (party)
25	At school I **can learn to spell** words that use different groups of letters for the same sound, for example the sound 'ay' can be written using the letters 'ay' like in "stay" or 'ai' like in "train"
28	If my teacher says a letter sound, I **can** correctly write the letter on a piece of paper
3	I can learn to spell all words when my teacher helps me at school
12	I can learn to spell all words when an adult helps me at school
17	I can learn to spell all words when my friends help me at school
20	I can learn to spell all words without any help from my teacher at school
24	I can learn to spell all words without any help from an adult at school
4	I can learn to spell all words without any help from my friends at school
14	I can learn to spell when my teacher helps me at school
27	I can learn to spell when an adult helps me at school
23	I can learn to spell when my friends help me at school
30	I can learn to spell without any help from my teacher at school
33	I can learn to spell without any help from an adult at school
37	I can learn to spell without any help from my friends at school
29	I can be good at learning to spell at school
31	I can be resilient when I am learning to spell at school
34	I can push myself to the limits when I am learning to spell at school
35	I can take risks when I am learning to spell at school
38	I can be confident when trying to spell a difficult word
42	I can stay positive about learning to spell, even when I make mistakes
44	I can stay confident about learning to spell, even when I make mistakes
39	I can use my initiative when learning to spell
43	I can be enthusiastic about learning to spell
49	I can learn to spell even if I am finding it difficult
51	I can get better at learning to spell by working hard at school
45	I can be successful in other lessons at school because I can spell lots of words
46	I can write with neat handwriting
48	I can understand how to spell lots of big words
8	At school, I **can spell** short 'tricky words' or 'sight words', for example "was" or "that"
18	At school I **can learn to spell** short 'tricky words' or 'sight words', for example "was" or "that"
10	At school, I **can spell** long 'tricky words' or 'sight words', for example "beautiful" or "shoulder"
19	At school, I **can learn to spell** long 'tricky words' or 'sight words', for example "beautiful" or "shoulder"
1	At school I can spell every word
2	In a spelling test at school, I can get all of the answers correct
7	At school I can learn to spell every word
9	I can learn spellings for a spelling test at school
11	At school I can learn to spell all of the words in the dictionary
47	I can practice my spellings well at school

A11 Spelling Self-Efficacy Measure Record Sheet

SSEM1 Record Sheet

Year Group:	Boy/Girl:
DOB:	Age:

1	1	2	3	4	5	6	7	8	
				9	10				

2	1	2	3	4	5	6	7	8	
				9	10				

3	1	2	3	4	5	6	7	8	
				9	10				

4	1	2	3	4	5	6	7	8	
				9	10				

4	1	2	3	4	5	6	7	8	
				9	10				

5	1	2	3	4	5	6	7	8	
				9	10				

6	1	2	3	4	5	6	7	8	
				9	10				

7	1	2	3	4	5	6	7	8	
				9	10				

8	1	2	3	4	5	6	7	8	
				9	10				

9	1	2	3	4	5	6	7	8	
				9	10				

10	1	2	3	4	5	6	7	8	
				9	10				

11	1	2	3	4	5	6	7	8	
				9	10				

A12 Descriptive Statistics SSEM Pilot

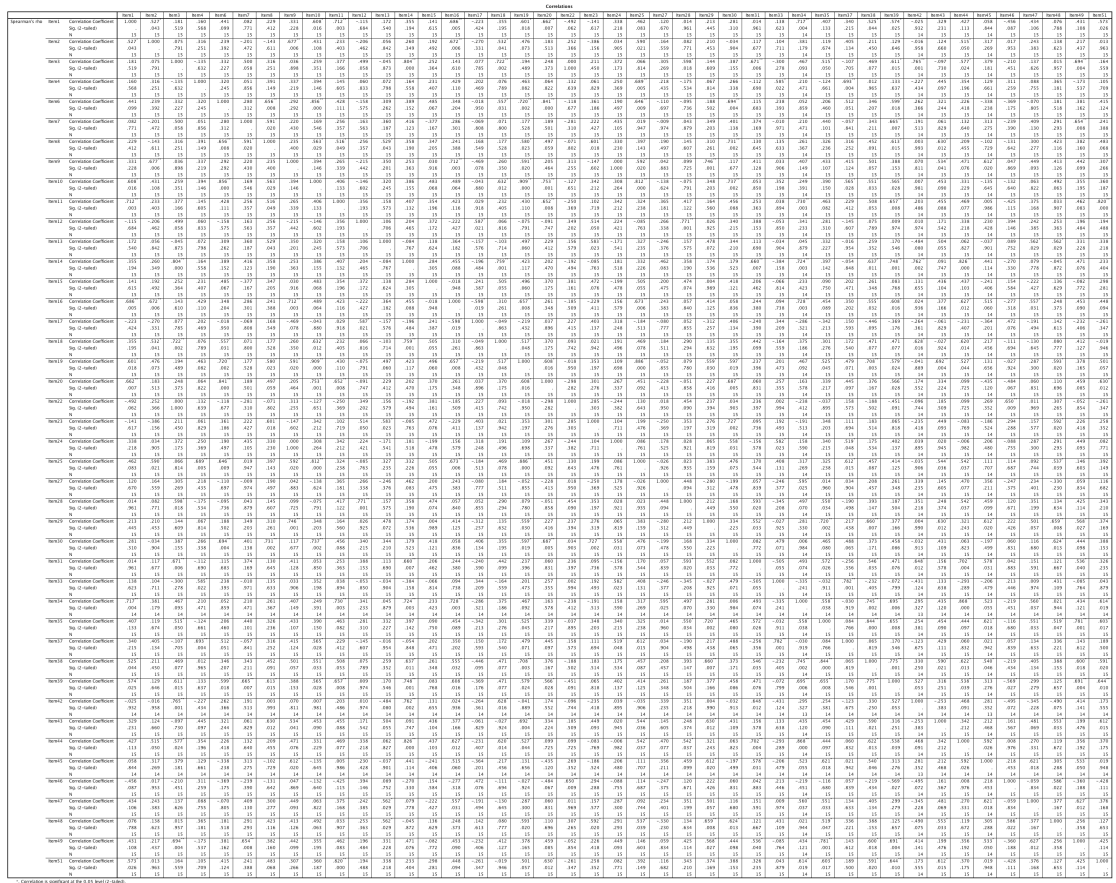
Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Item1	15	5	2	7	5.13	1.356	-.672	.580	1.243	1.121
Item2	15	7	3	10	6.60	2.063	-.390	.580	-.507	1.121
Item3	15	5	5	10	8.73	1.981	-1.164	.580	-.348	1.121
Item4	15	8	2	10	5.73	2.017	.601	.580	.785	1.121
Item6	15	9	0	9	4.47	2.900	-.234	.580	-.693	1.121
Item7	15	8	2	10	6.67	2.193	-.446	.580	-.141	1.121
Item8	15	6	4	10	8.20	2.242	-.770	.580	-1.030	1.121
Item9	15	8	2	10	8.47	2.503	-1.751	.580	2.403	1.121
Item10	15	9	1	10	6.80	2.651	-.521	.580	-.208	1.121
Item11	15	5	0	5	3.20	2.145	-.750	.580	-1.207	1.121
Item12	15	6	4	10	8.07	2.017	-.888	.580	-.294	1.121
Item13	15	10	0	10	8.40	2.772	-2.337	.580	5.854	1.121
Item14	15	5	5	10	9.07	1.751	-1.958	.580	2.726	1.121
Item15	15	8	2	10	7.53	2.800	-.593	.580	-1.111	1.121
Item16	15	9	1	10	8.27	2.631	-1.773	.580	3.123	1.121
Item17	15	6	4	10	6.33	2.127	.421	.580	-1.293	1.121
Item18	15	6	4	10	8.87	2.066	-1.703	.580	1.474	1.121
Item19	15	10	0	10	6.60	3.312	-.777	.580	-.439	1.121
Item20	15	8	0	8	4.27	2.052	-.987	.580	1.596	1.121
Item22	15	5	5	10	8.80	1.781	-1.492	.580	1.088	1.121
Item23	15	9	1	10	6.93	2.915	-.483	.580	-.948	1.121
Item24	15	10	0	10	5.07	2.549	-.653	.580	1.335	1.121
Item25	15	6	4	10	7.60	2.324	-.147	.580	-1.805	1.121
Item27	15	3	7	10	9.60	.828	-2.543	.580	7.067	1.121
Item28	15	5	5	10	8.60	2.028	-1.026	.580	-.770	1.121
Item29	15	8	2	10	8.33	2.289	-1.794	.580	3.399	1.121
Item30	15	9	0	9	4.67	2.127	-.164	.580	1.306	1.121
Item31	15	6	4	10	8.33	2.380	-.934	.580	-1.046	1.121
Item33	15	10	0	10	5.47	2.475	-.134	.580	.832	1.121
Item34	14	7	3	10	7.36	2.678	-.783	.597	-.759	1.154
Item35	15	9	1	10	7.67	2.870	-1.203	.580	.602	1.121
Item37	15	10	0	10	5.20	2.426	.078	.580	1.117	1.121
Item38	15	9	1	10	7.27	3.218	-1.020	.580	-.254	1.121
Item39	15	10	0	10	8.07	3.535	-1.888	.580	2.343	1.121
Item42	14	7	3	10	8.79	1.929	-2.349	.597	6.301	1.154
Item43	15	10	0	10	7.53	2.669	-1.655	.580	3.669	1.121
Item44	15	5	5	10	8.87	1.642	-1.208	.580	.396	1.121
Item45	14	7	3	10	8.43	2.209	-1.488	.597	1.597	1.154
Item46	15	5	5	10	8.47	1.598	-.900	.580	-.079	1.121
Item47	15	10	0	10	8.40	2.849	-2.180	.580	4.924	1.121
Item48	15	10	0	10	7.07	2.865	-1.086	.580	1.127	1.121
Item49	15	9	1	10	7.67	2.769	-1.208	.580	.752	1.121
Item51	15	9	1	10	8.53	3.114	-2.248	.580	3.816	1.121
Valid N (listwise)	13									

	Item1	Item2	Item3	Item4	Item6	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20	Item22	Item23
N Valid	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean	5.13	6.60	8.73	5.73	4.47	6.67	8.20	8.47	6.80	3.20	8.07	8.40	9.07	7.53	8.27	6.33	8.87	6.60	4.27	8.80	6.93
Std. Error of Mean	.350	.533	.511	.521	.749	.566	.579	.646	.685	.554	.521	.716	.452	.723	.679	.549	.533	.855	.530	.460	.753
Median	5.00	7.00	10.00	5.00	4.00	7.00	10.00	10.00	7.00	4.00	8.00	10.00	10.00	9.00	10.00	6.00	10.00	8.00	5.00	10.00	8.00
Mode	5	8	10	5	4	7	10	10	5	5	10	10	10	10	10	4	10	10	5	10	5[a]
Std. Deviation	1.356	2.063	1.981	2.017	2.900	2.193	2.242	2.503	2.651	2.145	2.017	2.772	1.751	2.800	2.631	2.127	2.066	3.312	2.052	1.781	2.915
Variance	1.838	4.257	3.924	4.067	8.410	4.810	5.029	6.267	7.029	4.600	4.067	7.686	3.067	7.838	6.924	4.524	4.267	10.971	4.210	3.171	8.495
Skewness	-.672	-.390	-1.164	.601	-.234	-.446	-.770	-1.751	-.521	-.750	-.888	-2.337	-1.958	-.593	-1.773	.421	-1.703	-.777	-.987	-1.492	-.483
Std. Error of Skewness	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580	.580
Z Skewness	**-1.159**	**-.672**	**-2.006**	**1.037**	**-.404**	**-.769**	**-1.327**	-3.019	**-.898**	**-1.293**	**-1.531**	-4.028	-3.375	**-1.022**	-3.056	**.725**	-2.935	**-1.340**	**-1.701**	**-2.572**	**-.833**
Kurtosis	1.243	-.507	-.348	.785	-.693	-.141	-1.030	2.403	-.208	-1.207	-.294	5.854	2.726	-1.111	3.123	-1.293	1.474	-.439	1.596	1.088	-.948
Std. Error of Kurtosis	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121
Z Kurtosis	**1.109**	**-.453**	**-.310**	**.701**	**-.618**	**-.126**	**-.919**	**2.144**	**-.185**	**-1.077**	**-.262**	5.223	2.432	**-.991**	2.786	**-1.154**	**1.315**	**-.392**	**1.424**	**.970**	**-.845**
Range	5	7	5	8	9	8	6	8	9	5	6	10	5	8	9	6	6	10	8	5	9
Minimum	2	3	5	2	0	2	4	2	1	0	4	0	5	2	1	4	4	0	0	5	1
Maximum	7	10	10	10	9	10	10	10	10	5	10	10	10	10	10	10	10	10	8	10	10

Item24	Item25	Item27	Item28	Item29	Item30	Item31	Item33	Item34	Item35	Item37	Item38	Item39	Item42	Item43	Item44	Item45	Item46	Item47	Item48	Item49	Item51
15	15	15	15	15	15	15	15	14	15	15	15	15	14	15	15	14	15	15	15	15	15
0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0
5.07	7.60	9.60	8.60	8.33	4.67	8.33	5.47	7.36	7.67	5.20	7.27	8.07	8.79	7.53	8.87	8.43	8.47	8.40	7.07	7.67	8.53
.658	.600	.214	.524	.591	.549	.615	.639	.716	.741	.626	.831	.913	.515	.689	.424	.590	.413	.735	.740	.715	.804
5.00	7.00	10.00	10.00	9.00	5.00	10.00	5.00	8.00	9.00	5.00	8.00	10.00	9.50	8.00	10.00	9.50	9.00	10.00	8.00	9.00	10.00
5	10	10	10	10	5	10	5	10	10	5	10	10	10	10	10	10	10	10	10	10	10
2.549	2.324	.828	2.028	2.289	2.127	2.380	2.475	2.678	2.870	2.426	3.218	3.535	1.929	2.669	1.642	2.209	1.598	2.849	2.865	2.769	3.114
6.495	5.400	.686	4.114	5.238	4.524	5.667	6.124	7.170	8.238	5.886	10.352	12.495	3.720	7.124	2.695	4.879	2.552	8.114	8.210	7.667	9.695
-.653	-.147	-2.543	-1.026	-1.794	-.164	-.934	-.134	-.783	-1.203	.078	-1.020	-1.888	-2.349	-1.655	-1.208	-1.488	-.900	-2.180	-1.086	-1.208	-2.248
.580	.580	.580	.580	.580	.580	.580	.580	.597	.580	.580	.580	.580	.597	.580	.580	.597	.580	.580	.580	.580	.580
-1.126	**-.253**	-4.384	**-1.769**	-3.082	**-.282**	**-1.610**	**-.230**	**-1.311**	**-2.074**	**.134**	**-1.758**	-3.255	-3.932	-2.853	**-2.083**	**-2.490**	**-1.552**	-3.757	**-1.872**	**-2.082**	-3.875
1.335	-1.805	7.067	-.770	3.399	1.306	-1.046	.832	-.759	.602	1.117	-.254	2.343	6.301	3.669	.396	1.597	-.079	4.924	1.127	.752	3.816
1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.121	1.154	1.121	1.121	1.121	1.121	1.154	1.121	1.121	1.154	1.121	1.121	1.121	1.121	1.121
1.191	**-1.610**	6.305	**-.687**	3.032	**1.165**	**-.933**	**.742**	**-.658**	**.537**	**.997**	**-.227**	**2.090**	5.460	3.273	**.354**	**1.384**	**-.071**	4.393	**1.005**	**.671**	3.404
10	6	3	5	8	9	6	10	7	9	10	9	10	7	10	5	7	5	10	10	9	9
0	4	7	5	2	0	4	0	3	1	0	1	0	3	0	5	3	5	0	0	1	1
10	10	10	10	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

A13 Inter-Item Correlation Matrix for SSEM



A14 Cronbach's Alpha SPSS Output for SSEM

Whole Scale Reliability (removed items 5, 21, 26, 32, 36, 40, 41 and 50)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.910	.906	43

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item1	325.38	1551.590	.438	.	.908
Item2	323.77	1573.859	.138	.	.911
Item3	321.77	1511.692	.598	.	.906
Item4	324.85	1565.474	.168	.	.911
Item6	325.85	1468.974	.563	.	.906
Item7	323.54	1573.269	.154	.	.911
Item8	321.92	1530.244	.467	.	.908
Item9	321.38	1577.923	.207	.	.910
Item10	323.31	1488.731	.625	.	.906
Item11	327.23	1495.359	.607	.	.906
Item12	322.54	1530.936	.430	.	.908
Item13	321.54	1614.103	-.145	.	.913
Item14	321.38	1541.590	.488	.	.908
Item15	323.15	1457.974	.610	.	.905
Item16	321.77	1533.859	.450	.	.908
Item17	324.46	1589.103	.030	.	.913
Item18	321.54	1551.436	.337	.	.909
Item19	323.31	1447.231	.695	.	.904
Item20	326.15	1503.974	.652	.	.906
Item22	321.69	1586.231	.084	.	.911
Item23	323.46	1485.769	.444	.	.908
Item24	325.23	1547.359	.255	.	.910
Item25	322.77	1490.859	.570	.	.906
Item27	321.08	1592.410	.080	.	.911
Item28	321.92	1518.410	.525	.	.907
Item29	321.77	1546.526	.424	.	.908
Item30	325.62	1497.423	.704	.	.905
Item31	322.23	1482.859	.615	.	.906
Item33	325.00	1589.833	.030	.	.913
Item34	323.00	1496.167	.507	.	.907
Item35	322.38	1469.090	.710	.	.904
Item37	325.08	1557.244	.223	.	.911
Item38	322.62	1464.423	.642	.	.905
Item39	322.08	1453.244	.606	.	.906
Item42	322.00	1513.500	.529	.	.907
Item43	322.46	1529.103	.505	.	.907
Item44	321.62	1524.590	.702	.	.906
Item45	321.85	1561.641	.268	.	.910
Item46	322.23	1592.192	.031	.	.912
Item47	321.38	1575.423	.207	.	.910
Item48	322.85	1548.974	.292	.	.910
Item49	322.23	1518.192	.534	.	.907
Item51	321.69	1476.564	.608	.	.906

Subscale 1 Reliability

Subscale	Items	Alpha (∝)	Deletions	Conclusions	Revised Alpha (∝)
1. Spelling Efficacy	1, 2, 7, 9, 11, 47	.797	Item 2 = .817	Remove Item 2	.817

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.797	.797	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item1	33.33	73.952	.566	.712	.776
Item2	31.87	73.981	.303	.687	.817
Item7	31.80	68.171	.442	.611	.790
Item9	30.00	54.714	.756	.823	.710
Item11	35.27	66.495	.511	.640	.775
Item47	30.07	48.495	.816	.809	.689

Subscale 1 Reliability (removed Item 2)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.817	.816	5

Subscale 2 Reliability

Subscale	Items	Alpha (∝)	Deletions	Conclusions	Revised Alpha (∝)
2. Efficacy of Learner Characteristics	29, 31, 34, 35, 38, 39, 42, 43, 44, 49, 51	.915	Item 29 = .916 Item 34 = .923 Item 43 = .921	Remove Item 43	.921

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.915	.912	11

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item29	84.62	286.256	.472	.989	.916
Item31	85.08	248.077	.802	.995	.900
Item34	85.85	274.141	.395	.903	.923
Item35	85.23	242.692	.905	.984	.894
Item38	85.46	234.436	.896	.989	.894
Item39	84.92	229.244	.831	.972	.899
Item42	84.85	258.474	.789	.991	.902
Item43	85.31	290.897	.324	.945	.921
Item44	84.46	286.269	.547	.971	.914
Item49	85.08	271.077	.621	.968	.910
Item51	84.54	242.936	.818	.959	.899

Subscale 2 Reliability (removed Item 43)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.921	.920	10

Subscale 3 Reliability

Subscale	Items	Alpha (∝)	Deletions	Conclusions	Revised Alpha (∝)
3. Efficacy of Learner Independence	3, 4, 12, 14, 17, 20, 23, 24, 27, 30, 33, 37	.771	Item 14 = .783 Item 27 = .774	Remove Items 14, 27	.788

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.771	.761	12

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item3	70.40	171.686	.304	.980	.766
Item4	73.40	169.543	.339	.970	.763
Item12	71.07	169.495	.340	.766	.763
Item14	70.07	183.638	.099	.973	.783
Item17	72.80	170.171	.301	.891	.767
Item20	74.87	165.267	.416	.908	.755
Item23	72.20	155.886	.371	.912	.764
Item24	74.07	142.067	.705	.984	.716
Item27	69.53	186.981	.165	.958	.774
Item30	74.47	144.410	.831	.973	.707
Item33	73.67	159.381	.415	.972	.755
Item37	73.93	151.638	.567	.927	.736

Subscale 3 Reliability (removed Items 14 and 27)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.788	.784	10

Subscale 4 Reliability

Subscale	Items	Alpha (∝)	Deletions	Conclusions	Revised Alpha (∝)
4. Efficacy of phonological awareness	6, 13, 15, 16, 22, 25, 28	.709	Item 22 = .714 Item 28 = .724	Remove Items 22, 28	.759

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.709	.702	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item6	49.20	76.029	.524	.699	.645
Item13	45.27	85.067	.356	.618	.694
Item15	46.13	82.838	.398	.829	.683
Item16	45.40	78.829	.539	.875	.643
Item22	44.87	99.695	.227	.578	.714
Item25	46.07	76.352	.719	.869	.601
Item28	45.07	99.495	.181	.578	.724

Subscale 4 Reliability (removed Items 22 and 28)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.759	.768	5

Subscale 5 Reliability

Subscale	Items	Alpha (∝)	Deletions	Conclusions	Revised Alpha (∝)
5. Efficacy of Technical Understanding	8, 10, 18, 19, 48	.837	Item 18 = .880	Remove Item 18	.880

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.837	.828	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item8	29.33	77.524	.633	.488	.809
Item10	30.73	63.352	.881	.829	.734
Item18	28.67	91.810	.290	.229	.880
Item19	30.93	56.067	.817	.790	.750
Item48	30.47	69.410	.627	.454	.809

Subscale 5 Reliability (removed Item 18)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.880	.884	4

Whole Scale Reliability After All Item Deletions

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.903	.899	36

A15 Cronbach's Alpha SPSS Output for SSEM After Revisions

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.865	.863	23

A16 Research Envelope Contents

Teacher's Brief

UNIVERSITY OF EXETER

Spelling Research – Teacher Instructions

Firstly, a massive thank you for helping with my research project!

My name is Will and I am completing a Doctorate in Educational, Child and Community Psychology at the University of Exeter. I envisage that this questionnaire and spelling test should take no longer than 45 minutes. Once I have scored each spelling test, I will be able to e-mail you a list of current spelling ages for each child.

Please follow the below instructions:

1. Introduce the class to the task: "We have been asked to help out with some research about what children think about spelling. I am going to ask you all some questions and I want you to answer them truthfully. Be as honest as you can, there are no right or wrong answers".

2. Hand out the questionnaires. Ask each child to write their name and school carefully on the front of their sheet.

3. Explain the task: "In front of you, you can see a statement with the numbers 0-10 written underneath it. Underneath 0 it says '*I'm certain I cannot do that*', underneath 10 it says '*I'm certain I can do that*' and underneath 5 it says '*I think I can sometimes do that*'. I am going to read out each statement. They all start with 'I can…'. I want you to listen carefully and think really hard about what I say and then decide whether you think you can do it or not. Let's try the examples together. '*I can eat a whole bar of chocolate in less than 20 minutes*' I would score myself 10 because I think I am certain I can do that. '*I can run all the way to the North Pole without stopping*' I would score myself 0 because I'm certain I cannot do that".

4. Ensure that each child understands the task (give more examples if needed to ensure they understand the scale and that they can use any number between 0-10, not just 0/5/10. Please also ensure they understand the answer sheet.

5. Please read out each statement. Some children will want to go ahead at their own faster pace – that is fine! Some children will need more help than others to complete the questionnaire.

6. Once this task is completed, please complete the single-word spelling test (SWST) with the class – instructions are on the top of the SWST sheet.

7. Please collect in all sheets and make sure each child's name is recognisable. Put all answer sheets (nothing else!) in the A4 envelope and pop in the post back to me.

Thank you again for your help!

Parent's Brief

UNIVERSITY OF EXETER

Spelling Research Info Sheet for Parents / Carers

My name is Will and I am completing a Doctorate in Educational, Child and Community Psychology at the University of Exeter.

I am currently carrying out some research to explore what children and young people think about spelling and the judgements they make in their ability to learn how to spell at school.

I have arranged to send some questionnaires to your child's teachers for them to complete with the class, along with a short single-word spelling test. I envisage that the questionnaire and spelling test will take no longer than 45 minutes to complete.

The information I gain from this study will contribute to my overall research project, which is concerned with creating a 'spelling confidence' rating scale for children and young people.

- All data will be anonymous. I will not disclose your child's name or date of birth to anyone and will allocate each a random participant number for the purpose of data analysis. No-one will see your child's answers to the questionnaires other than me. Most importantly, there are no right or wrong answers!
- Following the spelling test I will send a copy of the scores to each school for the teachers' reference.
- Data will be kept in a secure place and only I will have access to it. Once the study is complete, all data will be shredded.
- You have the right to withdraw your child's anonymous data from this study at any given time during the research process by contacting me via e-mail (wes201@exeter.ac.uk).

If you have any questions about the study, please contact me using the contact details below. Thank you in anticipation for your co-operation with this research.

Will Shield
Trainee Educational Psychologist
Member of the British Psychological Society
University of Exeter

Do you have any further questions, queries or feedback? Please contact:
Will Shield (Researcher): wes201@exeter.ac.uk
Dr Andrew Richards (Research Supervisor): A.J.Richards@exeter.ac.uk
Margie Tunbridge (Research Supervisor): M.A.Tunbridge@exeter.ac.uk

Demographic Information Request

Please complete this sheet **OR** if you have this information in another format (e.g. SIMS print-out etc) then a copy of that is fine.
In order to calculate an accurate spelling age, it is important that each child's date of birth is included in this information. Please return with the children's questionnaires in the provided envelope.

School: ……

Name (Initials are fine unless 2+ children have the same!)	Gender M/F	DOB dd/mm/yy	SEN? (Please tick)			Identified Literacy Difficulties e.g. SpLD, dyslexia	Does child have literacy intervention? Please briefly state 'spelling', 'reading', 'phonics' etc
			SA	SA +	Statement		

A17 Spelling Self-Efficacy Measure Revised (SSEM^{R})

What do I think about learning to spell at school?

Please read each statement carefully. Circle a number from 0 (*I'm certain I cannot do that*) to 10 (*I'm certain I can do that*). Take your time and answer each question honestly. There are no right or wrong answers.

My name is: .....

My school is: .....

I am in Year: .....

EXAMPLE: I can eat a whole bar of chocolate in less than 20 minutes										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

EXAMPLE: I can run all the way to the North Pole without stopping										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

Ready? Steady? Go!

1. At school I can spell every word										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

2. I can learn to spell without any help from an adult at school										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

3. At school I can spell short 'tricky words' or 'sight words', for example 'was' or 'little'										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

4. At school I can hear the different sounds in long words, for example the sounds in 'television'										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

5. I can stay confident about learning to spell, even when I make mistakes										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

Turn over! Keep going!

6. I can learn spellings for a spelling test at school										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do

7. At school I can spell long 'tricky words' or 'sight words', for example 'people' or 'would'										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

8. I can stay positive about learning to spell, even when I make mistakes										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

9. At school I can learn to spell words that use different groups of letters for the same word, for example the sound /ay/ can be written using the letters 'ay' like in 'stay' or 'ai' like in 'train'										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

10. I can use my initiative (be resourceful) when learning to spell										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

11. At school I can learn to spell all of the words in the dictionary										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

12. When I am learning to spell at school, I can recognise which words sound the same at the beginning, for example the words 'shop' and 'shell' have the same /sh/ sound at the beginning										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

13. I can be good at learning to spell at school										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

14. I can learn to spell without any help from my teacher at school										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

15. At school I can learn to spell every word										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

Nearly there! Not long to go!

16. I can push myself to the limits when I am learning to spell at school										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

17. I can learn to spell without any help from my friends at school										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

18. I can be confident when trying to spell a difficult word										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

19. When I am learning to spell at school, I can recognise which words sound the same at the end, for example the words 'made' and 'fade' have the same /ade/ sound at the end										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

20. I can be successful in other lessons at school because I can spell lots of words										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

21. I can practice my spellings well at school										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

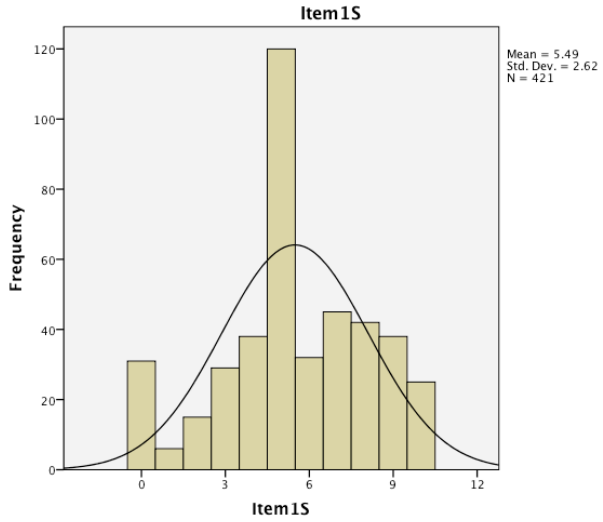
22. I can understand how to spell lots of long words										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

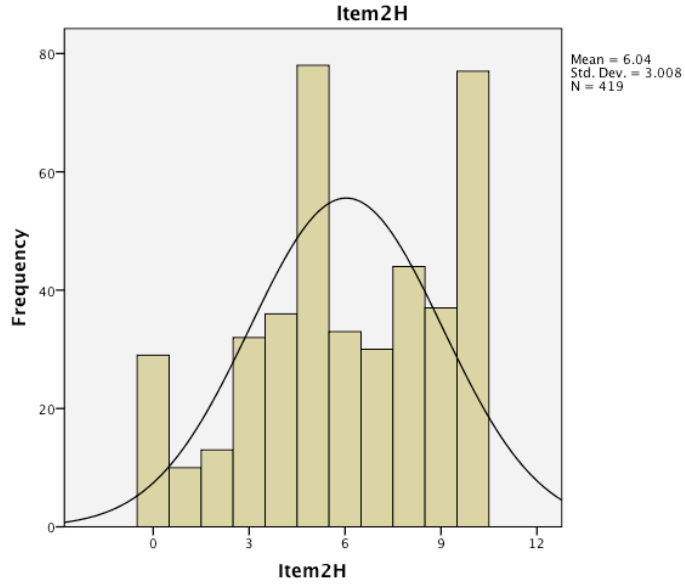
23. I can learn to spell even if I am finding it difficult										
0	1	2	3	4	5	6	7	8	9	10
I'm certain I cannot do that				I think I can sometimes do that						I'm certain I can do that

Finished! Thank you very much for filling in this questionnaire.

A18 Skewness and Kurtosis of SSEM[R]

Examples of Histograms from Data Analysis





Descriptive Statistics for SSEM^{R} and *z*-scores for Skewness and Kurtosis

		Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10
N	Valid	451	449	451	451	451	400	451	447	450	44
	Missing	0	2	0	0	0	51	0	4	1	
Mean		5.51	6.09	8.78	8.29	8.22	8.48	8.42	8.21	8.34	7.6
Median		5.00	6.00	10.00	9.00	9.00	10.00	10.00	9.00	10.00	8.0
Mode		5	5[a]	10	10	10	10	10	10	10	1
Std. Deviation		2.611	2.980	2.235	2.262	2.379	2.396	2.286	2.314	2.330	2.67
Skewness		-.318	-.351	-2.037	-1.485	-1.397	-1.740	-1.589	-1.527	-1.485	-1.20
Std. Error of Skewness		.115	.115	.115	.115	.115	.122	.115	.115	.115	.11
Z Skew		-2.770	-3.045	-17.721	-12.915	-12.150	-14.263	-13.819	-13.221	-12.901	-10.43
Kurtosis		-.329	-.788	3.451	1.747	1.313	2.395	1.971	1.973	1.456	.79
Std. Error of Kurtosis		.229	.230	.229	.229	.229	.243	.229	.230	.230	.23
Z Kurtosis		-1.436	-3.425	15.043	7.616	5.722	9.839	8.591	8.562	6.339	3.46
Minimum		0	0	0	0	0	0	0	0	0	
Maximum		10	10	10	10	10	10	10	10	10	1

Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20	Item21	Item22	Item23
450	449	450	450	449	450	449	449	450	450	450	450
1	2	1	1	2	1	2	2	1	1	1	1
8.93	8.27	6.32	5.28	7.89	7.25	7.57	8.61	7.46	8.00	7.30	7.95
10.00	9.00	7.00	5.00	9.00	8.00	8.00	10.00	8.00	9.00	8.00	9.00
10	10	5	0	10	10	10	10	10	10	10	10
2.025	2.197	2.925	3.299	2.601	2.857	2.613	2.138	2.495	2.615	2.722	2.521
-2.286	-1.314	-.538	-.201	-1.288	-.905	-1.061	-1.860	-.848	-1.389	-.985	-1.249
.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115
-19.862	-11.403	-4.675	-1.746	-11.181	-7.865	-9.205	-16.141	-7.370	-12.072	-8.561	-10.849
4.931	1.048	-.657	-1.137	.875	-.129	.380	3.236	-.151	1.149	.166	.798
.230	.230	.230	.230	.230	.230	.230	.230	.230	.230	.230	.230
21.469	4.558	-2.861	-4.950	3.804	-.563	1.653	14.076	-.656	5.004	.721	3.473
0	0	0	0	0	0	0	0	0	0	0	0
10	10	10	10	10	10	10	10	10	10	10	10

Descriptive Statistics for SSEM^{R} Total

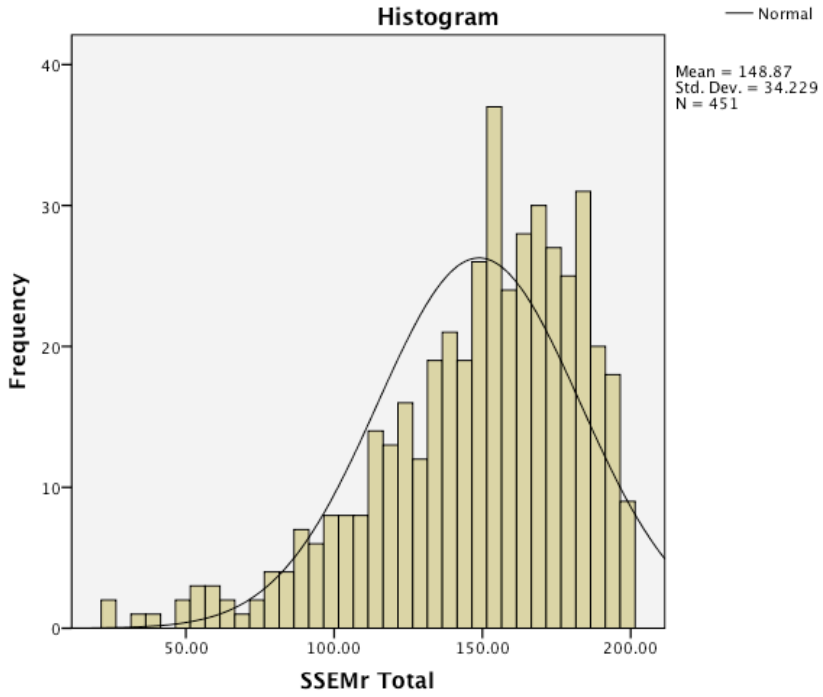
Descriptives

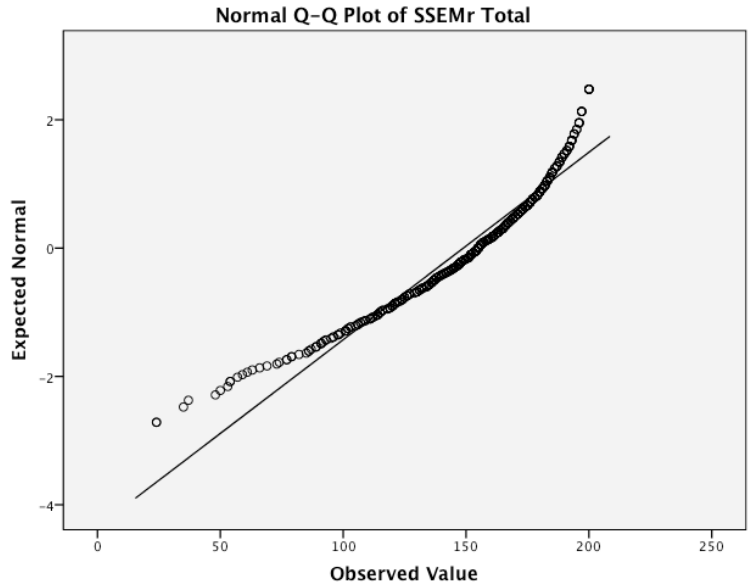
			Statistic	Std. Error
SSEMr Total	Mean		148.8670	1.61179
	95% Confidence Interval for Mean	Lower Bound	145.6994	
		Upper Bound	152.0345	
	5% Trimmed Mean		151.2074	
	Median		155.0000	
	Variance		1171.640	
	Std. Deviation		34.22923	
	Minimum		24.00	
	Maximum		200.00	
	Range		176.00	
	Interquartile Range		45.00	
	Skewness		-.982	.115
	Kurtosis		.873	.229

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SSEMr Total	.090	451	.000	.936	451	.000

a. Lilliefors Significance Correction





A19 Skewness and Kurtosis of SWST

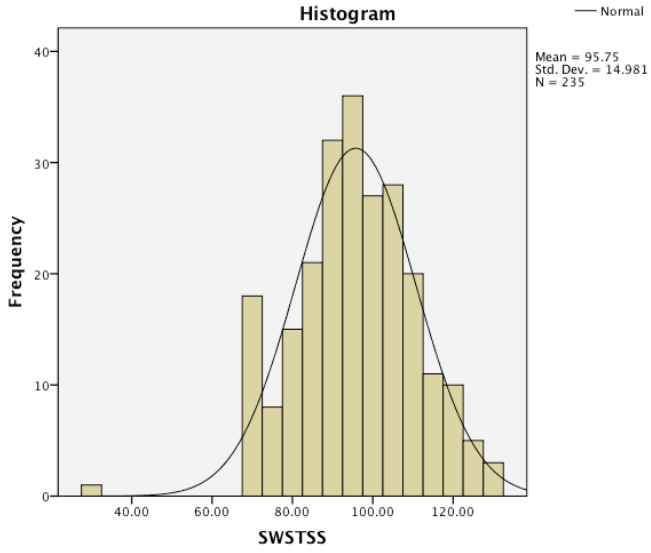
Statistics		
SWSTSS		
N	Valid	235
	Missing	186
Mean		95.7489
Median		95.0000
Mode		69.00
Std. Deviation		14.98121
Variance		224.437
Skewness		-.261
Std. Error of Skewness		.159
Z Skewness		-1.641
Kurtosis		.798
Std. Error of Kurtosis		.316
Z Kurtosis		2.524
Range		101.00
Minimum		30.00
Maximum		131.00
Percentiles	25	86.0000
	50	95.0000
	75	106.0000

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SWSTSS	.036	235	.200*	.983	235	.006

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction



A20 Principal Components Analysis (1)

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Item1	5.54	2.686	390
Item2	6.18	3.012	390
Item3	8.77	2.239	390
Item4	8.30	2.285	390
Item5	8.22	2.379	390
Item6	8.55	2.337	390
Item7	8.52	2.226	390
Item8	8.22	2.277	390
Item9	8.38	2.305	390
Item10	7.71	2.627	390
Item11	4.74	3.314	390
Item12	8.95	2.007	390
Item13	8.30	2.209	390
Item14	6.42	2.949	390
Item15	5.83	3.122	390
Item16	7.99	2.585	390
Item17	7.41	2.829	390
Item18	7.61	2.571	390
Item19	8.64	2.176	390
Item20	7.55	2.476	390
Item21	8.16	2.564	390
Item22	7.37	2.737	390
Item23	7.94	2.519	390

Correlation Matrix[a]

		Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20	Item21	Item22	Item23
Correlation	Item1	1.000	.511	.320	.394	.330	.434	.429	.355	.335	.335	.480	.310	.411	.467	.498	.327	.464	.349	.273	.451	.405	.487	.279
	Item2	.511	1.000	.408	.408	.315	.336	.418	.394	.389	.340	.435	.346	.483	.645	.521	.364	.478	.374	.333	.486	.385	.531	.368
	Item3	.320	.408	1.000	.349	.265	.410	.476	.436	.395	.327	.233	.349	.369	.362	.328	.353	.379	.230	.426	.441	.373	.408	.352
	Item4	.394	.408	.349	1.000	.333	.305	.461	.407	.426	.339	.408	.370	.371	.424	.330	.294	.417	.355	.416	.399	.299	.413	.275
	Item5	.330	.315	.265	.333	1.000	.350	.350	.679	.343	.421	.341	.329	.530	.289	.345	.353	.271	.414	.316	.370	.369	.410	.329
	Item6	.434	.336	.410	.305	.350	1.000	.457	.443	.347	.433	.315	.315	.497	.389	.466	.443	.409	.329	.344	.465	.515	.479	.393
	Item7	.429	.418	.476	.461	.350	.457	1.000	.413	.557	.391	.319	.507	.483	.503	.414	.401	.406	.417	.481	.497	.399	.560	.360
	Item8	.355	.394	.436	.407	.679	.443	.413	1.000	.417	.535	.337	.373	.528	.398	.365	.475	.396	.453	.401	.474	.549	.474	.445
	Item9	.335	.389	.395	.426	.343	.347	.557	.417	1.000	.406	.326	.480	.378	.476	.404	.436	.412	.314	.483	.478	.410	.480	.438
	Item10	.335	.340	.327	.339	.421	.433	.391	.535	.406	1.000	.303	.362	.423	.386	.355	.451	.420	.355	.314	.457	.419	.501	.406
	Item11	.480	.435	.233	.408	.341	.315	.319	.337	.326	.303	1.000	.274	.387	.482	.556	.328	.365	.279	.199	.425	.368	.400	.301
	Item12	.310	.346	.349	.370	.329	.315	.507	.373	.480	.362	.274	1.000	.350	.339	.316	.392	.332	.295	.501	.453	.329	.356	.329
	Item13	.411	.483	.369	.371	.530	.497	.483	.528	.378	.423	.387	.350	1.000	.526	.484	.402	.404	.448	.382	.424	.491	.533	.446
	Item14	.467	.645	.362	.424	.289	.389	.503	.398	.476	.386	.482	.339	.526	1.000	.529	.328	.556	.460	.387	.552	.433	.684	.436
	Item15	.498	.521	.328	.330	.345	.466	.414	.365	.404	.355	.556	.316	.484	.529	1.000	.369	.454	.412	.345	.552	.441	.583	.412
	Item16	.327	.364	.353	.294	.353	.443	.401	.475	.436	.451	.328	.392	.402	.328	.369	1.000	.410	.424	.310	.550	.516	.466	.539
	Item17	.464	.478	.379	.417	.271	.409	.406	.396	.412	.420	.365	.332	.404	.556	.454	.410	1.000	.474	.377	.569	.480	.532	.475
	Item18	.349	.374	.230	.355	.414	.329	.417	.453	.314	.355	.279	.295	.448	.460	.412	.424	.474	1.000	.398	.513	.411	.553	.455
	Item19	.273	.333	.426	.416	.316	.344	.481	.401	.483	.314	.199	.501	.382	.387	.345	.310	.377	.398	1.000	.434	.360	.483	.440
	Item20	.451	.486	.441	.399	.370	.465	.497	.474	.478	.457	.425	.453	.424	.552	.552	.550	.569	.513	.434	1.000	.602	.661	.526
	Item21	.405	.385	.373	.299	.369	.515	.399	.549	.410	.419	.368	.329	.491	.433	.441	.516	.480	.411	.360	.602	1.000	.508	.531
	Item22	.487	.531	.408	.413	.410	.479	.560	.474	.480	.501	.400	.356	.533	.684	.583	.466	.532	.553	.483	.661	.508	1.000	.537
	Item23	.279	.368	.352	.275	.329	.393	.360	.445	.438	.406	.301	.329	.446	.436	.412	.539	.475	.455	.440	.526	.531	.537	1.000
Sig. (1-tailed)	Item1		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item2	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item3	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item4	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item5	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item6	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item7	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item8	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item9	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item10	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item11	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item12	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item13	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item14	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
	Item15	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
	Item16	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000
	Item17	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	Item18	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000
	Item19	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
	Item20	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000
	Item21	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	Item22	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
	Item23	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

a. Determinant = 4.679E-006

Inverse of Correlation Matrix

	Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20	Item21	Item22	Item23
Item1	1.812	-.375	.004	-.119	-.099	-.249	-.175	.064	.047	.011	-.330	-.047	.020	.079	-.168	.036	-.266	-.025	.090	.012	-.136	-.206	.199
Item2	-.375	2.132	-.279	-.132	-.002	.212	.096	-.064	.049	.045	.004	-.107	-.218	-.830	-.318	-.171	-.093	.044	.049	-.034	.064	.012	.022
Item3	.004	-.279	1.657	-.058	.167	-.198	-.342	-.397	-.039	.039	.077	.027	-.052	.110	.024	-.034	-.120	.291	-.255	-.231	.046	-.002	-.056
Item4	-.119	-.132	-.058	1.655	.002	.016	-.216	-.201	-.181	-.046	-.361	-.044	-.035	-.004	.182	.057	-.211	-.111	-.259	-.033	.146	.004	.141
Item5	-.099	-.002	.167	.002	2.198	.000	.030	-1.212	-.140	-.067	-.228	-.109	-.547	.393	-.008	.084	.147	-.226	.012	-.064	.212	-.196	.054
Item6	-.249	.212	-.198	.016	.000	1.831	-.232	-.053	.126	-.199	.094	.040	-.300	-.003	-.313	-.220	-.075	.131	-.052	-.003	-.327	-.050	.014
Item7	-.175	.096	-.342	-.216	.030	-.232	2.194	.102	-.472	.017	.068	-.392	-.244	-.178	.061	-.045	.115	-.204	-.093	-.021	.042	-.365	.197
Item8	.064	-.064	-.397	-.201	-1.212	-.053	.102	2.747	-.010	-.449	.040	.008	-.053	-.129	.134	-.179	.045	-.192	-.091	.080	-.580	.138	-.049
Item9	.047	.049	-.039	-.181	-.140	.126	-.472	-.010	1.927	-.127	.022	-.221	.149	-.330	-.159	-.242	-.053	.243	-.267	-.013	-.091	.045	-.188
Item10	.011	.045	.039	-.046	-.067	-.199	.017	-.449	-.127	1.721	-.014	-.146	-.061	.042	.055	-.174	-.188	.074	.120	-.039	.057	-.367	-.047
Item11	-.330	.004	.077	-.361	-.228	.094	.068	.040	.022	-.014	1.826	-.039	-.013	-.437	-.637	-.152	.051	.160	.192	-.095	-.105	.222	-.037
Item12	-.047	-.107	.027	-.044	-.109	.040	-.392	.008	-.221	-.146	-.039	1.730	-.039	.028	.025	-.194	.016	.083	-.487	-.329	.075	.323	.038
Item13	.020	-.218	-.052	-.035	-.547	-.300	-.244	-.053	.149	-.061	-.013	-.039	2.150	-.391	-.206	-.032	.064	-.132	-.031	.379	-.280	-.053	-.178
Item14	.079	-.830	.110	-.004	.393	-.003	-.178	-.129	-.330	.042	-.437	.028	-.391	2.860	.077	.416	-.394	-.145	.070	-.137	.045	-.974	-.046
Item15	-.168	-.318	.024	.182	-.008	-.313	.061	.134	-.159	.055	-.637	.025	-.206	.077	2.174	.132	-.047	-.115	-.062	-.318	.023	-.412	-.051
Item16	.036	-.171	-.034	.057	.084	-.220	-.045	-.179	-.242	-.174	-.152	-.194	-.032	.416	.132	1.954	-.009	-.222	.234	-.350	-.184	-.098	-.448
Item17	-.266	-.093	-.120	-.211	.147	-.075	.115	.045	-.053	-.188	.051	.016	.064	-.394	-.047	-.009	1.976	-.285	-.022	-.301	-.160	.083	-.226
Item18	-.025	.044	.291	-.111	-.226	.131	-.204	-.192	.243	.074	.160	.083	-.132	-.145	-.115	-.222	-.285	1.852	-.200	-.254	.035	-.290	-.171
Item19	.090	.049	-.255	-.259	.012	-.052	-.093	-.091	-.267	.120	.192	-.487	-.031	.070	-.062	.234	-.022	-.200	1.864	.033	-.013	-.317	-.297
Item20	.012	-.034	-.231	-.033	-.064	-.003	-.021	.080	-.013	-.039	-.095	-.329	.379	-.137	-.318	-.350	-.301	-.254	.033	2.713	-.587	-.628	-.071
Item21	-.136	.064	.046	.146	.212	-.327	.042	-.580	-.091	.057	-.105	.075	-.280	.045	.023	-.184	-.160	.035	-.013	-.587	2.165	.020	-.309
Item22	-.206	.012	-.002	.004	-.196	-.050	-.365	.138	.045	-.367	.222	.323	-.053	-.974	-.412	-.098	.083	-.290	-.317	-.628	.020	3.099	-.280
Item23	.199	.022	-.056	.141	.054	.014	.197	-.049	-.188	-.047	-.037	.038	-.178	-.046	-.051	-.448	-.226	-.171	-.297	-.071	-.309	-.280	1.974

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.944
Bartlett's Test of Sphericity	Approx. Chi-Square	4669.698
	df	253
	Sig.	.000

Anti-image Matrices

		Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20	Item21	Item22	Item23
Anti-image Covariance	Item1	.552	-.097	.001	-.040	-.025	-.075	-.044	.013	.014	.004	-.100	-.015	.005	.015	-.043	.010	-.074	-.007	.027	.002	-.035	-.037	.056
	Item2	-.097	.469	-.079	-.037	.000	.054	.021	-.011	.012	.012	.001	-.029	-.048	-.136	-.069	-.041	-.022	.011	.012	-.006	.014	.002	.005
	Item3	.001	-.079	.604	-.021	.046	-.065	-.094	-.087	-.012	.014	.026	.010	-.015	.023	.007	-.010	-.037	.095	-.082	-.051	.013	.000	-.017
	Item4	-.040	-.037	-.021	.604	.001	.005	-.059	-.044	-.057	-.016	-.120	-.015	-.010	-.001	.051	.018	-.064	-.036	-.084	-.007	.041	.001	.043
	Item5	-.025	.000	.046	.001	.455	.000	.006	-.201	-.033	-.018	-.057	-.029	-.116	.063	-.002	.020	.034	-.056	.003	-.011	.044	-.029	.012
	Item6	-.075	.054	-.065	.005	.000	.546	-.058	-.011	.036	-.063	.028	.013	-.076	-.001	-.079	-.062	-.021	.039	-.015	-.001	-.082	-.009	.004
	Item7	-.044	.021	-.094	-.059	.006	-.058	.456	.017	-.112	.004	.017	-.103	-.052	-.028	.013	-.011	.027	-.050	-.023	-.004	.009	-.054	.046
	Item8	.013	-.011	-.087	-.044	-.201	-.011	.017	.364	-.002	-.095	.008	.002	-.009	-.016	.022	-.033	.008	-.038	-.018	.011	-.098	.016	-.009
	Item9	.014	.012	-.012	-.057	-.033	.036	-.112	-.002	.519	-.038	.006	-.066	.036	-.060	-.038	-.064	-.014	.068	-.074	-.002	-.022	.008	-.049
	Item10	.004	.012	.014	-.016	-.018	-.063	.004	-.095	-.038	.581	-.004	-.049	-.016	.008	.015	-.052	-.055	.023	.037	-.008	.015	-.069	-.014
	Item11	-.100	.001	.026	-.120	-.057	.028	.017	.008	.006	-.004	.548	-.012	-.003	-.084	-.160	-.043	.014	.047	.057	-.019	-.027	.039	-.010
	Item12	-.015	-.029	.010	-.015	-.029	.013	-.103	.002	-.066	-.049	-.012	.578	-.011	.006	.007	-.057	.005	.026	-.151	-.070	.020	.060	.011
	Item13	.005	-.048	-.015	-.010	-.116	-.076	-.052	-.009	.036	-.016	-.003	-.011	.465	-.064	-.044	-.008	.015	-.033	-.008	.065	-.060	-.008	-.042
	Item14	.015	-.136	.023	-.001	.063	-.001	-.028	-.016	-.060	.008	-.084	.006	-.064	.350	.012	.074	-.070	-.027	.013	-.018	.007	-.110	-.008
	Item15	-.043	-.069	.007	.051	-.002	-.079	.013	.022	-.038	.015	-.160	.007	-.044	.012	.460	.031	-.011	-.029	-.015	-.054	.005	-.061	-.012
	Item16	.010	-.041	-.010	.018	.020	-.062	-.011	-.033	-.064	-.052	-.043	-.057	-.008	.074	.031	.512	-.002	-.061	.064	-.066	-.043	-.016	-.116
	Item17	-.074	-.022	-.037	-.064	.034	-.021	.027	.008	-.014	-.055	.014	.005	.015	-.070	-.011	-.002	.506	-.078	-.006	-.056	-.037	.014	-.058
	Item18	-.007	.011	.095	-.036	-.056	.039	-.050	-.038	.068	.023	.047	.026	-.033	-.027	-.029	-.061	-.078	.540	-.058	-.051	.009	-.051	-.047
	Item19	.027	.012	-.082	-.084	.003	-.015	-.023	-.018	-.074	.037	.057	-.151	-.008	.013	-.015	.064	-.006	-.058	.537	.006	-.003	-.055	-.081
	Item20	.002	-.006	-.051	-.007	-.011	-.001	-.004	.011	-.002	-.008	-.019	-.070	.065	-.018	-.054	-.066	-.056	-.051	.006	.369	-.100	-.075	-.013
	Item21	-.035	.014	.013	.041	.044	-.082	.009	-.098	-.022	.015	-.027	.020	-.060	.007	.005	-.043	-.037	.009	-.003	-.100	.462	.003	-.072
	Item22	-.037	.002	.000	.001	-.029	-.009	-.054	.016	.008	-.069	.039	.060	-.008	-.110	-.061	-.016	.014	-.051	-.055	-.075	.003	.323	-.046
	Item23	.056	.005	-.017	.043	.012	.004	.046	-.009	-.049	-.014	-.010	.011	-.042	-.008	-.012	-.116	-.058	-.047	-.081	-.013	-.072	-.046	.507
Anti-image Correlation	Item1	.956[a]	-.191	.002	-.069	-.049	-.137	-.088	.029	.025	.006	-.181	-.026	.010	.035	-.085	.019	-.140	-.014	.049	.005	-.069	-.087	.105
	Item2	-.191	.944[a]	-.148	-.070	-.001	.107	.045	-.026	.024	.024	.002	-.056	-.102	-.336	-.148	-.084	-.045	.022	.025	-.014	.030	.005	.011
	Item3	.002	-.148	.942[a]	-.035	.088	-.114	-.180	-.186	-.022	.023	.044	.016	-.027	.051	.013	-.019	-.066	.166	-.145	-.109	.024	-.001	-.031
	Item4	-.069	-.070	-.035	.954[a]	.001	.009	-.113	-.094	-.101	-.027	-.208	-.026	-.019	-.002	.096	.032	-.116	-.063	-.147	-.015	.077	.002	.078
	Item5	-.049	-.001	.088	.001	.886[a]	.000	.014	-.493	-.068	-.035	-.114	-.056	-.252	.157	-.004	.041	.070	-.112	.006	-.026	.097	-.075	.026
	Item6	-.137	.107	-.114	.009	.000	.955[a]	-.116	-.024	.067	-.112	.051	.022	-.151	-.001	-.157	-.116	-.039	.071	-.028	-.001	-.164	-.021	.007
	Item7	-.088	.045	-.180	-.113	.014	-.116	.950[a]	.042	-.229	.009	.034	-.201	-.112	-.071	.028	-.022	.055	-.101	-.046	-.009	.019	-.140	.095
	Item8	.029	-.026	-.186	-.094	-.493	-.024	.042	.915[a]	-.004	-.207	.018	.004	-.022	-.046	.055	-.077	.019	-.085	-.040	.029	-.238	.047	-.021
	Item9	.025	.024	-.022	-.101	-.068	.067	-.229	-.004	.953[a]	-.070	.012	-.121	.073	-.141	-.078	-.124	-.027	.129	-.141	-.006	-.044	.018	-.096
	Item10	.006	.024	.023	-.027	-.035	-.112	.009	-.207	-.070	.965[a]	-.008	-.084	-.032	.019	.028	-.095	-.102	.042	.067	-.018	.030	-.159	-.025
	Item11	-.181	.002	.044	-.208	-.114	.051	.034	.018	.012	-.008	.915[a]	-.022	-.007	-.191	-.320	-.080	.027	.087	.104	-.043	-.053	.093	-.020
	Item12	-.026	-.056	.016	-.026	-.056	.022	-.201	.004	-.121	-.084	-.022	.937[a]	-.020	.013	.013	-.105	.009	.046	-.271	-.152	.039	.140	.020
	Item13	.010	-.102	-.027	-.019	-.252	-.151	-.112	-.022	.073	-.032	-.007	-.020	.955[a]	-.158	-.095	-.015	.031	-.066	-.015	.157	-.130	-.021	-.086
	Item14	.035	-.336	.051	-.002	.157	-.001	-.071	-.046	-.141	.019	-.191	.013	-.158	.922[a]	.031	.176	-.166	-.063	.030	-.049	.018	-.327	-.019
	Item15	-.085	-.148	.013	.096	-.004	-.157	.028	.055	-.078	.028	-.320	.013	-.095	.031	.947[a]	.064	-.022	-.057	-.031	-.131	.011	-.159	-.024
	Item16	.019	-.084	-.019	.032	.041	-.116	-.022	-.077	-.124	-.095	-.080	-.105	-.015	.176	.064	.944[a]	-.004	-.117	.123	-.152	-.089	-.040	-.228
	Item17	-.140	-.045	-.066	-.116	.070	-.039	.055	.019	-.027	-.102	.027	.009	.031	-.166	-.022	-.004	.965[a]	-.149	-.011	-.130	-.077	.034	-.115
	Item18	-.014	.022	.166	-.063	-.112	.071	-.101	-.085	.129	.042	.087	.046	-.066	-.063	-.057	-.117	-.149	.949[a]	-.108	-.113	.018	-.121	-.089
	Item19	.049	.025	-.145	-.147	.006	-.028	-.046	-.040	-.141	.067	.104	-.271	-.015	.030	-.031	.123	-.011	-.108	.936[a]	.014	-.006	-.132	-.155
	Item20	.005	-.014	-.109	-.015	-.026	-.001	-.009	.029	-.006	-.018	-.043	-.152	.157	-.049	-.131	-.152	-.130	-.113	.014	.957[a]	-.242	-.217	-.031
	Item21	-.069	.030	.024	.077	.097	-.164	.019	-.238	-.044	.030	-.053	.039	-.130	.018	.011	-.089	-.077	.018	-.006	-.242	.950[a]	.008	-.149
	Item22	-.087	.005	-.001	.002	-.075	-.021	-.140	.047	.018	-.159	.093	.140	-.021	-.327	-.159	-.040	.034	-.121	-.132	-.217	.008	.947[a]	-.113
	Item23	.105	.011	-.031	.078	.026	.007	.095	-.021	-.096	-.025	-.020	.020	-.086	-.019	-.024	-.228	-.115	-.089	-.155	-.031	-.149	-.113	.955[a]

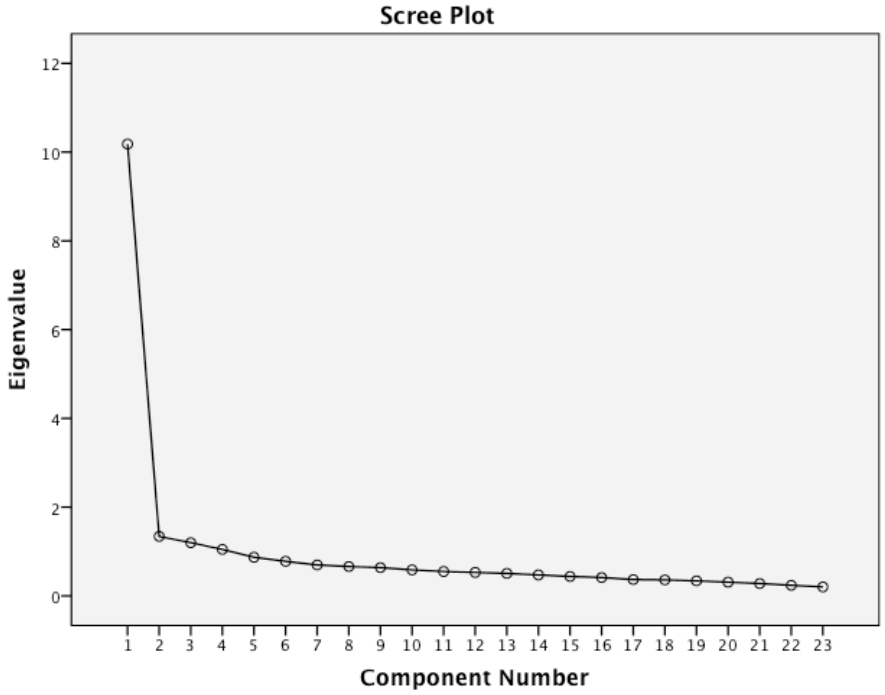
a. Measures of Sampling Adequacy(MSA)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	10.181	44.264	44.264	10.181	44.264	44.264	6.720
2	1.339	5.823	50.087	1.339	5.823	50.087	6.843
3	1.199	5.213	55.301	1.199	5.213	55.301	7.070
4	1.046	4.550	59.851	1.046	4.550	59.851	4.752
5	.871	3.788	63.638				
6	.779	3.386	67.025				
7	.698	3.033	70.057				
8	.661	2.874	72.931				
9	.637	2.769	75.701				
10	.586	2.548	78.249				
11	.549	2.386	80.635				
12	.529	2.298	82.933				
13	.506	2.201	85.134				
14	.472	2.054	87.188				
15	.437	1.901	89.089				
16	.414	1.801	90.890				
17	.368	1.599	92.489				
18	.361	1.571	94.060				
19	.338	1.471	95.531				
20	.309	1.344	96.875				
21	.279	1.211	98.086				
22	.238	1.034	99.120				
23	.202	.880	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.



Component Matrix[a]

	Component			
	1	2	3	4
Item22	.798			
Item20	.779			
Item14	.732			
Item13	.706			
Item8	.703			
Item7	.702			
Item21	.699			
Item17	.690			
Item15	.690			
Item2	.675			
Item23	.663			
Item9	.663			
Item16	.651			
Item6	.647			
Item18	.639			
Item10	.633			
Item1	.631			
Item19	.612		.408	
Item4	.596			
Item5	.588			.506
Item3	.585			
Item12	.583			
Item11	.576	-.439		

Extraction Method: Principal Component Analysis.
a. 4 components extracted.

Pattern Matrix[a]

	Component			
	1	2	3	4
Item23	.758			
Item16	.654			
Item21	.646			
Item20	.546			
Item18	.456			
Item17	.447			
Item22	.420	-.405		
Item6				
Item11		-.772		
Item1		-.706		
Item2		-.676		
Item15		-.669		
Item14		-.664		
Item19			.792	
Item12			.784	
Item7			.685	
Item9			.675	
Item3			.580	
Item4			.550	
Item5				.867
Item8				.709
Item13				.446
Item10				.403

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
a. Rotation converged in 11 iterations.

Structure Matrix

	Component			
	1	2	3	4
Item23	.801		.479	
Item21	.754	-.459	.435	.466
Item20	.752	-.597	.595	
Item16	.739		.467	.432
Item22	.691	-.680	.598	
Item17	.642	-.611	.509	
Item18	.617	-.470	.429	.413
Item6	.583	-.466	.451	.480
Item14	.519	-.784	.554	
Item2	.411	-.761	.507	
Item15	.513	-.759	.418	
Item11		-.754		.402
Item1		-.751	.414	
Item7	.430	-.513	.779	
Item19	.449		.776	
Item12			.753	
Item9	.469	-.425	.750	
Item3	.423		.655	
Item4		-.554	.644	.409
Item5				.887
Item8	.533		.522	.832
Item13	.495	-.581	.486	.651
Item10	.551		.473	.584

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2	3	4
1	1.000	-.440	.508	.368
2	-.440	1.000	-.496	-.382
3	.508	-.496	1.000	.409
4	.368	-.382	.409	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

A21 Reliability Analysis for SSEM^{R} (1)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.935	.937	22

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item1	160.52	1219.559	.586	.418	.933
Item2	159.89	1197.170	.627	.509	.932
Item3	157.22	1249.895	.517	.379	.934
Item4	157.71	1242.709	.547	.380	.933
Item5	157.80	1237.195	.548	.571	.933
Item7	157.56	1228.202	.646	.523	.932
Item8	157.81	1224.389	.658	.653	.932
Item9	157.66	1230.183	.613	.459	.932
Item10	158.37	1222.737	.571	.396	.933
Item11	161.58	1204.445	.517	.459	.935
Item12	157.10	1255.358	.534	.410	.934
Item13	157.78	1227.546	.659	.514	.932
Item14	159.70	1183.774	.699	.646	.931
Item15	160.69	1188.472	.593	.499	.933
Item16	158.12	1220.560	.595	.455	.933
Item17	158.77	1196.348	.657	.494	.932
Item18	158.46	1219.151	.598	.458	.933
Item19	157.43	1243.289	.570	.467	.933
Item20	158.53	1201.440	.744	.620	.930
Item21	158.00	1211.634	.641	.510	.932
Item22	158.70	1183.845	.767	.671	.930
Item23	158.08	1220.106	.617	.475	.932

Correlations

			Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20	Item21	Item22	Item23
Spearman's rho	Item1	Correlation Coefficient	1.000	.510**	.340**	.356**	.303**	.349**	.403**	.308**	.324**	.310**	.444**	.326**	.387**	.440**	.435**	.328**	.406**	.339**	.243**	.451**	.322**	.490**	.261**
		Sig. (2-tailed)	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	451	449	451	451	451	400	451	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item2	Correlation Coefficient	.510**	1.000	.403**	.379**	.300**	.341**	.406**	.371**	.364**	.292**	.416**	.300**	.460**	.630**	.482**	.327**	.465**	.346**	.312**	.475**	.357**	.530**	.337**
		Sig. (2-tailed)	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	449	449	449	449	449	398	449	445	448	446	447	448	447	448	448	447	448	447	447	448	448	448	448
	Item3	Correlation Coefficient	.340**	.403**	1.000	.305**	.296**	.370**	.465**	.386**	.384**	.246**	.184**	.343**	.336**	.327**	.260**	.310**	.342**	.272**	.395**	.385**	.299**	.397**	.322**
		Sig. (2-tailed)	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	451	449	451	451	451	400	451	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item4	Correlation Coefficient	.356**	.379**	.305**	1.000	.309**	.249**	.419**	.364**	.399**	.321**	.355**	.362**	.326**	.388**	.264**	.284**	.350**	.294**	.354**	.403**	.262**	.405**	.246**
		Sig. (2-tailed)	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	451	449	451	451	451	400	451	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item5	Correlation Coefficient	.303**	.300**	.296**	.309**	1.000	.355**	.345**	.714**	.309**	.385**	.249**	.321**	.460**	.251**	.235**	.380**	.237**	.410**	.289**	.379**	.361**	.379**	.330**
		Sig. (2-tailed)	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	451	449	451	451	451	400	451	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item6	Correlation Coefficient	.349**	.341**	.370**	.249**	.355**	1.000	.393**	.413**	.306**	.371**	.323**	.303**	.462**	.376**	.423**	.365**	.326**	.300**	.311**	.384**	.483**	.403**	.324**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	400	398	400	400	400	400	400	397	399	398	398	399	398	399	399	398	399	398	399	399	399	399	399
	Item7	Correlation Coefficient	.403**	.406**	.465**	.419**	.345**	.393**	1.000	.362**	.502**	.320**	.306**	.459**	.454**	.474**	.367**	.357**	.379**	.362**	.449**	.447**	.367**	.506**	.307**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	451	449	451	451	451	400	451	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item8	Correlation Coefficient	.308**	.371**	.386**	.364**	.714**	.413**	.362**	1.000	.375**	.482**	.279**	.325**	.449**	.340**	.247**	.442**	.346**	.425**	.335**	.455**	.459**	.441**	.429**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	447	445	447	447	447	397	447	447	447	445	446	447	446	447	447	446	447	446	446	447	447	447	447
	Item9	Correlation Coefficient	.324**	.364**	.384**	.399**	.309**	.306**	.502**	.375**	1.000	.322**	.326**	.454**	.352**	.445**	.340**	.390**	.402**	.309**	.407**	.469**	.374**	.467**	.372**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	450	448	450	450	450	399	450	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item10	Correlation Coefficient	.310**	.292**	.246**	.321**	.385**	.371**	.320**	.482**	.322**	1.000	.310**	.366**	.364**	.348**	.324**	.366**	.358**	.322**	.261**	.419**	.376**	.462**	.352**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	448	446	448	448	448	398	448	445	448	448	447	448	447	448	448	447	448	447	447	448	448	448	448
	Item11	Correlation Coefficient	.444**	.416**	.184**	.355**	.249**	.323**	.306**	.279**	.326**	.310**	1.000	.265**	.367**	.481**	.587**	.302**	.374**	.268**	.199**	.415**	.360**	.416**	.261**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	449	447	449	449	449	398	449	446	449	447	449	449	448	449	449	448	449	448	448	449	449	449	449
	Item12	Correlation Coefficient	.326**	.300**	.343**	.362**	.321**	.303**	.459**	.325**	.454**	.366**	.265**	1.000	.330**	.301**	.262**	.379**	.327**	.343**	.493**	.444**	.309**	.371**	.340**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	450	448	450	450	450	399	450	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item13	Correlation Coefficient	.387**	.460**	.336**	.326**	.460**	.462**	.454**	.449**	.352**	.364**	.367**	.330**	1.000	.485**	.422**	.396**	.379**	.412**	.328**	.423**	.474**	.507**	.391**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	449	447	449	449	449	398	449	446	449	447	448	449	449	449	449	448	449	448	448	449	449	449	449
	Item14	Correlation Coefficient	.440**	.630**	.327**	.388**	.251**	.376**	.474**	.340**	.445**	.348**	.481**	.301**	.485**	1.000	.490**	.292**	.556**	.425**	.344**	.521**	.419**	.618**	.387**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	450	448	450	450	450	399	450	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item15	Correlation Coefficient	.435**	.482**	.260**	.264**	.235**	.423**	.367**	.247**	.340**	.324**	.587**	.262**	.422**	.490**	1.000	.326**	.433**	.341**	.310**	.491**	.407**	.541**	.318**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000
		N	450	448	450	450	450	399	450	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item16	Correlation Coefficient	.328**	.327**	.310**	.284**	.380**	.365**	.357**	.442**	.390**	.366**	.302**	.379**	.396**	.292**	.326**	1.000	.353**	.430**	.300**	.528**	.510**	.486**	.475**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000
		N	449	447	449	449	449	398	449	446	449	447	448	449	448	449	449	449	449	448	448	449	449	449	449
	Item17	Correlation Coefficient	.406**	.465**	.342**	.350**	.237**	.326**	.379**	.346**	.402**	.358**	.374**	.327**	.379**	.556**	.433**	.353**	1.000	.435**	.336**	.509**	.424**	.514**	.413**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000
		N	450	448	450	450	450	399	450	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item18	Correlation Coefficient	.339**	.346**	.272**	.294**	.410**	.300**	.362**	.425**	.309**	.322**	.268**	.343**	.412**	.425**	.341**	.430**	.435**	1.000	.334**	.507**	.387**	.519**	.428**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000
		N	449	447	449	449	449	399	449	446	449	447	448	449	448	449	449	448	449	449	448	449	449	449	449
	Item19	Correlation Coefficient	.243**	.312**	.395**	.354**	.289**	.311**	.449**	.335**	.407**	.261**	.199**	.493**	.328**	.344**	.310**	.300**	.336**	.334**	1.000	.392**	.359**	.441**	.363**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000
		N	449	447	449	449	449	398	449	446	449	447	448	449	448	449	449	448	449	448	449	449	449	449	449
	Item20	Correlation Coefficient	.451**	.475**	.385**	.403**	.379**	.384**	.447**	.455**	.469**	.419**	.415**	.444**	.423**	.521**	.491**	.528**	.509**	.507**	.392**	1.000	.564**	.650**	.502**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000
		N	450	448	450	450	450	399	450	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item21	Correlation Coefficient	.322**	.357**	.299**	.262**	.361**	.483**	.367**	.459**	.374**	.376**	.360**	.309**	.474**	.419**	.407**	.510**	.424**	.387**	.359**	.564**	1.000	.483**	.508**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000
		N	450	448	450	450	450	399	450	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item22	Correlation Coefficient	.490**	.530**	.397**	.405**	.379**	.403**	.506**	.441**	.467**	.462**	.416**	.371**	.507**	.618**	.541**	.486**	.514**	.519**	.441**	.650**	.483**	1.000	.516**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000
		N	450	448	450	450	450	399	450	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450
	Item23	Correlation Coefficient	.261**	.337**	.322**	.246**	.330**	.324**	.307**	.429**	.372**	.352**	.261**	.340**	.391**	.387**	.318**	.475**	.413**	.428**	.363**	.502**	.508**	.516**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.
		N	450	448	450	450	450	399	450	447	450	448	449	450	449	450	450	449	450	449	449	450	450	450	450

**. Correlation is significant at the 0.01 level (2-tailed).

Mean Inter-Item Correlation

Inter-Item Correlation Matrix

	Item1	Item2	Item3	Item4	Item5	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20	Item21	Item22	Item23
Item1	1.000	.509	.315	.383	.327	.423	.350	.322	.321	.450	.304	.398	.458	.440	.315	.452	.344	.280	.446	.385	.483	.289
Item2	.509	1.000	.395	.387	.303	.411	.376	.372	.323	.402	.331	.470	.636	.462	.334	.472	.344	.328	.463	.371	.508	.360
Item3	.315	.395	1.000	.348	.273	.471	.432	.383	.307	.193	.350	.348	.339	.250	.338	.358	.239	.430	.430	.337	.401	.366
Item4	.383	.387	.348	1.000	.336	.451	.404	.411	.333	.370	.375	.362	.405	.262	.292	.397	.344	.407	.395	.292	.405	.276
Item5	.327	.303	.273	.336	1.000	.346	.707	.344	.421	.292	.330	.529	.296	.275	.355	.278	.429	.330	.388	.366	.429	.356
Item7	.423	.411	.471	.451	.346	1.000	.403	.549	.354	.289	.491	.464	.495	.366	.391	.405	.407	.494	.497	.388	.551	.366
Item8	.350	.376	.432	.404	.707	.403	1.000	.410	.526	.289	.371	.528	.393	.293	.464	.390	.464	.409	.486	.529	.489	.463
Item9	.322	.372	.383	.411	.344	.549	.410	1.000	.374	.307	.463	.377	.475	.354	.419	.415	.327	.483	.478	.393	.481	.421
Item10	.321	.323	.307	.333	.421	.354	.526	.374	1.000	.292	.339	.419	.378	.324	.429	.411	.331	.300	.443	.434	.493	.398
Item11	.450	.402	.193	.370	.292	.289	.289	.307	.292	1.000	.254	.355	.462	.582	.314	.359	.255	.183	.394	.357	.375	.260
Item12	.304	.331	.350	.375	.330	.491	.371	.463	.339	.254	1.000	.328	.325	.269	.383	.321	.318	.504	.462	.313	.362	.347
Item13	.398	.470	.348	.362	.529	.464	.528	.377	.419	.355	.328	1.000	.529	.432	.404	.416	.441	.374	.423	.492	.532	.430
Item14	.458	.636	.339	.405	.296	.495	.393	.475	.378	.462	.325	.529	1.000	.495	.321	.576	.455	.380	.531	.427	.667	.424
Item15	.440	.462	.250	.262	.275	.366	.293	.354	.324	.582	.269	.432	.495	1.000	.344	.446	.356	.307	.490	.421	.514	.333
Item16	.315	.334	.338	.292	.355	.391	.464	.419	.429	.314	.383	.404	.321	.344	1.000	.402	.420	.318	.538	.508	.466	.518
Item17	.452	.472	.358	.397	.278	.405	.390	.415	.411	.359	.321	.416	.576	.446	.402	1.000	.474	.379	.548	.477	.534	.457
Item18	.344	.344	.239	.344	.429	.407	.464	.327	.331	.255	.318	.441	.455	.356	.420	.474	1.000	.405	.513	.388	.557	.476
Item19	.280	.328	.430	.407	.330	.494	.409	.483	.300	.183	.504	.374	.380	.307	.318	.379	.405	1.000	.450	.351	.496	.450
Item20	.446	.463	.430	.395	.388	.497	.486	.478	.443	.394	.462	.423	.531	.490	.538	.548	.513	.450	1.000	.590	.664	.524
Item21	.385	.371	.337	.292	.366	.388	.529	.393	.434	.357	.313	.492	.427	.421	.508	.477	.388	.351	.590	1.000	.500	.504
Item22	.483	.508	.401	.405	.429	.551	.489	.481	.493	.375	.362	.532	.667	.514	.466	.534	.557	.496	.664	.500	1.000	.542
Item23	.289	.360	.366	.276	.356	.366	.463	.421	.398	.260	.347	.430	.424	.333	.518	.457	.476	.450	.524	.504	.542	1.000
	7.995	8.047	6.592	6.518	6.472	6.911	6.503	5.768	4.992	4.149	3.932	4.472	4.277	3.211	3.169	2.869	2.339	1.747	1.778	1.004	.542	
	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
Total Sum	93.287																					
Total Number	231																					
Mean	0.40383941																					

A22 Reliability Analysis for SSEM[R] Components (1)

Component 1

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.854	.856	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item16	38.25	103.043	.628	.413	.833
Item17	38.89	99.452	.620	.400	.835
Item18	38.58	104.383	.595	.378	.839
Item20	38.67	100.171	.732	.542	.814
Item21	38.14	102.791	.629	.431	.832
Item23	38.19	103.246	.653	.432	.828

Component 2

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.854	.856	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item1	29.52	140.277	.598	.373	.838
Item2	28.94	130.711	.651	.478	.828
Item11	30.60	129.138	.585	.409	.842
Item14	28.72	128.047	.712	.583	.816
Item15	29.73	124.721	.656	.466	.827
Item22	27.72	135.041	.662	.516	.827

Component 3

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.830	.831	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item3	42.59	70.015	.554	.317	.813
Item4	43.08	69.690	.553	.310	.813
Item7	42.95	65.038	.690	.482	.784
Item9	43.02	66.430	.630	.407	.797
Item12	42.44	71.560	.586	.360	.806
Item19	42.76	69.864	.597	.364	.804

Component 4

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.802	.807	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item5	24.18	33.138	.664	.535	.729
Item8	24.20	32.453	.730	.578	.698
Item10	24.79	33.639	.522	.296	.806
Item13	24.14	36.804	.572	.333	.773

A23 Principal Components Analysis (2)

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.938
Bartlett's Test of Sphericity	Approx. Chi-Square	4563.625
	df	210
	Sig.	.000

Anti-image Matrices

		Item1	Item2	Item3	Item4	Item5	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20	Item22	Item23
Anti-image Covariance	Item1	.584	-.112	-.015	-.042	-.025	-.058	.001	.024	.001	-.096	-.012	-.010	.021	-.030	.006	-.072	-.006	.027	-.018	-.046	.033
	Item2	-.112	.491	-.080	-.039	-.003	.020	-.005	.015	.018	.006	-.031	-.041	-.144	-.055	-.018	-.015	.024	.012	-.007	.007	-.007
	Item3	-.015	-.080	.622	-.029	.046	-.104	-.090	-.010	.007	.026	-.001	-.016	.029	.017	-.013	-.032	.085	-.080	-.048	-.004	-.037
	Item4	-.042	-.039	-.029	.623	-.004	-.061	-.035	-.049	-.026	-.118	-.032	-.007	-.002	.082	.019	-.052	-.034	-.075	-.003	.000	.051
	Item5	-.025	-.003	.046	-.004	.434	.002	-.207	-.028	-.016	-.043	-.029	-.111	.055	.012	.028	.037	-.057	.004	.000	-.029	.011
	Item7	-.058	.020	-.104	-.061	.002	.477	.019	-.110	.009	.028	-.094	-.056	-.034	-.008	-.022	.023	-.033	-.041	-.008	-.049	.043
	Item8	.001	-.005	-.090	-.035	-.207	.019	.364	-.006	-.099	.009	.010	-.029	-.015	.026	-.047	.000	-.035	-.020	-.021	.015	-.029
	Item9	.024	.015	-.010	-.049	-.028	-.110	-.006	.542	-.022	-.005	-.065	.028	-.064	-.021	-.061	-.023	.056	-.075	-.014	.003	-.040
	Item10	.001	.018	.007	-.026	-.016	.009	-.099	-.022	.605	-.008	-.049	-.030	.007	-.011	-.059	-.062	.048	.040	-.005	-.072	-.020
	Item11	-.096	.006	.026	-.118	-.043	.028	.009	-.005	-.008	.543	-.019	.004	-.078	-.215	-.046	.015	.040	.057	-.019	.036	-.007
	Item12	-.012	-.031	-.001	-.032	-.029	-.094	.010	-.065	-.049	-.019	.592	.006	.010	.018	-.050	.017	-.001	-.145	-.075	.058	-.001
	Item13	-.010	-.041	-.016	-.007	-.111	-.056	-.029	.028	-.030	.004	.006	.501	-.071	-.060	-.041	-.001	-.023	-.010	.050	-.014	-.037
	Item14	.021	-.144	.029	-.002	.055	-.034	-.015	-.064	.007	-.078	.010	-.071	.355	.005	.074	-.087	-.030	.018	-.007	-.105	-.005
	Item15	-.030	-.055	.017	.082	.012	-.008	.026	-.021	-.011	-.215	.018	-.060	.005	.503	-.003	-.045	-.017	-.036	-.051	-.050	.019
	Item16	.006	-.018	-.013	.019	.028	-.022	-.047	-.061	-.059	-.046	-.050	-.041	.074	-.003	.555	-.021	-.050	.055	-.082	-.016	-.118
	Item17	-.072	-.015	-.032	-.052	.037	.023	.000	-.023	-.062	.015	.017	-.001	-.087	-.045	-.021	.512	-.079	-.014	-.057	.016	-.049
	Item18	-.006	.024	.085	-.034	-.057	-.033	-.035	.056	.048	.040	-.001	-.023	-.030	-.017	-.050	-.079	.544	-.043	-.046	-.058	-.068
	Item19	.027	.012	-.080	-.075	.004	-.041	-.020	-.075	.040	.057	-.145	-.010	.018	-.036	.055	-.014	-.043	.533	.004	-.058	-.079
	Item20	-.018	-.007	-.048	-.003	.000	-.008	-.021	-.014	-.005	-.019	-.075	.050	-.007	-.051	-.082	-.057	-.046	.004	.403	-.091	-.036
	Item22	-.046	.007	-.004	.000	-.029	-.049	.015	.003	-.072	.036	.058	-.014	-.105	-.050	-.016	.016	-.058	-.058	-.091	.329	-.050
	Item23	.033	-.007	-.037	.051	.011	.043	-.029	-.040	-.020	-.007	-.001	-.037	-.005	.019	-.118	-.049	-.068	-.079	-.036	-.050	.534
Anti-image Correlation	Item1	.956[a]	-.210	-.024	-.069	-.050	-.111	.002	.043	.001	-.171	-.021	-.018	.046	-.055	.011	-.132	-.011	.048	-.037	-.104	.058
	Item2	-.210	.940[a]	-.145	-.071	-.007	.041	-.012	.029	.034	.011	-.057	-.083	-.345	-.110	-.035	-.030	.046	.023	-.015	.017	-.013
	Item3	-.024	-.145	.937[a]	-.046	.089	-.192	-.190	-.018	.012	.045	-.001	-.028	.062	.031	-.022	-.058	.147	-.138	-.096	-.009	-.064
	Item4	-.069	-.071	-.046	.951[a]	-.008	-.113	-.074	-.084	-.043	-.202	-.053	-.013	-.004	.146	.033	-.091	-.059	-.130	-.005	.000	.088
	Item5	-.050	-.007	.089	-.008	.877[a]	.005	-.521	-.058	-.031	-.089	-.057	-.238	.142	.025	.057	.079	-.117	.007	-.001	-.077	.023
	Item7	-.111	.041	-.192	-.113	.005	.949[a]	.044	-.216	.016	.055	-.176	-.114	-.082	-.017	-.042	.046	-.066	-.081	-.018	-.123	.085
	Item8	.002	-.012	-.190	-.074	-.521	.044	.907[a]	-.014	-.211	.020	.021	-.068	-.041	.062	-.104	.001	-.080	-.046	-.054	.042	-.066
	Item9	.043	.029	-.018	-.084	-.058	-.216	-.014	.958[a]	-.038	-.010	-.116	.054	-.146	-.040	-.111	-.043	.103	-.139	-.030	.007	-.075
	Item10	.001	.034	.012	-.043	-.031	.016	-.211	-.038	.959[a]	-.013	-.081	-.055	.015	-.020	-.102	-.112	.084	.070	-.010	-.162	-.035
	Item11	-.171	.011	.045	-.202	-.089	.055	.020	-.010	-.013	.882[a]	-.034	.008	-.178	-.412	-.084	.029	.074	.106	-.040	.084	-.012
	Item12	-.021	-.057	-.001	-.053	-.057	-.176	.021	-.116	-.081	-.034	.938[a]	.012	.021	.033	-.087	.032	-.001	-.257	-.154	.131	-.001
	Item13	-.018	-.083	-.028	-.013	-.238	-.114	-.068	.054	-.055	.008	.012	.959[a]	-.169	-.120	-.077	-.001	-.043	-.018	.111	-.034	-.072
	Item14	.046	-.345	.062	-.004	.142	-.082	-.041	-.146	.015	-.178	.021	-.169	.913[a]	.013	.167	-.204	-.069	.040	-.019	-.308	-.011
	Item15	-.055	-.110	.031	.146	.025	-.017	.062	-.040	-.020	-.412	.033	-.120	.013	.918[a]	-.006	-.089	-.032	-.070	-.113	-.123	.037
	Item16	.011	-.035	-.022	.033	.057	-.042	-.104	-.111	-.102	-.084	-.087	-.077	.167	-.006	.943[a]	-.039	-.090	.101	-.172	-.038	-.217
	Item17	-.132	-.030	-.058	-.091	.079	.046	.001	-.043	-.112	.029	.032	-.001	-.204	-.089	-.039	.960[a]	-.149	-.026	-.126	.038	-.094
	Item18	-.011	.046	.147	-.059	-.117	-.066	-.080	.103	.084	.074	-.001	-.043	-.069	-.032	-.090	-.149	.952[a]	-.080	-.099	-.137	-.125
	Item19	.048	.023	-.138	-.130	.007	-.081	-.046	-.139	.070	.106	-.257	-.018	.040	-.070	.101	-.026	-.080	.935[a]	.008	-.138	-.148
	Item20	-.037	-.015	-.096	-.005	-.001	-.018	-.054	-.030	-.010	-.040	-.154	.111	-.019	-.113	-.172	-.126	-.099	.008	.961[a]	-.250	-.079
	Item22	-.104	.017	-.009	.000	-.077	-.123	.042	.007	-.162	.084	.131	-.034	-.308	-.123	-.038	.038	-.137	-.138	-.250	.942[a]	-.120
	Item23	.058	-.013	-.064	.088	.023	.085	-.066	-.075	-.035	-.012	-.001	-.072	-.011	.037	-.217	-.094	-.125	-.148	-.079	-.120	.956[a]

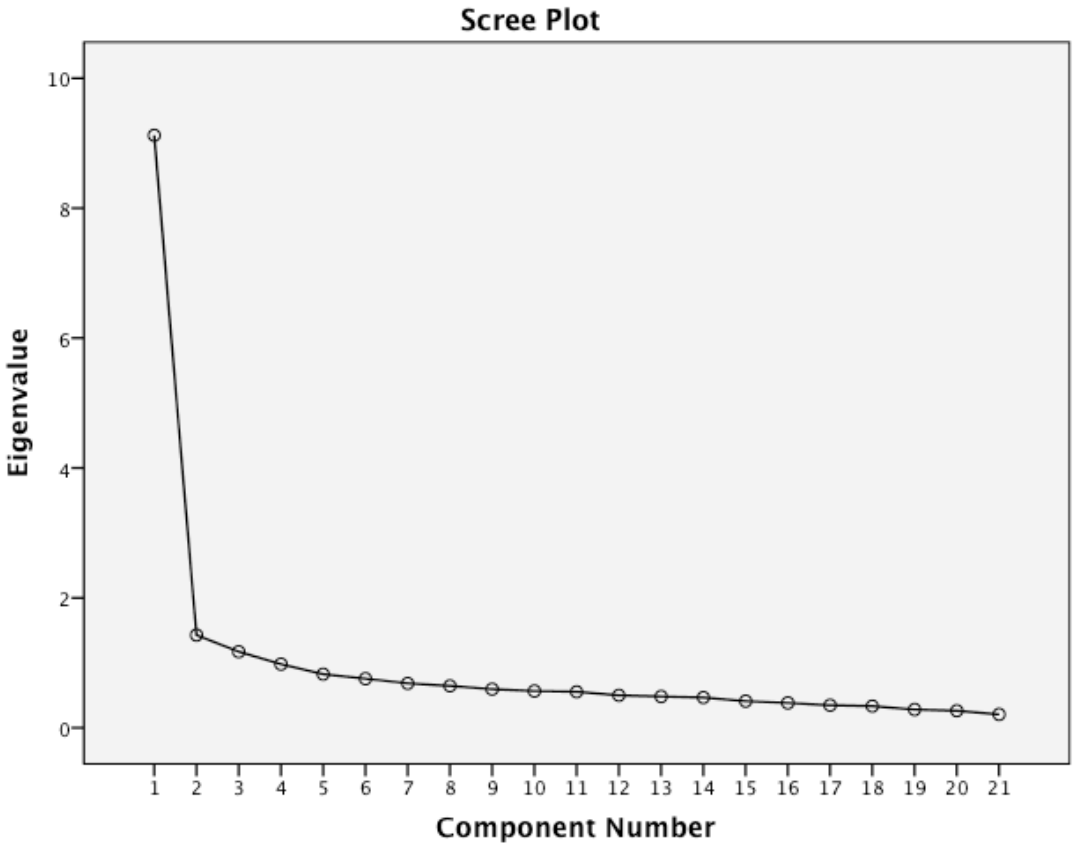
a. Measures of Sampling Adequacy(MSA)

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	9.122	43.437	43.437	9.122	43.437	43.437	6.732
2	1.428	6.798	50.236	1.428	6.798	50.236	6.569
3	1.171	5.578	55.813	1.171	5.578	55.813	6.806
4	.979	4.663	60.477				
5	.826	3.935	64.412				
6	.756	3.601	68.013				
7	.684	3.258	71.271				
8	.645	3.071	74.341				
9	.594	2.829	77.171				
10	.566	2.696	79.867				
11	.554	2.638	82.505				
12	.499	2.377	84.882				
13	.482	2.295	87.177				
14	.466	2.220	89.398				
15	.410	1.955	91.352				
16	.384	1.827	93.179				
17	.347	1.654	94.833				
18	.333	1.586	96.419				
19	.282	1.341	97.760				
20	.263	1.253	99.013				
21	.207	.987	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.



Component Matrix[a]

	Component		
	1	2	3
Item22	.804		
Item20	.773		
Item14	.736		
Item7	.700		
Item8	.699		
Item13	.696		
Item17	.692		
Item2	.668		
Item9	.665		
Item23	.660		
Item18	.649		
Item16	.635		
Item19	.630		
Item15	.622	-.469	
Item1	.622		
Item10	.616		
Item5	.601		-.477
Item4	.599		
Item12	.590		
Item3	.573		
Item11	.548	-.509	

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Pattern Matrix[a]

	Component		
	1	2	3
Item19	.797		
Item12	.741		
Item7	.706		
Item3	.667		
Item9	.664		
Item4	.469		
Item20			
Item11		-.815	
Item15		-.798	
Item14		-.693	
Item2		-.662	
Item1		-.658	
Item17		-.505	
Item22		-.417	
Item5			-.937
Item8			-.879
Item10			-.628
Item13			-.543
Item18			-.524
Item16			-.523
Item23			-.481

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 10 iterations.

Structure Matrix

	Component		
	1	2	3
Item19	.779		-.466
Item7	.773	-.503	-.470
Item9	.734	-.452	-.472
Item12	.726		-.431
Item3	.679		-.411
Item20	.657	-.637	-.632
Item4	.599	-.474	-.419
Item14	.554	-.795	-.478
Item15		-.780	-.410
Item11		-.744	
Item2	.500	-.738	-.419
Item1	.421	-.709	-.412
Item22	.636	-.701	-.665
Item17	.542	-.676	-.504
Item8	.511		-.856
Item5			-.812
Item13	.462	-.576	-.696
Item10	.430	-.424	-.685
Item18	.473	-.487	-.661
Item23	.563	-.430	-.656
Item16	.510	-.420	-.656

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

A24 Reliability Analysis (2)

Component 1: Belief in Phonological Awareness

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.830	.831	6

Inter-Item Correlation Matrix

	Item3	Item4	Item7	Item9	Item12	Item19
Item3	1.000	.383	.498	.421	.369	.418
Item4	.383	1.000	.478	.442	.389	.398
Item7	.498	.478	1.000	.562	.507	.482
Item9	.421	.442	.562	1.000	.453	.460
Item12	.369	.389	.507	.453	1.000	.484
Item19	.418	.398	.482	.460	.484	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item3	42.59	70.015	.554	.317	.813
Item4	43.08	69.690	.553	.310	.813
Item7	42.95	65.038	.690	.482	.784
Item9	43.02	66.430	.630	.407	.797
Item12	42.44	71.560	.586	.360	.806
Item19	42.76	69.864	.597	.364	.804

Component 2: Learner Independence and Optimism in Abilities

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.869	.871	7

Inter-Item Correlation Matrix

	Item1	Item2	Item11	Item14	Item15	Item17	Item22
Item1	1.000	.508	.448	.461	.442	.448	.482
Item2	.508	1.000	.402	.637	.470	.475	.517
Item11	.448	.402	1.000	.464	.584	.354	.378
Item14	.461	.637	.464	1.000	.500	.577	.667
Item15	.442	.470	.584	.500	1.000	.445	.520
Item17	.448	.475	.354	.577	.445	1.000	.539
Item22	.482	.517	.378	.667	.520	.539	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item1	36.79	189.088	.608	.387	.855
Item2	36.20	178.118	.658	.480	.848
Item11	37.87	177.937	.574	.409	.861
Item14	35.99	173.877	.735	.607	.838
Item15	37.00	171.816	.655	.472	.849
Item17	35.04	183.733	.615	.412	.854
Item22	34.99	182.211	.683	.529	.846

Component 3: Learner Confidence and Resilience

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.852	.855	7

Inter-Item Correlation Matrix

	Item5	Item8	Item10	Item13	Item16	Item18	Item23
Item5	1.000	.707	.415	.529	.363	.435	.364
Item8	.707	1.000	.528	.519	.482	.481	.480
Item10	.415	.528	1.000	.403	.434	.339	.405
Item13	.529	.519	.403	1.000	.400	.437	.424
Item16	.363	.482	.434	.400	1.000	.438	.532
Item18	.435	.481	.339	.437	.438	1.000	.492
Item23	.364	.480	.405	.424	.532	.492	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item5	47.67	119.203	.628	.542	.830
Item8	47.69	115.606	.734	.614	.816
Item10	48.28	117.726	.560	.341	.841
Item13	47.64	122.781	.608	.387	.833
Item16	48.01	116.909	.597	.389	.835
Item18	48.35	117.126	.586	.363	.836
Item23	47.96	117.443	.609	.410	.833

Reliability of Final SSEM^{R}

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.926	.929	20

Inter-Item Correlation Matrix

	Item1	Item2	Item3	Item4	Item5	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item22	Item23
Item1	1.000	.509	.315	.383	.327	.423	.350	.322	.321	.450	.304	.398	.458	.440	.315	.452	.344	.280	.483	.289
Item2	.509	1.000	.395	.387	.303	.411	.376	.372	.323	.402	.331	.470	.636	.462	.334	.472	.344	.328	.508	.360
Item3	.315	.395	1.000	.348	.273	.471	.432	.383	.307	.193	.350	.348	.339	.250	.338	.358	.239	.430	.401	.366
Item4	.383	.387	.348	1.000	.336	.451	.404	.411	.333	.370	.375	.362	.405	.262	.292	.397	.344	.407	.405	.276
Item5	.327	.303	.273	.336	1.000	.346	.707	.344	.421	.292	.330	.529	.296	.275	.355	.278	.429	.330	.429	.356
Item7	.423	.411	.471	.451	.346	1.000	.403	.549	.354	.289	.491	.464	.495	.366	.391	.405	.407	.494	.551	.366
Item8	.350	.376	.432	.404	.707	.403	1.000	.410	.526	.289	.371	.528	.393	.293	.464	.390	.464	.409	.489	.463
Item9	.322	.372	.383	.411	.344	.549	.410	1.000	.374	.307	.463	.377	.475	.354	.419	.415	.327	.483	.481	.421
Item10	.321	.323	.307	.333	.421	.354	.526	.374	1.000	.292	.339	.419	.378	.324	.429	.411	.331	.300	.493	.398
Item11	.450	.402	.193	.370	.292	.289	.289	.307	.292	1.000	.254	.355	.462	.582	.314	.359	.255	.183	.375	.260
Item12	.304	.331	.350	.375	.330	.491	.371	.463	.339	.254	1.000	.328	.325	.269	.383	.321	.318	.504	.362	.347
Item13	.398	.470	.348	.362	.529	.464	.528	.377	.419	.355	.328	1.000	.529	.432	.404	.416	.441	.374	.532	.430
Item14	.458	.636	.339	.405	.296	.495	.393	.475	.378	.462	.325	.529	1.000	.495	.321	.576	.455	.380	.667	.424
Item15	.440	.462	.250	.262	.275	.366	.293	.354	.324	.582	.269	.432	.495	1.000	.344	.446	.356	.307	.514	.333
Item16	.315	.334	.338	.292	.355	.391	.464	.419	.429	.314	.383	.404	.321	.344	1.000	.402	.420	.318	.466	.518
Item17	.452	.472	.358	.397	.278	.405	.390	.415	.411	.359	.321	.416	.576	.446	.402	1.000	.474	.379	.534	.457
Item18	.344	.344	.239	.344	.429	.407	.464	.327	.331	.255	.318	.441	.455	.356	.420	.474	1.000	.405	.557	.476
Item19	.280	.328	.430	.407	.330	.494	.409	.483	.300	.183	.504	.374	.380	.307	.318	.379	.405	1.000	.496	.450
Item22	.483	.508	.401	.405	.429	.551	.489	.481	.493	.375	.362	.532	.667	.514	.466	.534	.557	.496	1.000	.542
Item23	.289	.360	.366	.276	.356	.366	.463	.421	.398	.260	.347	.430	.424	.333	.518	.457	.476	.450	.542	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item1	144.91	984.396	.586	.415	.923
Item2	144.28	963.407	.631	.508	.922
Item3	141.61	1012.119	.515	.372	.925
Item4	142.10	1004.301	.555	.377	.924
Item5	142.19	1000.052	.550	.566	.924
Item7	141.95	991.970	.649	.522	.922
Item8	142.20	989.865	.650	.635	.922
Item9	142.05	994.080	.613	.458	.923
Item10	142.76	988.143	.565	.395	.924
Item11	145.97	970.791	.516	.456	.926
Item12	141.49	1016.909	.533	.394	.924
Item13	142.17	991.572	.660	.493	.922
Item14	144.09	951.799	.702	.645	.921
Item15	145.08	957.406	.587	.491	.924
Item16	142.51	987.935	.578	.428	.923
Item17	143.16	964.882	.649	.480	.922
Item18	142.85	984.717	.594	.451	.923
Item19	141.82	1005.773	.571	.467	.924
Item22	143.09	953.484	.761	.649	.919
Item23	142.46	986.885	.603	.463	.923

A25 Wording of Items Assigned to Components

Component 1: Phonological Awareness	Component 2: Learner Independence & Optimism	Component 3: Learner Confidence & Resilience
Item 3: At school I can spell short 'tricky words' or 'sight words', for example 'was' or 'little'	Item 1: At school I can spell every word	Item 5: I can stay confident about learning to spell, even when I make mistakes
Item 4: At school I can hear the different sounds in long words, for example the sounds in television	Item 2: I can learn to spell without any help from an adult at school	Item 8: I can stay positive about learning to spell, even when I make mistakes
Item 7: At school I can spell long 'tricky words' or 'sight words', for example 'people' or 'would'	Item 11: At school I can learn to spell all of the words in the dictionary	Item 10: I can use my initiative (be resourceful) when learning to spell at school
Item 9: At school I can learn to spell words that use different groups of letters for the same sound, for example the sound /ay/ can be written using the letters 'ay' like in 'stay' or 'ai' like in 'train'	Item 14: I can learn to spell without any help from my teacher at school	Item 13: I can be good at learning to spell at school
Item 12: When I am learning to spell at school, I can recognise which words sound the same at the beginning, for example the words 'shop' and 'shell' have the same /sh/ sound at the beginning	Item 15: At school I can learn to spell every word	Item 16: I can push myself to the limits when I am learning to spell at school
Item 19: When I am learning to spell at school, I can recognise which words sound the same at the end, for example the words 'made' and 'fade' have the same /ade/ sound at the end	Item 17: I can learn to spell without any help from my friends at school	Item 18:I can be confident when trying to spell a difficult word at school
	Item 22: I can understand how to spell lots of long words	Item 23: I can learn to spell even if I am finding it difficult

A26 Test-Retest Correlation Coefficients

Item	Correlation Coefficient from Time 1 to Time 2	Significance (2-tailed)
Example 1	.400*	.035
Example 2	.859**	.000
1	.765**	.000
2	.437*	.033
3	.496*	.014
4	.419*	.042
5	.673**	.000
6	.224	.294
7	.664**	.000
8	.642**	.001
9	.685**	.000
10	.574**	.003
11	.714**	.000
12	.703**	.000
13	.739**	.000
14	.713**	.000
15	.538**	.007
16	.825**	.000
17	.702**	.000
18	.673**	.000
19	.674**	.000
20	.618**	.001
21	.669**	.000
22	.655**	.001
23	.631**	.001

Correlations

			SSEMr Total	Time2SSETotal	Factor 1 Total	Factor 2 Total	Factor 3 Total	Time2Fact1Total	Time2Fact2Total	Time2Fact3Total
Spearman's rho	SSEMr Total	Correlation Coefficient	1.000	.908**	.830**	.925**	.863**	.735**	.891**	.813**
		Sig. (2-tailed)	.	.000	.000	.000	.000	.000	.000	.000
		N	451	24	451	451	451	24	24	24
	Time2SSETotal	Correlation Coefficient	.908**	1.000	.776**	.819**	.910**	.838**	.890**	.929**
		Sig. (2-tailed)	.000	.	.000	.000	.000	.000	.000	.000
		N	24	24	24	24	24	24	24	24
	Factor 1 Total	Correlation Coefficient	.830**	.776**	1.000	.669**	.670**	.732**	.711**	.766**
		Sig. (2-tailed)	.000	.000	.	.000	.000	.000	.000	.000
		N	451	24	451	451	451	24	24	24
	Factor 2 Total	Correlation Coefficient	.925**	.819**	.669**	1.000	.673**	.580**	.933**	.647**
		Sig. (2-tailed)	.000	.000	.000	.	.000	.003	.000	.001
		N	451	24	451	451	451	24	24	24
	Factor 3 Total	Correlation Coefficient	.863**	.910**	.670**	.673**	1.000	.754**	.772**	.913**
		Sig. (2-tailed)	.000	.000	.000	.000	.	.000	.000	.000
		N	451	24	451	451	451	24	24	24
	Time2Fact1Total	Correlation Coefficient	.735**	.838**	.732**	.580**	.754**	1.000	.634**	.837**
		Sig. (2-tailed)	.000	.000	.000	.003	.000	.	.001	.000
		N	24	24	24	24	24	24	24	24
	Time2Fact2Total	Correlation Coefficient	.891**	.890**	.711**	.933**	.772**	.634**	1.000	.704**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.001	.	.000
		N	24	24	24	24	24	24	24	24
	Time2Fact3Total	Correlation Coefficient	.813**	.929**	.766**	.647**	.913**	.837**	.704**	1.000
		Sig. (2-tailed)	.000	.000	.000	.001	.000	.000	.000	.
		N	24	24	24	24	24	24	24	24

**. Correlation is significant at the 0.01 level (2-tailed).

A27 Correlation Coefficients between SWST and SSEM^{R}

Correlations

			SWSTSS	SSEMr Total	Factor 1 Total	Factor 2 Total	Factor 3 Total
Spearman's rho	SWSTSS	Correlation Coefficient	1.000	.581**	.544**	.508**	.459**
		Sig. (1-tailed)	.	.000	.000	.000	.000
		N	235	235	235	235	235
	SSEMr Total	Correlation Coefficient	.581**	1.000	.830**	.925**	.863**
		Sig. (1-tailed)	.000	.	.000	.000	.000
		N	235	451	451	451	451
	Factor 1 Total	Correlation Coefficient	.544**	.830**	1.000	.669**	.670**
		Sig. (1-tailed)	.000	.000	.	.000	.000
		N	235	451	451	451	451
	Factor 2 Total	Correlation Coefficient	.508**	.925**	.669**	1.000	.673**
		Sig. (1-tailed)	.000	.000	.000	.	.000
		N	235	451	451	451	451
	Factor 3 Total	Correlation Coefficient	.459**	.863**	.670**	.673**	1.000
		Sig. (1-tailed)	.000	.000	.000	.000	.
		N	235	451	451	451	451

**. Correlation is significant at the 0.01 level (1-tailed).

- SWST-SS and total SSEM^{R} scores (r_s=.581, *p* (1-tailed) <.001)
- SWST-SS and Component 1 Total Score (r_s=.544, *p* (1-tailed) <.01)
- SWST-SS and Component 2 Total Score (r_s=.508, *p* (1-tailed) <.01)
- SWST-SS and Component 3 Total Score (r_s=.459, *p* (1-tailed) <.01)

A28 Mann-Whitney Test (SEN)

NB: Spearman's Rho, 2-tailed as expect relationship but not predicting direction

Ranks

	SENYesNo	N	Mean Rank	Sum of Ranks
Factor 1 Total	No	203	147.31	29904.50
	Yes	62	86.14	5340.50
	Total	265		
Factor 2 Total	No	203	147.33	29907.50
	Yes	62	86.09	5337.50
	Total	265		
Factor 3 Total	No	203	146.24	29686.50
	Yes	62	89.65	5558.50
	Total	265		
SSEMr Total	No	203	149.11	30269.50
	Yes	62	80.25	4975.50
	Total	265		

Test Statistics[a]

	Factor 1 Total	Factor 2 Total	Factor 3 Total	SSEMr Total
Mann-Whitney U	3387.500	3384.500	3605.500	3022.500
Wilcoxon W	5340.500	5337.500	5558.500	4975.500
Z	-5.520	-5.508	-5.091	-6.192
Asymp. Sig. (2-tailed)	.000	.000	.000	.000

a. Grouping Variable: SENYesNo

Statistics

SENYesNo			Factor 1 Total	Factor 2 Total	Factor 3 Total	SSEMr Total
.	N	Valid	186	186	186	186
		Missing	0	0	0	0
	Mean		51.8172	44.9516	57.4624	154.2312
	Median		55.0000	47.0000	62.0000	161.0000
	Mode		60.00	49.00	70.00	155.00[a]
	Std. Deviation		9.33514	15.51713	12.74664	33.74459
	Minimum		17.00	2.00	5.00	24.00
	Maximum		60.00	70.00	70.00	200.00
No	N	Valid	203	203	203	203
		Missing	0	0	0	0
	Mean		53.0739	42.9113	56.6158	152.6010
	Median		56.0000	44.0000	59.0000	156.0000
	Mode		60.00	33.00[a]	64.00	161.00[a]
	Std. Deviation		8.12157	14.68117	11.04537	29.59217
	Minimum		16.00	2.00	6.00	53.00
	Maximum		60.00	70.00	70.00	200.00
Yes	N	Valid	62	62	62	62
		Missing	0	0	0	0
	Mean		43.9032	30.8387	45.8065	120.5484
	Median		45.5000	31.0000	47.0000	123.0000
	Mode		40.00[a]	19.00[a]	62.00	89.00[a]
	Std. Deviation		12.91042	14.05865	15.17854	36.61616
	Minimum		10.00	.00	14.00	24.00
	Maximum		60.00	62.00	68.00	184.00

a. Multiple modes exist. The smallest value is shown

Ranks

	LitDiff	N	Mean Rank	Sum of Ranks
Factor 1 Total	Yes	37	50.70	1876.00
	No	129	92.91	11985.00
	Total	166		
Factor 2 Total	Yes	37	55.32	2047.00
	No	129	91.58	11814.00
	Total	166		
Factor 3 Total	Yes	37	55.20	2042.50
	No	129	91.62	11818.50
	Total	166		
SSEMr Total	Yes	37	48.62	1799.00
	No	129	93.50	12062.00
	Total	166		

Statistics

LitDiff			Factor 1 Total	Factor 2 Total	Factor 3 Total	SSEMr Total
.	N	Valid	186	186	186	186
		Missing	0	0	0	0
	Mean		51.8172	44.9516	57.4624	154.2312
	Median		55.0000	47.0000	62.0000	161.0000
	Mode		60.00	49.00	70.00	155.00[a]
	Std. Deviation		9.33514	15.51713	12.74664	33.74459
	Minimum		17.00	2.00	5.00	24.00
	Maximum		60.00	70.00	70.00	200.00
Yes	N	Valid	37	37	37	37
		Missing	0	0	0	0
	Mean		44.4324	32.2162	46.4595	123.1081
	Median		45.0000	31.0000	48.0000	124.0000
	Mode		40.00	31.00	45.00[a]	91.00[a]
	Std. Deviation		10.70706	12.67135	14.29956	31.17405
	Minimum		17.00	11.00	17.00	59.00
	Maximum		60.00	58.00	66.00	184.00
No	N	Valid	129	129	129	129
		Missing	0	0	0	0
	Mean		52.8062	42.8837	57.0078	152.6977
	Median		55.0000	46.0000	59.0000	161.0000
	Mode		60.00	46.00	64.00	161.00
	Std. Deviation		8.80348	14.45717	11.12184	30.09116
	Minimum		10.00	.00	14.00	24.00
	Maximum		60.00	70.00	70.00	200.00
Unknown	N	Valid	99	99	99	99
		Missing	0	0	0	0
	Mean		50.9091	39.3838	53.1313	143.4242
	Median		56.0000	40.0000	57.0000	150.0000
	Mode		60.00	33.00	66.00	147.00[a]
	Std. Deviation		10.79597	16.48543	13.44273	36.55638
	Minimum		11.00	2.00	6.00	35.00
	Maximum		60.00	70.00	70.00	200.00

a. Multiple modes exist. The smallest value is shown

Test Statistics[a]

	Factor 1 Total	Factor 2 Total	Factor 3 Total	SSEMr Total
Mann-Whitney U	1173.000	1344.000	1339.500	1096.000
Wilcoxon W	1876.000	2047.000	2042.500	1799.000
Z	-4.725	-4.046	-4.066	-5.008
Asymp. Sig. (2-tailed)	.000	.000	.000	.000

a. Grouping Variable: LitDiff

A29 Mann-Whitney Test (Gender)

Ranks

	Gender	N	Mean Rank	Sum of Ranks
SWSTSS	Male	112	109.88	12306.50
	Female	123	125.39	15423.50
	Total	235		
Fact1Total	Male	228	220.79	50339.00
	Female	223	231.33	51587.00
	Total	451		
Fact2Total	Male	228	230.00	52440.00
	Female	223	221.91	49486.00
	Total	451		
Fact3Total	Male	228	214.00	48792.50
	Female	223	238.27	53133.50
	Total	451		
SSETotal	Male	228	223.51	50960.00
	Female	223	228.55	50966.00
	Total	451		

Test Statistics[a]

	SWSTSS	Fact1Total	Fact2Total	Fact3Total	SSETotal
Mann-Whitney U	5978.500	24233.000	24510.000	22686.500	24854.000
Wilcoxon W	12306.500	50339.000	49486.000	48792.500	50960.000
Z	-1.748	-.863	-.659	-1.978	-.410
Asymp. Sig. (2-tailed)	.080	.388	.510	.048	.681

a. Grouping Variable: Gender

Statistics

Gender			Factor 1 Total	Factor 2 Total	Factor 3 Total	SSEMr Total
Male	N	Valid	228	228	228	228
		Missing	0	0	0	0
	Mean		51.1228	42.5789	54.2895	147.9912
	Median		55.0000	45.0000	58.0000	154.0000
	Mode		60.00	33.00	68.00[a]	147.00[a]
	Std. Deviation		9.85725	15.54666	13.66414	35.01768
	Minimum		10.00	.00	5.00	24.00
	Maximum		60.00	70.00	70.00	200.00
Female	N	Valid	223	223	223	223
		Missing	0	0	0	0
	Mean		51.4709	41.5964	56.6951	149.7623
	Median		55.0000	43.0000	60.0000	155.0000
	Mode		60.00	35.00[a]	70.00	155.00
	Std. Deviation		9.86932	15.69324	12.10228	33.45889
	Minimum		16.00	2.00	5.00	24.00
	Maximum		60.00	70.00	70.00	200.00

a. Multiple modes exist. The smallest value is shown

A30 Correlation Coefficients SSEM^{R} and Age

Correlations

			SWSTSS	Factor 1 T Score	Factor 2 T Score	Factor 3 T Score	SSEMr T Score	AgeYRS
Spearman's rho	SWSTSS	Correlation Coefficient	1.000	.544**	.508**	.459**	.581**	-.041
		Sig. (2-tailed)	.	.000	.000	.000	.000	.536
		N	235	235	235	235	235	235
	Factor 1 T Score	Correlation Coefficient	.544**	1.000	.669**	.670**	.830**	.100*
		Sig. (2-tailed)	.000	.	.000	.000	.000	.035
		N	235	451	451	451	451	449
	Factor 2 T Score	Correlation Coefficient	.508**	.669**	1.000	.673**	.925**	-.075
		Sig. (2-tailed)	.000	.000	.	.000	.000	.113
		N	235	451	451	451	451	449
	Factor 3 T Score	Correlation Coefficient	.459**	.670**	.673**	1.000	.863**	.093*
		Sig. (2-tailed)	.000	.000	.000	.	.000	.048
		N	235	451	451	451	451	449
	SSEMr T Score	Correlation Coefficient	.581**	.830**	.925**	.863**	1.000	.020
		Sig. (2-tailed)	.000	.000	.000	.000	.	.674
		N	235	451	451	451	451	449
	AgeYRS	Correlation Coefficient	-.041	.100*	-.075	.093*	.020	1.000
		Sig. (2-tailed)	.536	.035	.113	.048	.674	.
		N	235	449	449	449	449	449

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

References

AERA, APA, & NCME (1999). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

Bandura, A. (1977a). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.

Bandura, A. (1977b). *Social Learning Theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1981). Self-Referent Thought: A Developmental Analysis of Self-Efficacy. In J. H. Flavell & L. Ross (Eds.), *Social Cognitive Development: Frontiers and some possible frontiers*. Cambridge, UK: Cambridge University Press.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*, 122-147.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1989). The Multidimensional Self-Efficacy Scales. Unpublished Test, Stanford University.

Bandura, A. (1990). *Multidimensional Scales of Perceived Academic Efficacy*. Stanford, CA: Stanford University.

Bandura, A. (1994). Self-Efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of Human Behavior* (Vol. 4, pp. 71-81). New York: Academic Press.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: WH Freeman and Company.

Bandura, A. (2006). Guide for Constructing Self-Efficacy Scales. In F. Pajares & T. Urdan (Eds.), *Self-Efficacy Beliefs of Adolescents* (Vol. 5, pp. 307-337). Greenwich, CT: Information Age Publishing.

Bandura, A., & Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology, 88*, 89-99.

Berry, J. M. (1989). Cognitive Efficacy Across the Life Span: Introduction to the Special Series. *Developmental Psychology, 25*(5), 683-686.

Bong, M. (1997). Generality of Academic Self-Efficacy Judgements: Evidence of Hierarchical Relations. *Journal of Educational Psychology, 89*(4), 696-709.

Bong, M., & Clark, R. E. (1999). Comparison between Self-Concept and Self-Efficacy in Academic Motivation Research. *Educational Psychologist, 34*(3), 139-153.

Bong, M., & Skaalvik, E. M. (2003). Academic Self-Concept and Self-Efficacy: How Different are they Really? *Educational Psychology Review, 15*(1), 1-40.

Brackney, B. E., & Karabenick, S. A. (1995). Psychopathology and Academic Performance: The Role of Motivation and Learning Strategies. *Journal of Counseling Psychology, 42*(4), 456-465.

Brooks, G. (2013). *What Works for Children and Young People with Literacy Difficulties? The effectiveness of intervention schemes*. Sheffield: The Dyslexia-SpLD Trust.

Butler, R. J., & Green, D. (2007). *The Child Within: Taking the Young Person's Perspective by Applying Personal Construct Psychology*. Chichester, West Sussex: John Wiley & Sons.

Calsyn, R., & Kenny, D. (1977). Self-concept of ability and perceived evaluations by others: Cause or effect of academic achievement? *Journal of Educational Psychology, 69*, 136-145.

Chemers, M. M., Hu, L., & Garcia, B. F. (2001). Academic self-efficacy and first year college student performance and adjustment. *Journal of Educational Psychology, 93*, 55-64.

Choi, N., Fuqua, D. R., & Griffin, B. W. (2001). Exploratory Analysis of the Structure of Scores from the Multidimensional Scales of Perceived Self-Efficacy. *Educational and Psychological Measurement, 61*(3), 475-489.

Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7*, 309-319.

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cronbach, L.J. (1951). Coefficient Alpha and the Internal Structure of Tests. *Psychometrika*, *16*(3), 297-334.

Devon LDP Educational Psychology Service (2009). *Sound Spelling: Introduction* (Working Paper). Devon: Devon LDP Educational Psychology Service.

Devon LDP Educational Psychology Service (2011). CYPPS Early Reading. Devon Learning and Development Partnership.

DfE (2012a). Developing a new Year 1 phonics screening check Retrieved 20th March 2012, from http://www.education.gov.uk/schools/teachingandlearning/pedagogy/a00197709/developing-a-new-year-1-phonics-screening-check

DfE (2012b). FAQs: Year 1 phonics screening check, from http://www.education.gov.uk/schools/teachingandlearning/pedagogy/a00198207/faqs-year-1-phonics-screening-check

DfE (2012c). Special Educational Needs in England: January 2012 Retrieved 1st March 2013, from http://www.education.gov.uk/researchandstatistics/statistics/allstatistics/a00210489/sen-england-jan-2012

DfEE (1998). *The National Literacy Strategy. Framework for Teaching.* London, UK: Department for Education and Employment.

Downing, J., DeStefano, J., Rich, G., & Bell, A. (1984). Children's Views of Spelling. *Elementary School Journal, 85*(2), 184-198.

Dunlap, J. (2005). Problem-based learning and self-efficacy: How a capstone course prepares students for a profession. *Educational Technology Research and Development, 53*(1), 65-83.

Field, A. (2005). *Discovering Statistics Using SPSS*. London: SAGE Publications.

Fransella, F. (1995). *George Kelly*. London: SAGE Publications.

Frederickson, N., Frith, U., & Reason, R. (1997). *Phonological Assessment Battery (PhAB)*. Windsor: NFER-Nelson.

Gains, B. R., & Shaw, M. L. G. (2005). WebGrid5 Retrieved 1st June 2012, from http://gigi.cpsc.ucalgary.ca:2000

Gore, P. A. (2006). Academic Self-Efficacy as a Predictor of College Outcomes: Two Incremental Validity Studies. *Journal of Career Assessment, 14*(1), 92-115.

Graham, S., & Harris, K. R. (1989a). Components analysis of cognitive strategy instruction: Effects on learning disabled students' compositions and self-efficacy. *Journal of Educational Psychology, 56*, 210-214.

Graham, S., & Harris, K. R. (1989b). Improving learning disabled students' skills at composing essays: Self-instructional strategy training. *Exceptional Children, 81*(353-361).

Guadagnoli, E., & Velicer, W. (1988). Relation of sample size to the stability of component patterns. *Psychological Bulletin, 103*, 265-275.

Hanchon Graham, L. (2000). *Self-efficacy, motivation constructs, and mathematics performance of middle school students: A three-year longitudinal study (unpublished PhD thesis).* Emory University, Emory.

Hattie, J. (2009). *Visible Learning*. Oxon, UK: Routledge.

Hattie, J., & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research, 77*(1), 81-112.

Holden, G., Moncher, M. S., Schinke, S. P., & Barker, K. M. (1990). Self-Efficacy of Children and Adolescents: A Meta-Analysis. *Psychological Reports, 66*, 1044-1046.

Hooper, D. (2013). Exploratory Factor Analysis Retrieved 1st February 2013, from http://www.slideshare.net/dairehooper/exploratory-factor-analysis-12562520

Humphrey, N., & Mullins, P. (2002). Personal Constructs and Attribution for Academic Success and Failure in Dyslexia. *British Journal of Special Education, 29*(4), 196-203.

Hunter, J. E., & Schmidt, F. L. (1990). *Methods of meta-analysis: Correcting error and bias in research finding*. Newbury Park, CA: Sage.

Jankowicz, D. (2004). *The Easy Guide to Repertory Grids*. Chichester, West Sussex: John Wiley & Sons.

Jones, L. Ø., Varberg, J., Manger, T., Eikeland, O., & Asbjørnsen, A. (2012). Reading and Writing Self-Efficacy of Incarcerated Adults. *Learning and Individual Differences, 22*, 343-349.

Kaplan, D., & Muthén, B. (1985). A comparison of some methodologies for the factor analysis of non-normal Likert variables. *British Journal of Mathematical and Statistical Psychology, 38*, 171-189.

Kelly, G. (1955). *The Psychology of Personal Constructs* (Vol. 1). New York: Norton.

Kenney-Benson, G. A., Pomerantz, E. M., Ryan, A. M., & Patrick, H. (2006). Sex Differences in Math Performance: The Role of Children's Approach to Schoolwork. *Developmental Psychology, 42*(1), 11-26.

Klassen, R. (2002). A question of calibration: A review of the self-efficacy beliefs of students with learning disabilities. *Learning Disabilities Quarterly, 25*(2), 88-102.

Klassen, R. (2008). The optimistic self-efficacy beliefs of students with learning disabilities. *Exceptionality Education Canada, 18*(1), 93-112.

Kline, J. (2005). *Psychological Testing: A Practical Approach to Design and Evaluation*. Thousand Oaks, California: Sage Publications.

Kline, P. (1999). *The handbook of psychological testing* (2nd ed.). London: Routledge.

Kline, P. (2000). *The handbook of psychological testing* (2nd ed.). London: Routledge.

Lane, J., & Lane, A. (2001). Self-Efficacy and Academic Performance. *Social Behavior and Personality: an international journal, 29*(7), 687-693.

Lane, J., Lane, A., & Kyprianou, A. (2004). Self-Efficacy, Self-Esteem and their impact on Academic Performance. *Social Behavior and Personality: an international journal, 32*(3), 247-256.

Lent, R. W., Lopez, F. G., & Bieschke, K. J. (1991). Mathematics Self-Efficacy: Sources and relation to science ased career choice. *Journal of Counseling Psychology, 38*(424-430).

Ley, K., & Young, D. (2001). Instructional principles for self-regulartion. *Educational Technology Research and Development, 49*(2), 93-103.

Limpo, T., & Alves, R. A. (2013). Modeling writing development: Contribution of transcription and self-regulation to Portuguese students' text generation quality. *Journal of Educational Psychology, 105*(2), 401-413.

Long, M. (2000). *The Psychology of Education*. Oxon, UK: RoutledgeFalmer.

Luzzo, D. A., Hasper, P., Albert, K. A., Bibby, M. A., & Martinelli, E. A. (1999). Effects of Self-Efficacy-Enhancing Interventions on the Math/Science Self-Efficacy and Career Interests, Goals, and Actions of Career Undecided College Students. *Journal of Counseling Psychology, 46*(2), 233-243.

Marsh, H. W. (1990). Influences of internal and external frames of reference on the formation of math and English self-concepts. *Journal of Educational Psychology, 82*(1), 107-116.

McCarthy, P., Meier, S., & Rinderer, R. (1985). Self-efficacy and writing: A different view of self-evaluation. *College Composition and Communication, 36*, 465-471.

Meier, S., McCarthy, P. R., & Schmeck, R. R. (1984). Validity of self-efficacy as a predictor of writing performance. *Cognitive Therapy and Research, 8*(2), 107-120.

Miller, J. W., Coombs, W. T., & Fuqua, D. R. (1999). An Examination of Psychometric Properties of Bandura's Multidimensional Scales or Perceived Self-Efficacy. *Measurement & Evaluation in Counseling & Development, 31*(4), 186-197.

Miltiadou, M., & Savenye, W. C. (2003). Applying Social Cognitive Constructs of Motivation to Enhance Student Success in Online Distance Education. *AAC Journal, 11*(1), 78-95.

Morgan, D. L. (2007). Paradigms Lost and Pragmatism Regained: Methodological Implications of Combining Qualitative and Quantitative Methods. *Journal of Mixed Methods Research, 1*(1), 48-76.

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A metaanalytic investigation. *Journal of Counseling Psychology, 38*(1), 30-38.

National Literacy Trust (2013). Gender Issues. Retrieved 24th July 2013, from http://www.literacytrust.org.uk/reading_champions/resources/1058_gender_and_literacy

Noddings, N. (1996). *Current directions in self research: Self-concept, self-efficacy, and possible selves.* Paper presented at the Meeting of the American Educational Research Association, New York.

Norman, G. (2010). Likert scales, levels of measurement and the 'laws' of statistics. *Adv in Health Sci Educ, 15*, 625-632.

Norwich, B. (1987). Self-Efficacy and Mathematics Achievement: A Study of their Relation. *Journal of Educational Psychology, 79*(4), 384-387.

Nunnally, J. C. (1967). *Psychometric Theory*. New York: McGraw-Hill.

Nunnally, J. C. (1970). *Introduction to Psychological Measurement*. New York: McGraw-Hill.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory* (3rd ed.). New York: McGraw-Hill.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543-578.

Pajares, F. (1997). Current directions in self-efficacy research [online] Retrieved 2nd August 2012, from http://www.des.emory.edu/mfp/effchapter.html

Pajares, F., & Valiante, G. (1999). Grade Level and Gender Differences in the Writing Self-Beliefs of Middle School Students. *Contemporary Educational Psychology, 24*, 390-405.

Pajares, F., Viliante, G., & Cheong, Y. F. (2007). Writing self-efficacy and its relation to gender, writing motivation and writing competence: A developmental perspective. In S. Hidi & P. Boscolo (Eds.), *Writing and Motivation* (pp. 141-159). Amsterdam: Elsevier.

Phan, H. P. (2011). Interrelations between self,efficacy and learning approaches: a developmental approach. *Educational Psychology, 31*(2), 225-246.

Prat-Sala, M., & Redford, P. (2012). Writing essays: does self-efficacy matter? The relationship between self- efficacy in reading and in writing and undergraduate students' performance in essay writing. *Educational Psychology, 32*(1), 9-20.

Ramkissoon, M. (2004). The validity of the multidimensional scales of perceived self-efficacy in Jamaica. *Caribbean Journal of Psychology, 1*(1), 39-48.

Ranking, J. L., Bruning, R. H., & Timme, V. L. (1994). The Development of Beliefs about Spelling and their Relationship to Spelling Performance. *Applied Cognitive Psychology, 8*, 213-232.

Ranking, J. L., Bruning, R. H., Timme, V. L., & Katkanant, C. (1993). Is writing affected by spelling performance and beliefs about spelling? *Applied Cognitive Psychology, 7*, 155-169.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do Psychosocial and Study Skill Factors Predict College Outcomes? A Meta-Analysis. *Psychological Bulletin, 130*(2), 261-288.

Robson, C. (2002). *Real World Research* (2nd ed.). Oxford, UK: Blackwell Publishers Ltd.

Sacre, L., & Masterson, J. (2000). *Single Word Spelling Test (SWST)*. Windsor, UK: NFER-Nelson Publishing Company Ltd.

Schunk, D. H. (1981). Modeling and Attributional Effects on Children's Achievement: A Self-Efficacy Analysis. *Journal of Educational Psychology, 73*(1), 93-105.

Schunk, D. H. (1982). Effects of effort attributional feedback on children's perceived self-efficacy and achievement. *Journal of Educational Psychology, 74*(548-566).

Schunk, D. H. (1985). Self-Efficacy and Classroom Learning. *Psychology in the Schools, 22*(2), 208-223.

Schunk, D. H. (1990). Goal Setting and Self Efficacy during Self Regulated Learning. *Educational Psychologist, 25*(1), 71-86.

Schunk, D. H. (1991). Self-Efficacy and Academic Motivation. *Educational Psychologist, 26*, 207-231.

Schunk, D. H. (1995). Self-efficacy and education and instruction. In J. E. Maddux (Ed.), *Self-efficacy, adaptation and adjustment: Theory, research and applications* (pp. 281-303). New York: Plenum Press.

Schunk, D. H. (2003). Self-efficacy for reading and writing: influence of modeling, goal setting and self evaluation. *Reading and Writing Quarterly, 19*, 159-172.

Schunk, D. H. (2004). *Learning Theories: An Educational Perspective* (4th ed.). Upper Saddle River, NJ: Pearson Education Inc.

Schunk, D. H., & Pajares, F. (2004). Self-Efficacy in Education Revisited: Empirical and Applied Evidence. In D. M. McInerney & S. V. Etten (Eds.), *Big Theories Revisited (Research on Sociocultural Influences on Motivation and Learning)*. Connecticut: Information Age Publishing.

Schunk, D. H., & Swartz, C. W. (1993). Goals and progress feedback: Effects on self-efficacy and writing achievement. *Contemporary Educational Psychology, 18*(3), 337-354.

Schunk, D. H., & Zimmerman, B. J. (1997). Social Origins of Self-Regulatory Confidence. *Educational Psychologist, 32*, 195-208.

Shell, D. F., Murphy, C. C., & Bruning, R. H. (1989). Self-Efficacy and Outcome Expectancy Mechanisms in Reading and Writing Achievement. *Journal of Educational Psychology, 81*, 91-100.

Sheng, Y., & Sheng, Z. (2012). Is Coefficient Alpha Robust to Non-Normal Data? *Frontiers in Psychology, 3*(34), 1-13.

Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. (1982). The Self-Efficacy Scale: Construction and Validation. *Psychological Reports, 51*, 663-671.

Skinner, B. F. (1938). *The Behaviour of Organisms*. New York: Appleton-Century-Crofts.

Smith, R. J., Arnkoff, D. B., & Wright, T. L. (1990). Test Anxiety and Academic Competence: A Comparison of Alternative Models. *Journal of Counseling Psychology, 37*(3), 313-321.

Solity, J., & Deavers, R. (1999). The Early Reading Research: Ensuring Success for All. *Special Children, 120*, 1-8.

Solity, J., & Vousden, J. (2009). Real books vs reading schemes: a new perspective from instructional psychology. *Educational Psychology, 29*(4), 469-511.

Spector, P. (1992). *Summated rating scale construction*. Thousand Oaks, CA: Sage.

Standards & Testing Agency (2012). *English grammar, punctuation and spelling test framework*. London, UK: Department for Education.

Stevens, J. P. (1992). *Applied multivariate statistics for the social sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using Multivariate Statistics* (4th ed.). Needham Heights, MA: Allyn & Bacon.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research*. Thousand Oaks, CA: Sage Publications.

Tompkins, G. E. (2010). Stages of Spelling Development Retrieved 25th March 2012, from http://www.education.com/reference/article/stages-spelling-development/

Truss, E. (2013). Press Release: New grammar, punctuation and spelling test will raise children's literacy standards. Retrieved 15th May 2013, from https://www.gov.uk/government/news/new-grammar-punctuation-and-spelling-test-will-raise-childrens-literacy-standards

Tymms, P. (2012). Questionnaires. In J. Arthur, M. Waring, R. Coe & L. V. Hedges (Eds.), *Research Methods & Methodologies in Education*. London: SAGE Publications.

Vancouver, J. B., & Kendall, L. N. (2006). When Self-Efficacy Negatively Relates to Motivation and Performance in a Learning Context. *Journal of Applied Psychology, 91*(5), 1146-1153.

VandenBos, G. R. (2007). *APA Dictionary of Psychology*. Washington: American Psychological Association.

Wadsworth, L. M., Husman, J., Duggan, M. A., & Pennington, M. N. (2007). Online Mathematics Achievement: Effects of Learning Strategies and Self-Efficacy. *Journal of Developmental Education, 30*(3), 6-14.

Williams, J. E., & Coombs, W. T. (1996). *An Analysis of the Reliability and Validity of Bandura's Multidimensional Scales of Perceived Self-Efficacy*. Paper presented at the Annual Meeting of the American Educational Research Association.,

Wood, R. E., & Locke, E. A. (1987). The relation of self-efficacy and grade goals to academic performance. *Educational and Psychological Measurement, 47*, 1013-1024.

Woolfolk, A., Hughes, M., & Walkup, V. (2008). *Psychology in Education*. Essex, UK: Pearson Education Limited.

Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-Motivation for Academic Attainment: The Role of Self-Efficacy Beliefs and Personal Goal Setting. *American Educational Research Journal, 29*(3), 663-676.

Zimmerman, B. J., & Kitsantas, A. (2007). Reliability and Validity of Self-Efficacy for Learning Form (SELF) Scores of College Students. *Journal of Psychology, 215*(3), 157-163.

Zimmerman, B. J., & Paulson, E. J. (1995). Self-monitoring during collegiate studying: An invaluable tool for academic self-regulation. In P. R. Pintrich (Ed.), *New directions in college teaching and learning* (pp. 13-27). San Francisco: Jossey-Bass.