University of Strathclyde

Department of Psychology

Is Precision Teaching a more beneficial learning and teaching methodology if it includes an added metacognitive motivation factor?

By Ellen Ferguson

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Copyright Statement

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Abstract

Motivation is crucial to all aspects of effective learning and teaching. This is more so with learners who experience difficulties and in particular struggling readers. An important question raised in the motivation research is whether it is the 'will' related to self-concept or the 'skill' related to self-efficacy beliefs that is the most influential dimension in learning motivation. This study examines whether Precision Teaching with an added metacognitive motivation element is a more beneficial learning and teaching methodology in relation to such struggling readers.

Critical Realism, a contemporary social scientific methodology that supports all psychologists working with applied research outside the laboratory was used in this study. This approach facilitated the exploration and analysis of the complex processes, both theoretical and conceptual and those linked to values and perceptions involved in learning motivation.

The study implemented a mixed methodology design involving 69 primary four stage pupil participants who were identified as struggling readers. The control group received a precision teaching phonics based programme in isolation. The intervention group received the same precision teaching phonics programme with an added metacognitive motivation element. This metacognitive element related to promoting the participants thinking about the learning strategies they were using. The teaching programme was delivered in the class and by the class teacher.

The results were mixed. The qualitative analysis of interviews, discussions and questionnaires was mostly positive with some differences related to pupils' use of learning strategies identified. The quantitative analysis involved standardised assessments of reading attainment and reading motivation. The statistical results indicated that there was no significant difference between the groups, thus no intervention effect was found.

Interestingly this study highlighted that precision teaching reflects motivation research and when accurately implemented is a motivation teaching approach. Moreover the qualitative results suggested that two contrasting motivation approaches

can be successfully combined and operationalised to deliver a practical learning and teaching programme.

This study promotes inclusion, facilitating the implementation of motivation based reading remediation programmes within the mainstream class and involving the class teacher.

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Literature Review

Introduction

Research indicates that motivation is an essential factor in all learning processes (Bandura, 1994; Frederickson & Cameron, 2004; Linnenbrink & Pintrich, 2003: Seifert, 2004). It therefore has a wide range of applications and this review's particular focus is the role of motivation within the classroom context and the influence of motivation factors on learning and teaching programmes to support struggling readers. The review will consider *why* motivation is important to the learning process, *how* motivation influences learning progress and *what* motivation factors are most influential in the class environment, particularly in relation to learners who have experienced difficulty with learning. The first section of this review will be a general analysis of motivation theory in relation to the role of motivation in the learning process and the interactions between influential motivation factors. The second section of the review will focus on the role of motivation in regard to struggling readers at mid-primary stages. The later part of the second section will also consider the influence of teaching programmes that involve explicit motivation factors.

The introduction will give an overview and background to the importance of motivation in learning including the difficulties associated with defining and measuring what is a multi-faceted concept. Thereafter the relationships between individual and contextual motivation factors will be discussed. This will involve analysing the interactions between the learner, curriculum and pedagogical influences, and the differing impacts each of the factors have on motivation, learning processes and learning outcomes. The individual factors will include the types of learning orientation associated with intrinsic and extrinsic motivation and the related mastery and performance learning approaches. Also the theories and perspectives relating to self-belief, self-efficacy, self-concept, attribution and goal theories will be analysed.

Research has also identified contextual teacher and teaching related motivation factors connected to teacher/ pupil relationships and teaching approaches as being key pedagogical and curricular dimensions that can influence learner beliefs and impact on learning outcomes (Black & Wiliam, 2002). The influence of teacher factors will

be discussed in Section 1 of the review, with Section 2 considering the operationalisation of motivation principles into classroom practice. Specifically, the merits of both precision teaching and metacognitive interventions as effective pedagogical approaches that reflect the principles of learning motivation will be explored.

This review will be focusing on motivation in the classroom and while it is acknowledged that research indicates socio-economic and cultural factors including parental experiences and their views of education as impacting on pupils' general learning motivation (Harlen & Deakin Crick, 2002), these areas will not be covered in this review. Furthermore, peer influences are also considered motivation factors (Seifert, 2004). However research suggests that the impact of peer motivation is more relevant to older learners (Smith, Dakers, Dow, Head, Sutherland & Irwin, 2005). Thus, in relation to struggling readers at mid-primary stages, although peer relationships will be mentioned this aspect will not be discussed in detail.

Figure 1 in the first section of the review summarises the motivation factors discussed, detailing the factors, effects and interactions between the motivation dimensions that impact on learning outcomes relating to attainment and attitude. In Section 2, Figure 2 reflects the review discussions surrounding the operationalisation of motivation principles in relation to two different teaching programmes, that of metacognitive and precision teaching pedagogy. The strategic objectives, motivation influences and learning outcomes of the teaching programmes are compared and thereafter consideration is given to the benefits of combining the two different approaches in regard to increasing motivation and learning outcomes.

From the literature reviewed it is evident that motivation is a multi-stranded concept with learning outcomes influenced by complex interactions between the motivation variables of both the individual learner and the learning context. Nevertheless the review will conclude that the motivation of struggling readers to engage with the learning task is mainly based on affective decisions formed by the learner, and these decisions are a result of interactions involving the learner, the specific curricular task and the teacher interaction. However, appropriate learning interventions associated

with teacher interactions and curriculum intervention can positively influence learning decisions and impact on learning progress.

Section One

1.1 Why is Motivation Important in the Education Context?

1.1.1 What is Motivation – Theoretical Definition

The theoretical underpinnings of motivation, particularly applicable in the learning context, centre on theories of self-efficacy, self concept, attribution and goal theory (Linnenbrink & Pintrich, 2003; Schunk, 1990; Seifert, 2004; Weiner, 1985). These motivation theories and their applications are reflected in education research and publications (Harlen & Deakin Crick, 2002; SEED, 2007; Smith, et al., 2005). The wide ranging application as well as the contextual complexities reflected in the different theories perhaps explains the absence of a specific universally applied definition of motivation.

1.1.2 Motivation Themes

There are also difficulties in separating the various components of motivation, several systematic reviews of motivation in different learning contexts (Harlen & Deakin Crick, 2002; Smith et al., 2005) indicate broad motivation themes. These include the role of self and also teaching and learning applications. Within those themes the 'role of self' and the associated self-efficacy, self-regulation, self-esteem and self-concept dimensions are considered as most influential. Although factors related to the other stated themes, such as teacher interactions, task relevance and learning instructions are too deemed influential (Harlen & Deakin Crick, 2002; Smith et al., 2005). These features and themes have been identified in other motivation research (Bandura, 1994; Linnenbrink & Pintrich, 2003; Pajares and Schunk, 2001; Schunk, 1990; Seifert, 2004; Zimmermann, 1998) including educational publications such as the Teaching and Learning Research Programme (2007).

Research concurs that motivation to engage in learning cannot be viewed as a unitary concept but is a consequence of a number of dynamic and transactional chains involving the learner making affective directed decisions (Kyriacou & Goulding, 2006; Smith et al., 2005). Seifert (2004) states that motivation arises from basic

drives, instincts and emotions and as such refers to patterns of behaviour and affect and depend on a learner's emotional perceptions. Weiner (1985) also asserts that it is emotion that directs motivation and the subsequent effort directed towards task engagement.

1.1.3 Motivation Behaviour

In a general context Bandura (1994) defines motivation in terms of intensity and persistence of effort required to complete an action. In relation to education, Harlen et al., (2002) interprets motivation as being the will to engage with a task and learn. Similarly both Harlen and Deakin Crick (2002) and Seifert (2004) state that motivation relates to energy, drive and incentive to complete or engage with an activity. Kyriacou and Goulding (2006) define motivation as having a positive attitude as well as positive intentions and actions. In the same way, Linnenbrink and Pintrich (2003) state level of learner interest in a task defines motivation. When considered in a different context, such as a work setting, motivation is correspondingly viewed in relation to sustained behaviour to complete goals and actions (Locke & Latham, 2002; Schunk, 1990).

1.1.4 Measuring Motivation

Developing specific and consistent measures of motivation is difficult, perhaps in part due to the nature of the interconnecting dimensions and the reliance on subjective perceptions (Frederickson & Cameron, 2004). However, there are useful motivation assessment tools, such as questionnaires, inventories and observation schedules that reflect the motivation research. For example, questionnaires measuring reading motivations and classroom motivations include descriptive terms such as interest, curiosity, compliance, efficacy, attitude, engagement and involvement (Leo & Galloway, 1994; Wigfield & Guthrie, 1997). In addition, The Motivation to Read Questionnaire (MRQ) (Wigfield & Guthrie, 1997) and The Reading Self-concept Scale (RSCS) (Chapman & Tunmer, 1999) are considered to be comprehensive, valid and reliable motivation assessment tools. As such they are recommended as appropriate assessment techniques in relation to education progress (Frederickson & Cameron, 2004) and have also been applied in studies exploring motivation and learning (Rider & Colmar, 2006). These assessment measures will be discussed later in the review.

1.1.5 Perspectives on Motivation

Research also indicates that pupils and teachers can have different perspectives on motivation. For instance teachers rate motivation both on the interest demonstrated by the pupil and also the standard of task completion (Linnenbrink & Pintrich, 2003). Therefore the emphasis could be on outcome rather than effort. It may also be that task outcome is easier and more concrete to evaluate and therefore it is unsurprising that this can be interpreted by teachers as evidence of motivating behaviour and a description of motivation (Black & Wiliam, 1998). Pupils are more concerned with interest and relevance, as well as highlighting teacher approach and teacher expectation as impacting on their motivation to engage with a task (Harlen & Deakin Crick, 2002; Smith et al., 2005). For example, depending on the perspective, a pupil who completes tasks but is not interested and a pupil who is interested but believes they cannot complete the tasks could both reflect erroneous interpretations and assessment of pupil motivation (Linnenbrink & Smith, 2003).

In association with this, Smith et al. (2005) further report that pupils who are disinterested and thus lack motivation may not see the value in learning. In contrast, disengaged pupils do value learning and education but, for whatever reason, usually related to self-belief in ability, have withdrawn from the learning process and are deemed disengaged and not de-motivated. For that reason failure to complete tasks or task avoidance can be reported as lack of motivation, yet it may be that the pupil is motivated but there is a barrier to the learning process (Black & Wiliam, 2002).

1.1.6 Motivation Defined

However over time and across contexts, research suggests that the essence of motivation relates to a level of engagement that indicates interest and persistence (Bandura, 1994; Harlen & Deakin Crick, 2002), and is not solely based on the completion of tasks, successful or not (Black & Wiliam, 2002). Therefore, a motivated pupil is a learner who is actively willing to engage with learning and will be seen trying hard and being involved with the task process.

Thus from the motivation research it can be inferred that there are a number of competing theoretical frameworks as well as different perspectives from different interested parties. This perhaps reflects the dynamic and transactional nature of the

concept of motivation. Furthermore, although motivation factors in general remain constant, depending on context, different theoretical models emphasise different interactions between the numerous motivation factors. For example, some motivation models have a broader framework and consider the impact of family, culture, peers and whole school ethos on general learning motivation of all categories of learners including able and less able across all learning contexts (Black & Wiliam, 2002). Other models are centred on a particular motivation factor such as self-efficacy or attribution and how this particular factor impacts learner motivation (Linnenbrink & Pintrich, 2003; Weiner, 1985).

1.2 Motivation and Learning Processes

This review has highlighted the importance of motivation in education and also discussed the complexities and difficulties defining and interpreting the concept of motivation, including some of the implications this has on understanding motivation and implementing associated interventions. The review will now consider the motivation theories concerned with learning processes.

As indicated from the diagrammatic model and related explanation in Figure 1 motivation is a multi-faceted concept involving different interactions between the cause and effect variables detailed within key areas. Research suggests three key distinct areas: the individual learner, the curriculum, and pedagogy (Black & Wiliam, 2002; SEED, 2007). Thus the pupil, the task or topic undertaken and the teaching approach can all influence or be influenced by motivation and impact on learning engagement and, ultimately, educational progress.

As well as the different areas of influence there are also different dimensions and factors associated with motivation, including the curricular aspects of learning goals, attainment outcomes, task difficulty and relevance (Binder, 1988; Cassen & Kingdom, 2007; Locke & Latham, 2002; Smith et al., 2005). Pedagogical factors are linked to teaching approaches, teacher/ pupil interactions and feedback processes (Binder & Watkins, 1990; Black & Wiliam, 2002; Zimmermann, 1990). There are also types of learning motivations described as intrinsic and extrinsic motivation and the linked mastery and performance learning (Dweck, 1999; Linnenbrink & Pintrich, 2003; McLean, 2003; Schunk, 1990). Dimensions relevant to the individual learner

surround concepts of efficacy, concept, esteem, regulation and attribution (Bandura, 1994; Pajares, 1997; Weiner, 1985; Zimmermann, 1990). Further to this there are also specific areas of motivation research, such as literacy and reading, which add to the complexity of factors to be accounted for (SEED, 2005; Wigfield & Guthrie, 1997).

This again highlights the multifaceted nature of motivation (Seifert, 2004). Hence the challenge of research is possibly not only to define those varied dimensions but also to ascertain the level of influence each of the dimensions contributes to the overall motivational impact (Pajares & Schunk, 2001). This includes examining the different motivation interactions across different learning contexts (Seifert, 2004; Linnenbrink & Pintrich, 2003; Wigfield & Guthrie, 1997).

1.3 Types of Learning Motivation and Learning Orientation

1.3.1 Intrinsic and Extrinsic Motivation

As detailed above, motivation researchers agree that there are different types of motivation associated with the learning process and with individual learners. Studies indicate that a pupil's learning goals are important as they influence the learning motivation (Pintrich, 2000). Such learning goal orientations can reflect the learner's expectations and beliefs formed as a result of previous learning experiences and interactions (Dweck, 1999; Smith et al., 2005). The learning motivations commonly described as extrinsic or external and intrinsic or internal motivations are key in determining what learning strategies are used (Harlen & Deakin Crick, 2002). The learning strategies associated with extrinsic and intrinsic motivations are performance and mastery learning respectively.

Learning that is intrinsically motivated may reflect the psychoanalytic movement of Jung and Freud that considers human beings are predisposed to learning and self-motivating with control coming from the individual learner (Frederickson & Cameron, 2004). In contrast learning that is extrinsically motivated is viewed as being directed and dependant on constraints of external reinforcements such as rewards and/or teacher feedback or even peer comparisons (Smith et al., 2005). Extrinsic learning is reflective of behaviourist theories such as those proposed by Skinner, who as previously discussed saw motivation as being controlled by contextual factors (Frederickson & Cameron, 2004).

1.3.2 Mastery and Performance Learning Goals

The type of learning motivation is thought to influence whether the learning orientation or approach is considered a mastery or performance learning goal. Mastery learning is thought to be directed by intrinsic motivation and takes place when the focus is on knowledge and understanding and as such is thought to be an effective type of learning (Miller, 2003; Pintrich & Schunk, 1996). In contrast, performance learning is considered to be directed by extrinsic motivation and is focused on competitive and comparative attainments or achievements (McLean, 2003). Performance goals are thus dependant on others for setting outcome or success criteria and also providing feedback that could be inconsistent, unreliable or inaccurate (Linnenbrink & Pintrich, 2003; Seifert & O'Keefe, 2001). Whereas, mastery learning with its focus on learning processes has more consistent, reliable and relevant indicators of progress such as feedback from personal goals that inform next learning steps (McLean, 2003; Seifert, 2004).

Locke and Latham (2002) similarly define performance goals as relating to scores or levels achieved on a task, and learning or mastery goals as relating to the number of strategies acquired or developed to accomplish the task effectively. Moreover, studies by Locke and Latham (2002) suggest learners with mastery approaches to learning set higher goals and have greater expectations. In addition, a study by Sideridis (2005) indicated that pupils with a mastery attitude to learning used more strategies on spelling tasks and were more likely to persist when they made errors. These findings perhaps indicate that pupils with mastery approaches use better strategies and respond more positively to negative feedback. Thus mastery orientated learners view learning as a positive challenge and feedback as an opportunity to improve (McLean, 2003).

Both Sideridis (2005) and Locke and Latham (2002) reported that learners were more anxious when undertaking performance orientated tasks resulting in ill-formed strategies to complete such tasks. This suggests that teachers have a role in directing a learning culture that supports mastery attitudes to learning (Linnenbrink & Pintrich, 2003; Seifert, 2004). This research perhaps also highlights the influence of teacher interactions on both the curricular task and also the learner's approach to learning that has implications for learner motivation. Contextual teacher factors will be discussed later in the review.

Similarly a study by Dweck (1999) demonstrated that when two groups of students were given an identical task that was described as either a 'learning/ mastery' task or a 'performance' task, the students with the 'learning/ mastery' task performed better, and demonstrated more persistence. It was also found that beliefs about ability were not considered important in the 'learning/ mastery' task cohort. Dweck (1999) concluded that learning or mastery goals are preferred as they can result in use of more relevant learning strategies, a higher degree of learner competence, a greater interest in school work and also a more positive attitude to learning. This indicates that the curriculum and learning and teaching environment can promote affirmative learning motivations (SEED, 2007). This would support the development of hypotheses around learning and teaching interventions.

1.3.3 Intrinsic and Extrinsic Motivation: Different Perspectives

Although most research agrees with the notions of extrinsic and intrinsic learning motivations, there is less consensus regarding whether these are separate entities or are on opposite ends of a continuum (Kyriacou & Goulding, 2006). In addition, there is research to suggest that extrinsic motivations or performance goal approaches should not always be considered a negative learning style (Locke & Latham, 2002). For example a learner could be initially dependant on external rewards and encouragements such as praise at the start of the learning process, however as the learning becomes more accomplished and the learner experiences success the learning motivations could become more intrinsic and effective (Seifert, 2004). Moreover, a combination of performance and mastery related feedback may well increase learner engagement depending on the complexity of the learning task and the individual learner (Kyriacou & Goulding, 2006).

Furthermore, Dweck (1999) proposes that it is the learner's perspective specifically on how intelligence is acquired and develops that dictates what type of learning motivations and goals are applied. Learners with an entity view of intelligence see ability as fixed and unchangeable either through effort or learning strategies and therefore develop performance goals, avoiding more demanding or new learning (Weiner, 1985). In contrast, an incremental view of intelligence sees ability as flexible and changeable, influenced by effort and relevant strategies and therefore mastery learning goals apply (Gardner, 1993).

Therefore, types of learning motivation applied in practice could be dependant on a learner's views of intelligence in general or specific beliefs about ones own ability (discussed in more detail in the following section). Nonetheless, most of the research evidence supports the view that intrinsic motivations may be the result of numerous extrinsic influences (Black & Wiliam, 2002; Linnenbrink & Pintrich, 2003). Therefore, the type of learning motivations are influenced by many of the different motivational factors associated with the learner, curriculum and/or pedagogical approaches. Thus, learner beliefs, task demands and teacher interactions can direct whether the learning is either extrinsically or intrinsically motivated as well as whether the learner has a performance or mastery learning approach (Smith et al., 2005).

1.4 Motivation and Learning Theories and Perspectives

1.4.1 Individual Learner Motivation Dimensions

Research indicates there are different motivational models to explain learning processes and pupil engagement with learning, yet most studies identify similar themes and report comparable findings. Themes include the role of self, relevance of curricular topic and interactions between the learner, teacher and peers, with conclusions identifying 'self' as being considered the most important influence (Bandura, 1994; Bandura & Martinez-Pons, 1992; Harlen & Deakin Crick, 2002; Pintrich & Schunk, 1996; Zimmermann).

There main theories related to the role of self and understanding learning motivations include self-efficacy, self-concept, attribution, self-worth and achievement goal theory are prominent to understanding learning motivations (Dweck, 1999; Pajares & Schunk, 2001; Seifert, 2004).

1.4.2 Defining Self-Beliefs

There can be confusion over the understanding of, distinctions between, and use of some definitions, particularly self-concept, self-esteem, self-efficacy and self-worth (Linnenbrink & Pintrich, 2003; Seifert, 2004). This again reflects the previous discussions associated with the complexities of conceptualising motivation particularly when considering causal frameworks and theoretical models (Frederickson & Cameron, 2004).

At a general level, self-efficacy is defined as an individual's perception about their ability to complete specific actions (Bandura, 1994). Within an educational context this represents a pupil's perceived ability to complete a particular learning task. Thus, self-efficacy relates to how learners think, feel and motivate themselves to engage in a specific learning context (Black & Wiliam, 2002). The question 'can I do this task in this situation' perhaps exemplifies this (Linnenbrink & Pintrich, 2003: p120). Self-efficacy relates to judgements about ability to complete specific tasks, whereas self-esteem is a more broad definition and involves emotional reactions to achievements. Thus the statements 'I can read certain fiction books well' in comparison to 'I feel good about reading' are examples of self-efficacy and self-esteem respectively (Pajares & Schunk, 2001).

Where self-efficacy theories appear explicit in relation to the impact and influence on learning motivations, self-concept is perhaps less so. This could be because self-concept beliefs influence and are influenced by wider societal factors and can be a summation of experiences from across different learning contexts rather than from one learning area (Pajares, 1997). This suggests that family dimensions as well as peers and teachers influence self-concept beliefs (Pajares, 1997).

Self-worth is also linked to self-concept and is defined as judgements of value and respect (Pajares & Schunk, 2001). Self-concept could be considered a description of an individual's perceived self accompanied by an evaluative judgment of self-worth. Therefore self-concept involves evaluations of self-worth and is dependant on how a culture or social structures values the attributes on which the individual bases those feelings of self-worth (Pajares & Schunk, 2001).

Self-efficacy and self-concept are considered especially dominant in motivational research (Frederickson & Cameron, 2004) and moreover a recurring argument in the literature concerns the relationship between these self-beliefs (Linnenbrink & Pintrich, 2003). Some studies indicate that self-concept beliefs influence the motivation to engage with the task (Pajares & Schunk, 2001) while others suggest that it is self-efficacy with the task that impacts on continued motivation to engage (Bandura, 1994). Thus, a key question is whether it is the 'will' related to self-concept

beliefs or the 'skill' of self-efficacy beliefs that raises motivation to learn (Frederickson & Cameron, 2004: p6).

1.4.3 Self-Efficacy

Self-efficacy theory is considered a circular model where self-efficacy beliefs influence motivational engagement that impacts on learning and achievement outcomes that feed back to and informs self-efficacy beliefs (Bandura, 1994; Linnenbrink & Pintrich, 2003). Thus, self-efficacy also has a role in pupils' self-regulation of their motivation to learn (Seifert, 2004). Consequently, self-efficacy beliefs are goal or task referenced with the learning task influencing self-efficacy beliefs and in turn the learning motivations (Linnenbrink & Pintrich, 2003; Locke & Latham, 2002).

Therefore, self-efficacy beliefs influence task choices, determine how much effort and persistence will be expended, and influence resilience to failure (Schunk, 1990). The theory connects task achievement with confidence and competence beliefs (Zimmermann & Martinez-Pons, 1990). As perhaps indicated from the previous discussions and definition examples, self-efficacy beliefs are particularly sensitive to context and also context variation (Bandura, 1994).

Individuals can tend to naturally select tasks where they feel competent and confident and avoid those activities where they feel less so (Bandura, 1994). In support of this a developmental perspective suggests that young learners quickly associate tasks they are good or efficacious at with tasks they like, perhaps demonstrating that learner motivations are influenced from an early stage with interest initially directed by skill (Wigfield, 1994). Subsequently, inferences and beliefs formed from previous learning experiences inform self-efficacy beliefs and determine motivation and learning approaches to familiar or new learning (Bandura, 1994). Thus, self-efficacy beliefs can be a significant motivational influence on the level and type of accomplishment attempted or undertaken (Pajares & Schunk, 2001; Zimmermann & Martinez-Pons, 1990).

1.4.4 Self-Concept

Research suggests that self-concept beliefs are based on social and self comparisons such as peers and previous learning experiences (Pajares & Schunk, 2001), thus being better at reading than peers or being better at reading than maths. On the other hand self-efficacy beliefs are mainly related to a specific task and not comparative with the self (Bandura, 1994). Although if the task is unfamiliar social comparisons, such as that of peers will be made, thus an example could be 'my friend can read so I can read' (Pajares & Schunk, 2001). This again highlights the interconnections between self-efficacy and self-concept.

There is agreement that affect dimensions linked to self-esteem, self-worth, self-concept and self-efficacy are influential and in addition that there are similarities and interconnection between the concepts. However, it is suggested that it is the exploration of the interactions between these affect based concepts already identified, particularly self-efficacy and self-concept that will further more understanding of motivation processes and influences, rather than further research to define them (Linnenbrink & Pintrich, 2003; Seifert, 2004).

1.4.5 Motivation and Learning Processes: Gender Effects

1.4.6 Attainment

There is evidence to suggest that there are gender differences reflected in learning attainments. For example, there are concerns relating to the underachievement of boys at Standard Grade and Higher examination levels and Government publications highlight 85% of girls in comparison to 78% of boys attained the expected reading levels for their age with the gap continuing to widen in the secondary sector (SEED, 2006).

1.4.7 Attitude

Research also suggests that boys and girls differ in their approach and interaction with the curriculum. For example, girls tend to have higher aspirations and are more conscientious towards completing tasks (Tatar, 1998). Girls are also more inclined to underestimate their ability, express more test anxiety and internalise attributions of failure that has consequences for future learner self-beliefs (Harlen & Deakin Crick, 2002; Hutchison, 2004). In contrast, boys are less positive towards school although

they present as being more confident (Tartar, 1998). Similarly, where girls are more motivated in relation to literacy and reading tasks (Pecjak & Peklaj, 2006) boys tend to have more negative attitudes to reading including negative reading self-concepts (Marsh, Smith & Barnes, 1985). For example, in a longitudinal study of primary age pupils related to phonics it was found that boys had less positive attitudes to reading than girls (Johnston & Watson, 2005b). Other research indicates that girls read more including a wider variety of literature, whereas boys reading experiences are more limited with a narrower range of reading materials (Wray, Medwell, Fox & Poulson, 2000). Thus highlights differences in learning engagement and motivation between genders.

1.4.8 Learning Orientation

Research relating to learning orientation goals also identifies differences between gender. For example a study by Rogers, Galloway, Armstrong and Leo (1998) involved secondary age pupils undertaking English and Mathematic curricular tasks and were assessed for demonstrating mastery, performance or task-avoidance learning strategies. Girls were more mastery orientated in the English task and task-avoidant in the Mathematic based activities, while boys presented as being performance orientated in all tasks. Overall the girls were more successful on the English based tasks and the boys achieved more on the mathematic tasks. The study concluded that there are perhaps different learning orientations between gender as well as different areas of the curriculum demanding different learning approaches. This perhaps exemplifies both the individual and contextual factors that influence motivation as detailed in Figure 1.

Other studies highlight learner perceptions and prior learning experiences as well as contextual variables such as task specificity and teacher interactions as more influential than gender (Keogh, Barnes, Joiner & Littleton, 2000; Tatar, 1998; Wray et al., 2000). Moreover research relating to reading attainment and reading self-concept in Primary four stage pupils did not find any statistical differences between boys or girls (Rider & Colmar, 2006).

Nevertheless there is research to indicate that failure and negative learning experiences can lead to increasing disaffection with school among male pupils

(Hutchison, 2004; Powney, 1997). There is also evidence that suggests that female pupils can feel restricted by the curriculum and become discouraged (Keogh et al., 2000). Therefore, understanding motivation influences and processes may be helpful for supporting all learners.

Motivation and Learning Theories and Perspectives: curricular and pedagogical

1.5.1 Attribution Theory and Goal Theory

This review has so far considered theories that emphasise the relationship and influence of learner beliefs on general learning motivations. There are also other related theories where the focus is on the learning task and the relationship and influence it can have on self-beliefs, particularly self-efficacy (Linnenbrink & Pintrich, 2003). For that reason this review is now going to examine motivational theories with the emphasis on curricular and pedagogical interactions.

Understanding learner perceptions of the causes of success and failure in learning outcomes are of central importance in the development of effective learning interventions (Harlen & Deakin Crick, 2002). Thus attribution and goal theories examine the influence of factors associated with the learning environment and can contribute to the further insight into motivation and effective interventions to encourage motivational behaviour (Frederickson et al., 2004).

1.5.2 Attribution

The theory of attribution refers to a perceived cause of an outcome and is an individual's explanation for that outcome or consequence and is closely related to self-efficacy (Weiner, 1985). The theory proposes a three dimensional taxonomy of the causes of success and failure incorporating ability, effort, task difficulty and luck. Other typical attributing factors identified also include skill, use of strategies, and teacher support (Schunk, 1990; Seifert, 2004). Where self-efficacy theory assigns statements of ability to particular learning contexts, such as 'I am good at reading books', attribution theory goes further and identifies the perceived reason for success or failure, thus 'I am good at reading books because I try hard', where 'trying hard' or effort is the attributing factor (McLean, 2003).

Within Weiner's (1985) model the attributing causes can be located in three causal domains that include stability, locus of control and controllability. The dimension of

stability indicates that outcome attributions, all things being equal, will generally be the same. Whereas unstable outcomes indicate that despite all things being equal, such as the requirements of the task, the outcome will be different and changeable over time and context. Locus of control states that attributions can be external or internal, thus task outcomes or perceptions of success or failure can be internalised and due to effort or external and related to environmental factors such as luck (or teacher effort?). The dimension of controllability indicates that the attributing causes can be controlled and therefore altered by the learner or alternatively outwith and uncontrollable by the learner.

1.5.3 Attribution and Learners' Perceptions

Importantly it is the learner perceptions that place the attributions into either one of the domains that influence motivation (Seifert, 2004). For example, learners who attribute success or failure to ability, perceiving ability to be fixed, will believe task outcomes are stable, internal and uncontrollable. Thus, they will not see effort as a way of changing learning outcomes and will be less resilient to challenge (Frederickson et al., 2004). 'I did well because I revised for the test' and 'I am stupid anyway so there was no point to revising' exemplify the contrasting learner attribution perceptions.

What is more, failure attributed to what the learner perceives as stable causes, such as ability, could continue to lead to future expectations of continued failure and feelings of hopelessness. This is related to and supports Dweck's (1999) entity and incremental views of ability previously discussed in regard to self-beliefs. Thus, learners who attribute success or failure as something they have control over are more likely to accept challenges and persist when faced with difficulty (Smith et al., 2005).

Research has also shown that pupils who expect failure attribute success to characteristics that they perceive as external, unstable and uncontrollable attributes (Frederickson & Cameron, 2004; Seifert, 2004; Weiner, 1985). For instance, success at a spelling test would be attributed to ease and luck and considered unlikely to be repeated. These perceptions would also impact on future learning and motivation to learn (Schunk, 1990). In comparison, students who attribute success to internal and controllable factors are more likely to experience emotions of satisfaction, confidence.

and good self-esteem, thereby positively influencing future learner behaviour and motivation (Seifert, 2004; Weiner, 1985). This perhaps highlights that the outcomes of learning tasks and learner behaviours are dependant on intricate connections between learning task and learner perceptions, such as attribution and self-belief, that have implications on the motivation to engage with other learning (Pajares & Schunk, 2001). Thus 'educational achievement is a complex phenomenon involving interactions of social, instructional and learner factors' (Schunk 1990: p3).

Schunk (1990) further stresses the complex relationship between attribution beliefs, motivation and efficacy in regard to contextual learning factors such as teaching interventions. For instance, studies have indicated that unsolicited teacher assistance considered to be helpful can result in negative attributions and efficacy as such teacher help could indicate low ability. Therefore the help is interpreted as 'I need help and must be stupid and so there is no point in trying'. Similarly, learners reduce effort as a way of protecting perceptions of ability to themselves and in front of peers, thus 'If I don't try hard I will not look stupid' (Dweck, 1999; McLean, 2003; Seifert, 2004).

Such learning behaviours are defined as failure-avoidant and learned helplessness (Seifert & O'Keefe, 2001) and could reflect the disengaged behaviour previously described (Smith et al., 2005). However, Schunk (1990) also found pupils who perceived themselves as having lower ability than their peers, still recognised effort as a relevant learning attribution. These findings have implications for learning and teaching interventions related to emphasising positive learning attributions (Seifert, 2004). Much of the literature uses examples in relation to pupils who underestimate their ability and attribute learning outcomes accordingly. However, there are also incorrect attributions in relation to over estimates of ability and this too has implications for learning and use of appropriate strategies (McLean, 2003).

1.5.4 Goal Theory

Similar to attribution theory, goal theory too considers the influence of, and between, learning tasks on pupils' learning behaviour. Goal theory proposes that planned goals or aims can direct learner behaviour to achieve particular learning objectives and may influence self-efficacy and attribution beliefs as well as motivation (Bandura, 1994;

Locke & Latham, 2002). Goals are defined as objects or aims of an action and are determined by the individual, task conditions (Locke & Latham, 2002). Goals can impact on performance by directing on-task behaviour, energising and/or encouraging effort, maintain persistence on-task and increase understanding and motivation (Locke & Latham, 2002; Zimmermann et al., 1992). This is also supported by other research including that associated with teaching methodologies such as precision teaching (Binder & Watkins, 1990; SEED, 2007).

1.4.5 Goal Theory and Learning Orientation

Performance and mastery goals were previously discussed in relation to intrinsic and extrinsic learning motivations. It was indicated that learning or mastery goals were more effective than performance goals in regard to understanding and also motivation behaviour (Smith et al., 2005; Sideridis, 2005). However, Locke and Latham (2002) consider goal targets in goal theory as distinct from goal orientations. For example, a goal target does not necessarily determine whether a learner is extrinsic or intrinsic goal orientated. This as aforementioned could depend on the pupil learning profile (Kyriacou, 2006). This is perhaps an important distinction and could have implications when interpreting or assessing other theories and learning interventions such as precision teaching (to be discussed later in this review).

That being said, Seifert (2004) suggests that goal orientation, that is either a mastery or performance learning approach is directed by the learner's emotional responses including beliefs formed as a result of previous learning experiences. This perhaps reflects the theories regarding self-beliefs already explored. However, other research indicates that it is the particular curricular targets that can direct learner goal orientations and motivational behaviour (Binder & Watkins, 1990; Locke & Latham, 2002).

1.4.6 Learning Goals: Contextual and Individual Motivation Factors

Like the theories before, research indicates that goal theory has many variables that influence and are interdependent with learning task, learner belief, learning outcome and learner motivation (Locke & Latham, 2002; Seifert, 2004). Therefore both learner beliefs and learning goals or targets will at different times and across different learning situation each be the more dominant and guiding factor (McLean, 2003).

Thus, a learner with high efficacy could approach a task in order to understand more or the particular task could influence the learner's perception that they have the ability to succeed. Both could result in the increased motivation on the task and could also influence future learner beliefs and learning behaviour.

Learner commitment, or what could be described as attitude or motivation to the goal, is crucial to task outcome and is deemed more important when the goal is challenging to the learner (Zimmermann et al., 1992). There are several factors that can influence motivation, for example the goal or task has to be viewed as important to the learner (Black & Wiliam, 2002). This again refers back to interest and utility being relevant factors of motivation (Harlen & Deakin Crick, 2002). In conjunction with importance or relevance the goal or learning task has to be perceived by the learner as being attainable thus again applying to self-belief research and particularly self-efficacy (Bandura, 1994).

Correspondingly when learners are involved in the goal setting process they generally assign higher goals and importantly are more actively engaged with attaining those goals than if the goals were allocated (Harlen & Deakin Crick, 2002; Locke & Latham, 2002). Also attaining goals leads to setting higher or more goals and creates motivation (Locke and Latham, 2002; Smith et al., 2005). This again reflects self-efficacy theory where increased skills lead to increased confidence that influences motivation (Bandura, 1994). However, if learner perceptions are incorrect this could lead to mismatched goals (McLean, 2003). That being said, goal feedback can increase self-efficacy and also correct or alter flawed attributions (Lock & Latham, 2002; McLean, 2003; Zimmermann & Martinez-Pons, 1990). Although, the opposite can also be true where, misdirected feedback and/ or inappropriate learning goals can negatively influence learner activity (Black & Wiliam, 2002; Locke & Latham, 2002).

Both attribution and goal theories contribute to the understanding of motivation in the educational context. As indicated they can influence effective learning and teaching approaches, particularly in relation to facilitating effective learning perceptions and assisting pupils to set relevant learning targets. These theories will be further discussed when considering motivation and pedagogical practices that include metacognitive strategies and precision teaching.

Motivation and Learning Theories and Perspectives: Contextual Factors

1.6.1 Influence of the Teacher

Research also indicates the importance and influence of teacher interactions on pupils' perceptions of, and motivation toward, learning (Seifert, 2004). Teachers can impact directly on the learning environment as they manage the resources, teaching strategies, classroom organisation, task setting and assessment process (Seifert, 2004). For instance, as discussed above, feedback can both positively and negatively influence learners' motivation (Locke & Latham, 2002). Therefore it would seem they are in a central position in relation to the learning process that also includes facilitating learning motivation (Powney, 1997; Wray et al., 2000).

1.6.2 The Influence of the Teacher on Pupils' Self-beliefs and Attributions

Teachers can facilitate a supportive and understanding class environment that promotes pupils' feelings of self-efficacy and effort (Wray & Medwell, 1999). Research suggests that teacher directed interactions and interventions such as explanations of the purpose of the learning task and assessment criteria as well as providing constructive feedback that directs future learning can increase self-efficacy (Linnenbrink & Pintrich, 2003).

In addition, teachers can also help pupils to self-regulate and self-evaluate their work (Fisher, 2005), for example the teaching of reading strategies including demonstrating how and when to use particular strategies (Walker, 2003). As previously discussed, use of self-regulated strategies can lead to more effective mastery learning processes (Seifert, 2004). In contrast, teacher interactions that dominate lessons with the aim of preparing pupils to pass tests or tasks leading to graded feedback rather than task understanding can result in peer comparisons, performance learning and may influence the effort pupils put into future learning (Wray et al., 2000). Furthermore, such teaching interaction styles can disadvantage less confident pupils encouraging ability rather than effort based learning attributions (Fisher, 2005).

Therefore it can be concluded that teacher interactions are an influential motivation dimension, with appropriate teacher interactions instrumental in implementing learning and teaching instruction that can facilitate positive self-belief and increase learning motivation (Linnenbrink & Pintrich, 2003). However, in contrast teacher

interactions can also have a negative effect on pupils' learning perceptions and impede motivation (McLean, 2003).

1.6.3 The Influence of the Teacher on Implementing Learning Programmes

There is evidence to suggest that teachers can be reluctant to implement new and different learning programmes if such programmes are presented as only general principles to be interpreted by the teacher into classroom practices (Black & Wiliam, 2002). This may be because of teaching time and/or confidence in teaching skills (Greenway, 2002) and could have implications for delivery of new effective learning programmes that could be beneficial to pupils (Black & Wiliam, 2002).

Moreover, evidence indicates that highly prescribed programmes with detailed implementation instructions such as Paired Reading (Topping & Lindsay, 1992) or the Clackmannanshire Synthetic Phonics Initiative (Ellis, 2007) are more likely to be accepted into class teacher practices and more reliably and consistently implemented (Topping & Lindsay, 1992). In addition, learning programmes that have scripted teaching resources and teacher training have also been found to be supportive to teachers, beneficial to pupils, and contributed to the commitment and accurate delivery of the learning programme (Ellis, 2007; Russell, 1992; Topping & Ferguson, 2005).

In contrast, less prescribed learning programmes can be more reliant on teacher skills in relation to interpretation and implementation and could result in misapplication and inaccuracies (Topping & Ferguson, 2005). That being said, there is also evidence to suggest that delivery of structured learning programmes are also vulnerable to misinterpretation and misapplication with implications for effective learning outcomes (Black & Wiliam, 2002). For example the term 'paired reading' has become problematic, as it is widely interpreted and applied to any joint reading activity. This has implications for the effectiveness of the programme, as the research evidence is based on the original specific and structured technique and not loosely based interpretations (Topping & Bryce, 2004). Precision teaching, a highly structured teaching method, has also experienced negative connotations and misapplication perhaps due to misunderstanding of the approach (Binder, 2004).

Other research indicates that it is teaching abilities that have a greater impact on pupil motivation and attainment than specific programmes, for example many curriculum approaches and packages have been found both to work and fail and what seems critical are the skills of the teacher (Allington & Johnston, 2000; Hall & Harding, 2003).

1.6.4 Impact of Pedagogy on Motivation

Therefore although both teacher skills and teaching programmes can be considered separate contextual factors that can each influence pupils' motivation to learn, from the evidence discussed it would seem that it is difficult to isolate teaching skills from even a highly prescribed teaching programme (Powney, 1997; Raybould & Solity, 1988). Teaching programmes will be discussed again in more detail in Section 2 with a focus on highly structured precision teaching methods in comparison to the less prescribed metacognitive learning approaches. The influence of these two different teaching methodologies will be analysed in relation to pupils' motivation and learning outcomes.

1.6.5 Teacher Beliefs

Teacher/pupil interactions and curriculum delivery are also influenced by teachers' personal belief processes relating to how they view: knowledge acquisition, ability to learn, gender, and their own teacher skills (Black & Wiliam, 2002; Greenway, 2002; Hutchinson, 2004).

The nature of individual teachers' beliefs about how knowledge and skills are acquired can determine how the curriculum is delivered. For example, evidence indicates that some teachers believe that knowledge is transferred directly from the teacher with pupils' understanding a later and secondary process (Black & Wiliam, 2002). This can lead to teacher dominated lessons that research suggests results in less effective learning and impacts negatively on learning motivation (Harlen & Deakin Crick, 2002). Research further indicates knowledge and understanding results from an interactive learning environment that requires both the teacher and pupil to be actively involved (Hall & Harding, 2003). Therefore the belief that active learner involvement is required for understanding and learning progress could result in a teaching approach that promotes pupil involvement (Zimmermann & Martinez-Pons, 1990).

Beliefs about intelligence were discussed earlier from the perspective of the pupil and it was found that pupils' views of intelligence can influence learning motivation (Dweck, 1999). Similarly, the beliefs that teachers hold about learning potential concerning whether ability is fixed or incremental can also impact on pupil motivation (Dweck, 1999). For example, evidence indicates that fixed beliefs about ability are inaccurate and unconstructive (Black & Wiliam, 2002). Therefore, if teachers view struggling learners as having fixed ability they may have lower learning expectations for those pupils and also place less emphasis on encouraging effort (Hall & Harding, 2003). This will lead to less teacher support in relation to implementation of learning strategies, delivery of the curriculum and guidance (McLean, 2003). In addition, fixed beliefs about ability could also result in less positive nurturing teacher/ pupil interactions that may also negatively influence pupil motivation to learn (Seifert, 2004).

Efficacy beliefs of teachers are themselves related to their instructional practices and to pupils' achievements and well being (Pajares & Schunk, 2001). Efficacious teachers can create positive learning environments with challenging tasks as well as support, encouragement and high expectations (Pajares & Schunk, 2001). However, less confidence in skills can result in reluctance or resistance to embrace new teaching programmes including less effective implementation of learning programmes (Black & Wiliam, 2002; Ellis, 2007). Therefore affective motivation factors relating to teacher's self-efficacy beliefs also have implications for pupil's learning motivation and attainment.

Finally, as discussed, gender can also have implications for learning motivation (Harlen & Deakin Crick, 2002) and this also relates to teacher/ pupil interactions. Teacher interactions towards boys and girls can be different and may indicate gender-stereotyped beliefs regarding learner abilities and behaviour (Vardill & Calvert, 2000). For example, teachers can view boys as challenging, competitive and demanding of attention, whereas girls can be seen as conscientious, cooperative and better behaved (Tatar, 1998). This can lead to teachers having higher expectations of girls than they have of boys (Tatar, 1998) as well as more negative feedback to boys (Vardill & Calvert, 2000) and as discussed above this can influence pupil learning motivation.

1.6.6 Summary of Teacher Influence on Motivation to Learn

Much research measures effective teaching in relation to delivery or implementation of activities recognised as being effective to promoting learning motivation, such as modelling writing or sounding out letters, providing clear instruction and prompting learning behaviours (Wray et al., 2000; Taylor, Peterson, Pearson & Roderiguez, 2002). However, effective teaching also involves the promotion of positive teacher/peer relationships to support learning motivation. Seifert (2004) describes this as promoting a nurturing learning environment with effective classrooms seen as warm, cooperative and democratic (Taylor, Pressley & Pearson, 2000). Allington & Johnston (2000) state no particular instructional programme characterises influential teaching, however effective teachers were sensitive to individual needs, established trust, had high expectations and emphasised mastery orientated teaching.

Therefore, teacher interactions related to teacher/ pupil relationships and curriculum delivery can influence pupils' learning motivations particularly self-efficacy and attribution beliefs (Seifert, 2004; Wray et al., 2000). Furthermore, teacher interactions are influenced by teachers' beliefs in relation to learning processes including how knowledge is communicated, whether learning abilities are fixed or incremental, expectations of pupils that may be affected by gender and also teacher's own self-efficacy of their teaching skills. Such findings, highlights the multi-faceted nature of motivation and also supports the development of learning and teaching interventions.

Motivation to Learn: Explanation of Figure 1

The preceding review suggests the theoretical model displayed in Figure 1 (page 26) and details the motivation factors and interactions discussed and analysed. The model highlights individual and contextual factors related to learning motivation, the effects of facilitating learning motivation including the impact that increasing learning motivation can have on attainment and attitude outcomes as well as the interactions between the motivation factors. Although the model details the motivation factors and effect of these factors separately the directional arrows serve to indicate that all the factors, both individual and contextual, influence and are influenced by each other. The second section of this review considers the contextual factors related to the operationalisation of motivation principles as reflected in two different teaching programmes and is represented in Figure 2.

Factors Related to Learning Motivation

From research it is apparent that individual factors relating to affect dimensions are influential and have particular significance where learners experience difficulties with learning. Thus the model presented in Figure 1 highlights self-belief, self-concept, self-efficacy and attribution as factors related to motivation. Learner orientation and whether a learner is intrinsically or extrinsically focused is a further cause of motivation directing how the learner will approach learning tasks. This is related to mastery and performance learning respectively. Gender is another individual factor that is considered in this model and influences attitudes towards learning as well as teacher/pupil interactions. Thereafter the contextual factors detailed are teacher and curriculum related, contained within these categories are teacher/ pupil interactions, teacher beliefs, curriculum tasks and specific teaching programmes.

Effects of Learning Motivation

When learning motivation is facilitated the effects relate to increased learner self-belief, self-concept and self-efficacy. The learner will also have positive attributions in regards to skills, effort and ability. Moreover the learner will be intrinsically orientated including increased task behaviour.

Outcomes of Learning Motivation

Motivation to learn can lead to increased attainment and increased attitude to learn that loops back and further informs and influences the causal motivation factors.

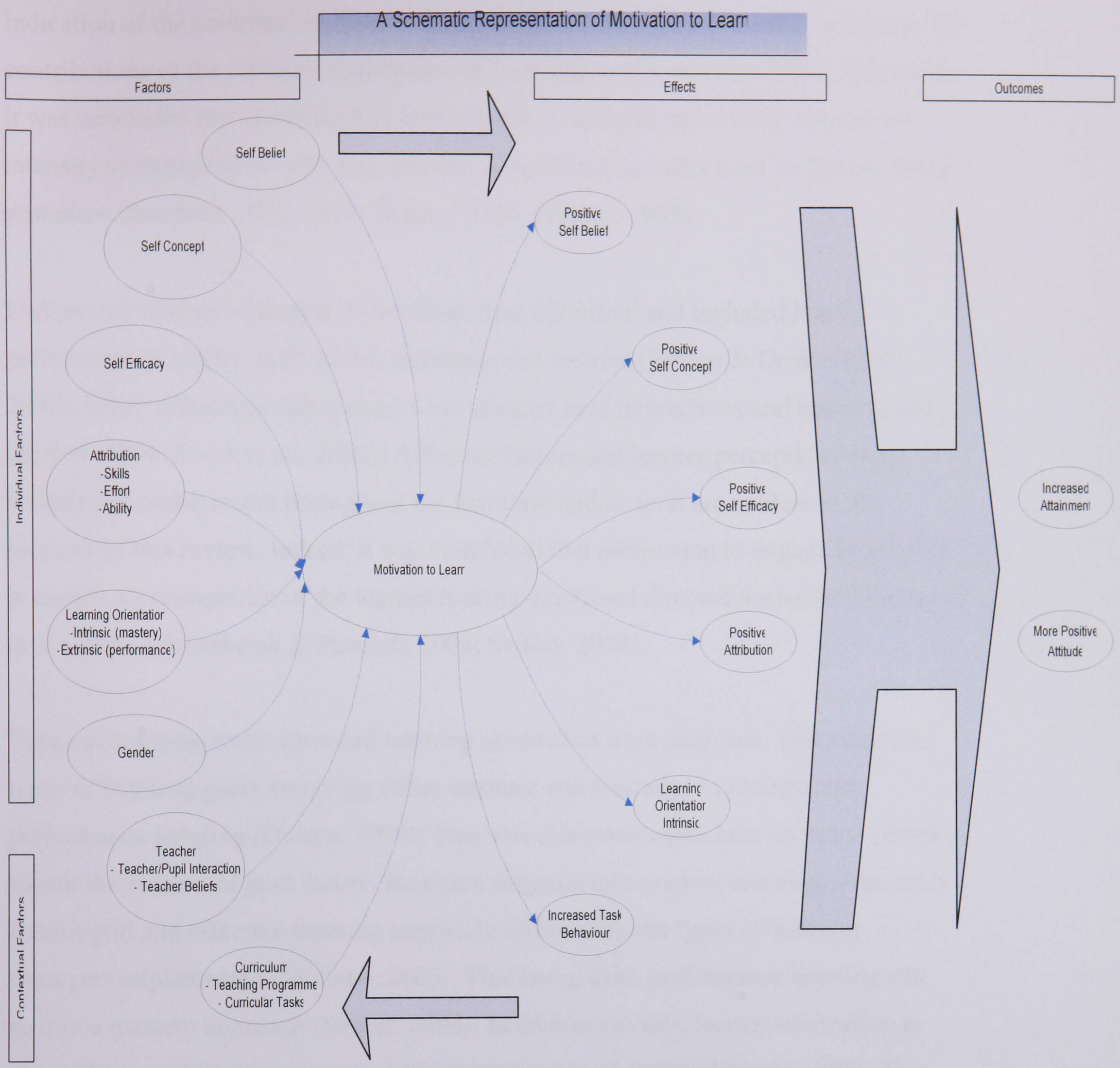

Figure 1. A Schematic Representation of Motivation to Learn

1.6.7 Summary of points

The importance of motivation was discussed including research indicating that motivation is crucial to effective learning processes, is the foundation of all learning tasks, and is a recommended topic for educationalists (Frederickson & Cameron, 2004).

The question of 'what is motivation' was explored. This included the difficulties of definition and the consistency of applying motivation and associated concepts, such as self-efficacy, self-concept and self-esteem. These difficulties are perhaps an

indication of the complexities involved in understanding motivation and unpicking the contributions of the different dimensions (Frederickson & Cameron, 2004). Generally, it was concluded that motivation to learn relates to and informs choice of task and intensity of engagement with that task and is significantly influenced by learner belief processes (Bandura, 1977; 1994; Seifert, 2004; Weiner, 1985).

Factors and themes relating to motivation were identified and included learner perceptions of ability, skill, effort, relevance and interest (Harlen & Deakin Crick, 2002). Other influential dimensions were teacher/ peer interactions and learning task (Seifert, 2004; Smith et al., 2005). Affective factors and learner perceptions were found to be omnipresent throughout the literature and as such are evident in all sections of this review. Indeed, it was concluded that motivation to engage in learning is mainly a consequence of the learner making emotional directed decisions (Kyriacou et al., 2006; Linnenbrink & Pintrich, 2003; Seifert, 2004).

Types of learning motivation and learning orientation were analysed. This related to types of learning goals involving either intrinsic and mastery or extrinsic and performance learning (Dweck, 1999). This was discussed again later on in the review within the context of goal theory. Research suggests that mastery learning is the more meaningful and effective learning approach, influencing the types of learning strategies implemented (McLean, 2003). That being said, performance learning can lead to a mastery approach (Seifert, 2004). In addition to this, learner orientation is also influenced by either entity or incremental views of ability (Dweck, 1999). This was further discussed when considering attribution theory and causal perceptions in relation to task outcomes and it was again highlighted that affective learner expectancies can influence task motivation (Weiner, 1985).

Self-belief theories related to the individual learner were detailed and it was indicated that self-efficacy and self-concept were thought the most influential (Bandura, 1994; Pajares & Schunk, 2001). Nevertheless there were contrasting opinions regarding distinctiveness, relationship and primacy of the concepts (Linnenbrink & Pintrich, 2003). The important question of whether it is the 'will' of self-concept or the 'skill' of self-efficacy that is more influential in increasing motivation to learn was explored (Frederickson & Cameron, 2004). Furthermore, it was highlighted that continued

research of the relationships and interactions between the already defined concepts could be beneficial to confirming or developing effective learning interventions (Linnenbrink & Pintrich, 2003).

Gender differences in attainment were highlighted with some evidence suggesting that at the primary and secondary stages girls have higher attainments (SEED, 2006). In addition, research indicates that boys have more performance orientated learning whereas girls have a more mastery approach (Tatar, 1998). Teacher beliefs also suggest teacher attitudes differ with teachers having higher expectations of girls. Thus the influence of gender on learning orientation and teacher/pupil interactions could explain some of the differences in pupil motivation and learning outcomes (Hutchison, 2004; Wray et al., 2000). Moreover, the evidence from gender and teacher dimensions reflecting both individual and contextual factors exemplified the multi-faceted nature of the interactions and influences between the motivation dimensions.

Thereafter curricular and pedagogical theories regarding attribution and goal theory were detailed. Attribution theory relates to causal explanations for task outcomes (Weiner, 1985) and from the research it was again apparent that learner perceptions and emotions are paramount when rationalising task outcome. In addition, the theory highlighted learner controllability as a key factor in directing engagement with the task (Weiner, op.cit). Goal theory too detailed the influence of the learner involvement when setting goals on learning outcomes (Locke & Latham, 2002; Zimmerman et al., 1992). It was also debated whether attributions or goals are more influential in directing pupil learning orientations related to mastery or performance (Seifert, 2004). However, both theories stressed the importance of learner engagement, feedback processes, and the influences of curriculum tasks on motivation (Harlen & Deakin Crick, 2002; Smith et al., 2005). In addition, attribution theory also highlighted the importance of learner causal beliefs as essential to learning motivation (Seifert, 2004; Weiner, 1985).

Moreover, it was agreed that understanding self-belief, attribution and goal theories can help with the classroom implementation of learning strategies, involving goal setting, pupil involvement and feedback processes, commonly described as

metacognitive approaches (Zimmermann, 1990). These are strategies that are recognised as influencing motivation and promoting effective learning outcomes (Black & Wiliam, 2002; Linnenbrink & Pintrich, 2003). Metacognitive interventions will be discussed in more detail later in this review.

It was also highlighted that teacher beliefs and teaching programmes are influential contextual factors in learning motivation impacting on teacher/pupil interactions and implementation of the curriculum (Greenway, 2002; Topping & Ferguson, 2005). Furthermore, positive teacher/pupil interactions (Wray, et al., 2000), supported by a structured well delivered educational programme (Black & Wiliam, 2002), are key to promoting learner skill and will in relation to increasing motivation and learning progress (Linnenbrink & Pintrich, 2003).

From the literature it is evident that key questions relate to the cause and effect of the varied motivation dimensions and the primacy of any of those factors (Linnenbrink & Pintrich, 2003). Related to this, is the question of whether it is 'will' or 'skill' in the classroom that is most important to effective learning (Frederickson & Cameron, 2004; Pintrich & Schunk, 2001). That being said, the overall finding from the literature is that learner affect and self-belief are fundamental in learning motivation (Bandura, 1994; Lock & Latham, 2002; Seifert, 2004; Weiner, 1985). Furthermore, it is increasing learner confidence and resilience that can transfer into 'the learning-orientated behaviour of the intrinsically motivated student' (Seifert, 2004: p148).

This review has so far demonstrated that motivation is very complex conceptually, yet there exist identifiable themes and factors as well as theories that contribute to explanations and understanding of motivation. What is more, from the research it is possible to operationalise motivation into practical interventions for the classroom (Black & Wiliam, 2002; Linnenbrink & Pintrich, 2003; Seifert, 2004). The review is now going to discuss the research related to motivation and literacy with a focus on struggling readers. Finally, different teaching interventions that reflect aspects of motivational principles will be reviewed.

The motivation model in Figure 1 displays the factors, effect dimensions and outcomes discussed in this section.

Section Two

2.1 The implications of motivation for reading

It is acknowledged that in today's demanding society reading skills are not just relevant to school but are fundamental to most aspects of daily life and can impact on future prospects. It has been said that since World War 1 until the present day the demands and diversities of daily life continue to bring different and new challenges that require more highly developed literacy skills (Stainthorp, 2002).

Scottish Government literacy statistics indicate that 85% of girls and 78% of boys at 13 years of age have not reached the reading level expected for their age (SEED, 2006). These figures are also representative of the rest of the United Kingdom (DfES, 2006). Moreover, a review of longitudinal studies states that pupils who have ongoing reading difficulties will experience lower academic attainments, be at risk of school exclusion, as well as having other behavioural and social problems (Cassen & Kingdom, 2007). Given the relevance and influence of literacy on most aspects of the curriculum, and also the wider long term implications, the focus on raising literacy attainment at national and local levels is understandable (SEED, 2007).

Motivation is an essential factor in learning progress (Frederickson & Cameron, 2004) and this part of the review is now going to discuss the role of motivation in promoting literacy and reading skills. Nationally and world-wide there has been much research into reading acquisition, reading difficulties and reading interventions, and from this the relevance of motivation in reading at all levels has been highlighted (HMIE, 2007; National Reading Panel, 2000, 2006; SEED 2005).

2.1.1 Reading Self-Belief Theories

As previously reviewed, the principles relating to motivation and associated interventions, such as increasing self-beliefs through attribution factors, implementing goal or feedback processes are applicable to all learners (Black & Wiliam, 1998, 2002; Smith et al., 2005). However, this is perhaps more so for pupils who find learning challenging and in particular those pupils who are struggling readers (Guthrie & Davis, 2003; Guthrie, Hoa, Wigfield, Tonks & Perencevich, 2006). For example, studies have found that struggling readers tend to have low confidence,

conceptualised as low self-efficacy, in their reading skills and subsequently use less effective learning strategies and can present as task avoidant, having less ability and lacking in effort. In contrast proficient readers appear more confident, complete more tasks and are persistent when the tasks become more challenging (Guthrie & Davis, 2003). In addition, Wigfield and Guthrie (1997) found that pupil's persistence in learning to read and future engagement with reading is linked to perceptions about ability, self-efficacy and others' expectations.

This reflects the research surrounding self-beliefs and attribution previously discussed in relation to motivation and learning. This research indicates that learners are more likely to engage in, persist with, and use more effective strategies in tasks where they perceive themselves to be competent or believe they can learn new skills (Bandura, 1994; Pajares, 1997). Thus, motivation towards reading is a complex concept involving a mixture of attitudes, beliefs of self-efficacy and self- concept, as well as interest and effort (Stainthorp, 2002).

2.1.2 Reading Self-concept Theory

From this, and the motivation research previously discussed, it is perhaps unsurprising that the findings related to self-concept theory are also highly relevant to reading motivation (Chapman & Tunmer, 1997; Chapman, Tunmer & Prochnow, 2000; Rider & Colmar, 2006). Learning motivations, including self-beliefs, are influenced by previous learning experiences (Pajares & Schunk, 2001). Similarly, Stanovich (1986) proposed that initial experiences in learning to read influence both future motivation and the development of reading related self-perceptions. Thus, it is further predicted that negative learning experiences will in turn affect future reading performance, this is now known as the Matthew Effect (Stanovich, 1986). Therefore, learners who fall behind in their reading, subsequently read less and the learning or skills gap widens (Topping & Ferguson, 2005). Moreover, the negative Matthew Effect refers to the emerging negative self-concepts and consequential reduction of opportunities that can promote positive self-perceptions (Stanovich, 1986; Dreher & Baker, 2003).

Issues in reading motivation research are similar to those found in general learning motivation that was discussed in Section 1. This includes the debate over the cause and effect primacy of will and/ or skill (Guthrie & Davis, 2003), the causal ordering

of the motivation factors (Linnenbrink & Pintrich, 2003), as well as the difficulties with defining the self-belief dimensions (Rider & Colmar, 2006). And as previously discussed, this can be problematic when measuring the strength of, and comparing relationships between, the dimensions or factors (Linnenbrink & Pintrich, 2003; Rider & Colmar, 2006). That being said, where self-concept concerns general descriptive and evaluative beliefs (Pajares & Schunk, 2001), Chapman and Tumner (1995) define reading self-concept as the combination of three interrelated but separately defined components relating to competence, ease or difficulty of task and attitude. Moreover, this has now developed into the Reading Self-Concept Scale (RSCS) recognised as having statistical reliability and validity (Frederickson & Cameron 2004).

Research also suggests a specific relationship between reading achievement and reading self-concept. For example, a study involving 80 primary four stage equivalent Australian pupils compared components of reading skills with dimensions of self-concept. The findings suggested a significant relationship overall and also significance between the sub-scales of reading accuracy and comprehension with self-concept (Rider & Colmar, 2006). Moreover, the more competent readers held more positive reading self-perceptions and attitudes towards reading than less competent readers. In addition, the findings related to each of the separate reading skills measured (Rider & Colmar, 2006).

These findings are supported by other research indicating that pupils who are experiencing difficulty with reading, believe they have less ability and feel more negative towards reading (Chapman & Tumner, 1997, 2000). In addition, such pupils did not expect to do well with their reading tasks (Chapman, et al., 2000; Guthrie & Davis, 2003; Schunk, 2003). In relation to this, studies indicate that in contrast to good readers, poor readers have been found to attribute failure on reading tasks to the absence of ability, and successes to factors other than ability (Butkowsky & Willows, 1980). Thus, the struggling reader maintains low self-concept beliefs (Butkowsky & Willows, 1980). Such causal attributes relating to the domains of stability, locus of control and controllability, previously discussed in Section 1 in regard to Weiner's (1985) model can influence future efforts. Further links are demonstrated in the statistically relevant component sub-scales of Chapman and Tumner's (1997) reading

scale that also reflect the causal attributes highlighted in Weiner's (1985) attribution theory.

Research also indicates that links between task difficulty, ability and comparison with peers are established by eight years of age (Chapman & Tumner, 1995; Guthrie & Davis, 2003). Not only does this suggest that reading self-concept has particular component parts and is related to reading attainment, but also that enhancing reader's self-concepts at an early stage could influence future reading skills and motivation to read (Rider & Colmar, 2006).

Other studies also highlight these issues indicating that struggling readers are most probably aware of their difficulties, have experienced negative learning outcomes, and could be on an individual reading programme that, ironically, rather than being viewed as supportive, results in further class isolation (Fisher, 2005). What is more, reading is considered a social activity with attached high societal values (Guthrie & Davis, 2003; Walker, 2003) and this too has implications for self-concept beliefs in general (Seifert, 2004) and reading self-concept in particular (Miller, 2003).

The RSCS (Chapman & Tumner, 1995) reflects general evaluative perceptions of self-concept related to reading (Rider & Colmar, 2006). Wigfield & Guthrie (1997) developed the Motivation to Read Questionnaire (MRQ), a psychometrically reliable assessment that also reflects self-efficacy, attribution and learning orientation reading constructs (Frederickson & Cameron 2004). Such measures lend support to the existence of different self-belief dimensions, while also addressing the underlying question of distinctiveness between the hypotheses of self-concept and self-efficacy. Thus as discussed learner beliefs relating to ability and task complexity can influence reading attitudes and motivation to undertake reading tasks.

2.1.3 Reading Self-efficacy Theory

Self-efficacy theory also proposes that learners are more likely to engage in tasks where they feel competent (Bandura, 1994). Thus, reading research also indicates that pupil persistence in learning to read is linked to perceptions of reading skills (Reutzel & Smith, 2004; Roberts & Wilson, 2006). Guthrie and Davis (2003) concur with this finding although state that struggling readers are also influenced by teacher

expectations, again highlighting the social and societal influences that also affects other self-beliefs as detailed above. In addition contextual motivation factors related to teacher interactions (discussed in Section 1) also influence struggling readers (Wray & Medwell, 1999).

Research indicates that it is at mid-primary stages that reading tasks become more challenging and comparison with peers more important (Wigfield & Guthrie, 1997). Furthermore, the gap between readers who are struggling begins to widen, the difficulties are more apparent, and the reader engages less (Guthrie & Davis, 2003; Wigfield, 1997). This perhaps demonstrates the complexity of separating the self based dimensions. For example, both reading skills and reading self-concept interactions are evident. The reading task is more challenging thus requiring competency or efficacy evaluations and also peer comparisons will influence self-beliefs as a whole. This in turn influences future engagement and the negative Matthew Effect becomes apparent (Stanovich, 1986).

Reading research indicates that motivational factors related to struggling readers are qualitatively different from the motivations of pupils who are skilled but who dislike reading (Guthrie & Davis, 2003; Schunk, 2003). This reflects the general motivation research discussed earlier that highlights the differences between de-motivated and disengaged pupils (Smith et al., 2005). Similarly, Guthrie and Davis (2003) describe struggling readers as disengaged stating the differences lie in such pupils' low self-efficacy beliefs and it is this that prevents engagement with and future progress in reading. Linked to this are the extrinsic learning orientations of struggling readers, that as previously discussed encourage performance based learning that can further impact negatively on self-efficacy beliefs (Harlen & Deakin Crick, 2002).

2.1.4 Reading Theory Summation

As this review has shown, struggling reader self-beliefs, whether self-efficacy, self-concept or the interactions between the two have a significant impact on reading progress and consequently reading motivation (Frederickson & Cameron, 2004). Self-efficacy involves reader perceptions that are related to specific literacy tasks and/ or skills (Wigfield & Guthrie, 1997), whereas self-concept is more general, although can also be domain specific to reading (Rider & Colmar, 2006). Self-concept beliefs are

also influenced by environmental influences such as peers' or society's values (Guthrie et al., 2006; Linnenbrink & Pintrich, 2003). This can have a significant affect on struggling readers as there are high societal values, judgements and expectations placed on reading achievements that are perhaps absent from other areas of the curriculum (Pajares & Schunk, 2001; Stainthorp, 2002). In addition, by mid-primary stages struggling readers have experienced negative learning and are aware of and are sensitive to their difficulties (Chapman & Tumner, 1995).

The self-beliefs formed then further direct reader evaluation and can result in causal attributes of the success or failure of task outcomes, generally related to ability, effort or luck (Weiner, 1985). Struggling readers tend to attribute task failures to ability and successes to luck (Butkowsky & Willows, 1980). Ultimately this can lead to what is termed the negative Matthew Effect (Stanovich, 1986) whereby struggling readers become reluctant to engage with reading and thus have less opportunity for practice and increasing reading skills. This can then lead to the entrenchment of negative self-concept and self-efficacy beliefs of being a poor reader with a lack of reading skills (Guthrie et al., 2006). These findings are also reflected in the research surrounding performance orientated learning and the associated failure-avoidant and learned helplessness behaviours (Seifert & O'Keefe, 2001).

2.1.5 Reading and Teacher Interactions

As previously discussed, teacher interactions are important contextual motivation factors and this is perhaps more so with learners who are struggling (Chapman & Tumner, 1995). Moreover, reading progress requires active engagement on the part of the learner and how the teacher interacts and/or directs the learner affects how active the engagement can be (Fisher, 2005). As also discussed earlier, teachers who encourage pupil/ teacher dialogue facilitate more effective pupil interactions than traditional teacher led instruction that can disengage struggling readers (Walker, 2003). Research further indicates that teachers can influence and direct positive mastery learning approaches in relation to struggling readers that benefits reading progress (Guthrie & Davis, 2003). This perhaps has implications for teacher interactions in relation to struggling readers who can be performance goal orientated, anxious, fear failure and be embarrassed about reading out loud (Guthrie & Davis, 2003).

2.1.6 Reading, Teacher Interactions and self-efficacy

Self-efficacy is considered an important motivation factor particularly in relation to struggling readers, for example efficacious readers use more metacognitive learning strategies than readers who have low-self-efficacy (Sideridis, 2005; Walker, 2003) Self-efficacy is generally influenced by feedback from specific task outcomes, thus successful task outcomes can result in increased self-efficacy (Guthrie et al., 2006). So too, encouraging positive attributions such as acknowledging effort can increase self-efficacy (Weiner, 1985). Importantly, self-efficacy can also be increased with positive verbal responses from the teacher and particularly when the comments relate to the task and attributes success to using strategies that are learnable (Schunk, 2003).

While self-efficacy enhances motivation to learn, and impacts on academic performance (Zimmermann & Martinez-Pons, 1990), self-efficacy without the prerequisite knowledge and skills will not result in improved literacy performance (Rider & Colmar, 2006). Thus, teacher interactions and teaching programmes are both influential contextual motivation variables that are difficult to consider in isolation, with both important to facilitating positive learning experiences and influencing pupils' motivation.

2.1.7 Reading Interventions and Implementing Motivation Learning and Teaching

Reading interventions generally reflect the theoretical underpinnings of reading theory and reading motivation (National Reading Panel, 2006; SEED, 2005; Topping & Ferguson, 2005). Nevertheless, there are contrasting views in regard to reading acquisition that influences reading interventions (Stainthorp, 2002). Nonetheless, it is accepted that effective reading interventions require both relevant remediation programmes in conjunction with supporting appropriate learner perceptions and re-engagement with reading (Rider & Colmar, 2006; SEED, 2005).

There is an abundance of research surrounding effective learning practices and reading interventions. For example, Reutzel and Smith (2004) conducted a synthesis of reading strategies based on American national reviews, including the National Reading Panel (2000), and found similar interventions to those found in UK based publications (e.g., HMIe, 2007; National Reading Panel, 2000, 2006; SEED, 2005). Moreover, the interventions relating to supporting struggling readers were also

consistent with those used to increase general learning motivation. For example, Linnenbrink and Pintrich, (2003) and Seifert (2004) recommend encouraging high but accurate self-efficacy through relevant feedback and fostering understanding that competence is changeable and controllable. Similarly, Reutzel and Smith (2004) and Torgesen (2002) detail particular reading activities to cultivate positive intrinsic motivation leading to expectations of success and high engagement. Therefore research emphasises that interventions which increase positive self-beliefs could be beneficial to improving reading skills and motivation to read.

Other recommendations found in the literature for general learning motivation includes providing challenging but achievable tasks, clear communication of the objectives of the lesson, facilitating independent and self-directed learners through setting relevant tasks, useful feedback and promoting positive teacher/ pupil interactions (Black & Wiliam, 2002; Seifert, 2004; Smith et al., 2005). The strategies suggested for supporting and motivating struggling readers are more specific but are similar to general learning motivation strategies. Such strategies include, involving teacher modelling and demonstration of specific reading skills, encouraging independent reading practices, allowing pupil choice in reading resources, and promoting peer discussions (Guthrie et al., 2006; Oldfather, 1999; Reutzel & Smith, 2004). This also indicates that the distinction between general reading interventions and those related to struggling readers are more often qualitative differences involving attention to the level of detail, awareness of individual difficulties, and sensitive implementation (Guthrie & Davis, 2003).

Research, including learning strategies proposed by Reutzel and Smith (2004) reflects such qualitative differences. This research identifies the 'goldilocks principle' (Reutzel & Smith, 2004: p80), highlighting a corresponding balance between task selection based on interest and task difficulty can influence motivation. Thus, tasks that are selected solely for interest may prove too difficult, perhaps resulting in negative attributions, affecting learner self-efficacy and ultimately motivation. In this regard, the teacher could assist the pupil in selecting interesting but appropriately challenging tasks (Reutzel & Smith, 2004). Furthermore, if the task is suitable and the learner has been involved in task selection it is more likely that self-regulated learning and on-task motivation will occur (McLean, 2003; Teaching & Learning Research

Programme, 2007). These principles apply to interventions for struggling readers (Topping & Ferguson, 2005; Torgesen, 2002).

Many of the above interventions promote mastery learning and are known to facilitate self-regulated and independent learning (McLean, 2003). Such learning approachs are representative of the metacognitive processes to be discussed in the next sections (Flavell, 1987; Zimmermann, 1990).

2.1.8 Reading Acquisition

As the introduction of this section indicated, reading theory and reading acquisition is a much debated area and there are contrasting views informing reading interventions (HMIe, 2007, SEED, 2005). The more traditional approach to reading is sequential and hierarchical starting with learning individual sounds and letters progressing to whole words, this approach emphasises phonemic and phonological awareness of the alphabetic system (Johnson & Watson, 2003; Russell, 1992). This process has to be actively taught and is not thought to be spontaneous or natural unlike oral language development (Ehri, 2002; Torgerson, Brooks & Hall, 2006).

Thus, it is argued that reading acquisition is a learned and skilled based behaviour that requires a systematic and structured teaching programme (Hatcher, Hulme & Snowling, 2004). This could relate to precision teaching approaches discussed later in this review. In contrast, reading theory suggests that reading is acquired as a result of real world language opportunities and exposure to books and as such whole words are taught from the outset (Byrne, 2002). Current theories incorporate a combination of both approaches and reading strategies should thus demonstrate a balance of learning technical processes with opportunities for whole language based activities (Torgesen, 2002).

Nonetheless, effective reading remediation interventions propose an explicit and intense phonics component as this can be most effective to struggling readers and reading recovery (Greenaway, 2002; Hatcher et al., 2004). Moreover, it is found that a highly structured approach to the teaching of reading can have a positive effect on both preventing reading failures and supporting struggling readers (Snowling, 2002). Such structured programmes can address fluency difficulties as well as providing

explicit learning strategies, such as sounding out and blending letter sounds, both of which have been identified as issues pertaining to struggling readers (Torgesen, 2002). That being said, other research indicates that reading approaches focussing on memory tasks (commonly referred to as rote learning), with the accompanying high level of teacher directed instruction, are not effective interventions for struggling readers (Reutzal & Smith, 2004; Walker, 2003).

2.1.9 Reading Progress, Struggling Readers and Motivation

However, research indicates that both learner skill and learner belief are significant factors in supporting struggling readers. Importantly, increasing specific skills can positively impact on learner belief and has been discussed as influencing learning motivation in general and struggling readers in particular, reflecting self-efficacy research (Bandura, 1994). This also reflects the findings proposing appropriate reading remediation programmes with facilitating positive learner perceptions (Reutzal & Smith, 2004; Rider & Colmar, 2006).

In summary, general motivation and specific reading research would seem to concur that interventions promoting positive learner perceptions are essential and can be significantly influenced by 'nurturing pupil/ teacher interactions' (Linnenbrink & Pintrich, 2003; Pajares & Schunk, 2001; Seifert, 2004: p148) and this includes constructive feedback processes (Black & Wiliam, 2002; Reutzel & Smith, 2004;). Such interventions require specific, meaningful verbal interactions and dialogue between the learner and teacher (Pajares & Schunk, 2001; Zimmermann et al., 1992). The purpose of such interventions is to foster beliefs pertaining to control and competence with a view to facilitating autonomous and self-directed learning (Linnenbrink & Pintrich, 2003; Seifert, 2004; Schunk, 2003). In addition, there also has to be the support of a structured reading remediation programme to increase struggling reader skills in relation to reading fluency and use of specific phonemic strategies (Hatcher et al., 2004; Snowling, 2002).

2.2 Motivation and Pedagogy

Motivation is a central part of learning, is crucial to delivering an effective curriculum, and one purpose of understanding motivation is to determine and implement effective learning and teaching interventions (Frederickson & Cameron,

2004). Therefore this section of the review will discuss two particular learning and teaching interventions that reflect some of the motivational principles explored. As considered earlier, goal setting procedures (Locke & Latham, 2002), and facilitating accurate attributions (Weiner, 1985), can influence motivation including resilience to negative feedback, persistence with difficult learning challenges and encourage self-regulated learning (Harlen & Deakin Crick, 2002; Smith et al., 2005). Accordingly, precision teaching and metacognitive learning practices that reflect these dimensions will now be discussed.

Although these are two different teaching methodologies, this review will demonstrate that both could be considered examples of such learning and teaching interventions that embrace motivation philosophies. Furthermore, it could be asserted that precision teaching is a skill based approach (Ainscow & Tweddle, 1979) whereas metacognitive practices are more related to learner perception and cognitive processes (Flavell, 1987). Thus, these interventions can be seen as representative of the skill and will of motivation, as previously discussed (Linnenbrink & Pintirch, 2003; Rider & Colmar, 2006; Russell, 1992).

2.3 Motivation and Pedagogy: Metacognitive Intervention

2.3.1 Metacognitive Processes Defined

One purpose of motivation interventions can be to seek, change or modify faulty learner attributions including views about success or failure (Frederickson & Cameron, 2004). Metacognition is commonly described as 'thinking about thinking' or 'thinking about how to think' and this process can positively influence learner perceptions (Flavell, 1979; Frederickson & Cameron, 2004). Metacognition has been described as self-regulated learning that involves strategic learning actions (Butler & Winne, 1995). Thus, it is an awareness of learning processes and as such is, knowing how to learn, knowing which strategies work best and thinking critically (Zimmermann, 1990).

This involves the learner monitoring ongoing task progress while at the same time making changes or adapting learning strategies if required (Cetinkaya & Erktin, 2002) and responding to feedback produced from the task outcomes (Locke and Latham, 2002). Therefore, metacognitive skills involve task awareness, and being able to plan

tasks as well as monitor and self-evaluate task outcomes (Frederickson & Cameron, 2004; Zimmermann, 1998). In addition, it is also important that the learner can interpret either self-generated assessment or feedback from other sources into positive learning actions (Locke & Latham, 2002; Zimmermann et al., 1992).

Thus, metacognitive interventions are learner directed and generated, involving active learner involvement in decision making processes, such as assessing, identifying, questioning and evaluating what resources, skills and effort are required for the task (Stevens, Van Werkhoven, Stoking, Castelinjns & Jager, 2001). As such, they reflect mastery orientated learning that evidence suggests is generally more effective (Dweck, 1999).

2.3.2 Metacognitive Interventions

Metacognitive learning is a general non-specific approach that needs to be explicitly taught and is applicable to most learning situations (Flavell, 1987). As previously highlighted, research suggests that teachers can teach pupils to think critically about tasks, identify helpful strategies and encourage control of learning (Blair, 2003; Fisher, 2005; Linnenbrink & Pintrich, 2003; Walker, 2003). As a consequence, and as discussed above, pupil/ teacher interactions are especially influential and commonly such interactions relate in some form to feedback (Fisher, 2005; Topping & Ferguson, 2005). Feedback as aforesaid is central to learning progress, however it needs to be embedded within a learning cycle that involves metacognitive processes (Zimmermann, 1998).

2.3.3 Metacognitive Processes: Feedback

Research indicates that feedback can be viewed by the learner as deeply social and personal impacting on self-beliefs and is thus not just a teaching procedure (Pajares, 1997; Reutzel & Smith, 2004). Feedback can be formalised and involve processes of summative and formative procedures, however it can also take the form of informal remarks made by a teacher during an activity as well as resulting from the more implicit understandings of teacher/ pupil expectations (Black & Wiliam, 1998: Fisher, 2005). Research indicates that feedback processes are significant to learning engagement (Butler & Winne, 1995) and effective feedback should be objective, task-orientated, highlighting learner strengths and identifying possible useful strategies

(Locke & Latham, 2002). What is more, metacognitive processes can facilitate such effective, learner-generated, feedback (Flavell, 1987; Zimmermann, 1998). Research recommends that feedback should relate to concrete explicit explanations of task or learning outcomes, such as effort, practice and strategies used (Stevens et al., 2001). This can be linked to Weiner's (1987) attribution theory model as well as Stanovich's (1986) negative Matthew Effect, both of which stress the importance of emotional factors including the impact of feedback processes on learner perceptions.

Feedback in isolation can be unhelpful, for example studies have indicated that feedback referring to grades or marks can increase peer competition and emphasise ability over effort (Dweck, 1999; Locke & Latham, 2002). Even when a grade is accompanied by a teacher comment, most pupils focus on the grade (Black & Wiliam, 2002). This perhaps has implications for classroom ethos and learner attribution to learning: in a competitive learning environment, pupils viewed those with high marks as high achievers and expending high effort, while low achievers were perceived as lacking ability and effort.

Conversely, when only comments were given in relation to task feedback most pupils placed more importance on effort (Locke & Latham, 2002). Thus, again highlighting the influence of feedback as well as learning orientation such as mastery or performance, whereby performance learning can lead to adverse comparisons. In addition, such research also demonstrates the importance of ability perceptions including the notion of fixed or incremental ability proposed by Dweck (1999), where high ability is incorrectly associated with high effort and could in turn influence pupil effort on task.

2.3.4 Metacognitive Processes: Struggling Learners

Therefore, although there are different motivation dimensions interacting, including beliefs, attributions and environmental factors, use of metacognitive processes could possibly redress some of the unhelpful feedback interpretations. Unsurprisingly, research further indicates that learners who have experienced difficulties with learning in general and reading in particular can also have poor metacognitive skills (Guthrie, et al., 2006; Horner & O'Conner, 2007; McGuiness, 1999). In particular, such learners have difficulty identifying useful learning strategies and this can lead to them

give up quickly, consequently not having the persistence or resilience that is required for demanding tasks such as reading (Cetinkaya & Erktin, 2002). In contrast, using metacognitive strategies can result in successful academic outcomes leading to increased pupil on-task behaviours and increased self-efficacy (Zimmermann, 1998). This is independent of ability, and referred to pupils across differing ranges of low to high abilities (Pajares & Schunk, 2001; Zimmermann & Martinez-Pons, 1990).

This could suggest that it is the self-efficacy dimension that influences learning strategies such as metacognitive approaches rather than use of metacognitive strategies increasing self-efficacy. This again raises the question of motivational cause and effect associated with the self theories of motivation. For example, are pupils who feel confident more likely to understand and think more about their work or are pupils who use more effective learning strategies more likely to experience positive feedback and thus feel more confident (Linnenbrink & Pintrich, 2003).

2.3.5 Metacognitive Processes and Struggling Readers

Research supporting specific metacognitive reading interventions for struggling readers also validates the importance placed on metacognitive processes as an effective learning approach. This includes the encouragement of self-regulated learning related to self-evaluation and hence self-generated feedback (Smith et al., 2005; Zimmermann et al., 1992). To this end, self-evaluation is considered central to mastery learning approaches (McLean, 2003) and research indicates that teachers promotion of self-evaluation reading records and also reading strategy checklists are beneficial to supporting independent learning (Carr 2002; Walker, 2003).

Moreover, research indicates that such self-evaluation approaches can make explicit the relationship between learning progress, and identification and use of learning strategies (Schunk, 2003). These findings also indicate that focussing on identifying strategies can positively influence both self-efficacy and learner attributions (Schunk, 2003). These interventions are again reflective of the mastery learning orientations discussed earlier, based on knowledge and understanding that can lead to more effective learning (Dweck, 1999). Although as also considered, other research suggests that a combination of intrinsic and extrinsic learning is sometimes appropriate (Kyriacou et al., 2006), for example, curriculum demands that direct

learning and reading goals and are necessary for progressing reading skills (HMIe, 2007).

2.3.6 Metacognitive Strategies

Nonetheless, research does indicate that the use of metacognitive interventions impacts on effective learning outcomes (Pintrich & Schunk, 1996; Zimmermann, 1998). However, the general application as well as the varied metacognitive interventions can perhaps make defining the approach more difficult (Frederickson & Cameron, 2004). That being said, the essence of metacognitive strategies is encouraging individual learners to think critically about their learning attitudes and their approaches in relation to learning tasks and not solely relying on teacher led instruction or explanation (Carr, 2002; Fisher, 2005).

Stevens et al. (2001) as well as other research (Blair, 2003; Carr, 2002; Walker, 2003) highlight generic questions, questionnaires and checklists that perhaps exemplify the practical application of metacognitive interventions. For instance, identifying what the task involves, what is needed to complete the task, how this can be achieved, and what could have helped more. The answers to such metacognitive thinking could refer to task effort, listening to instructions, practising, or using a particular resource (Black & Wiliam, 2002; Carr, 2002; Stevens et al., 2001). Moreover, the subsequent task reflections or evaluations involved in the metacognitive process could indicate that the task was achieved because of learner effort or, alternatively, it was not achieved as a different strategy or support was required. As noted earlier, this learner involvement in identifying and evaluation strategies can positively influence self-efficacy (Schunk, 2003).

2.3.7 Metacognition and Motivation Theory

Therefore, metacognitive research corresponds with other motivation theories such as attribution and self-efficacy, whereby the metacognitive interventions involve cognitive processes encouraging autonomous learning and attributing task outcomes to external controllable factors and in so doing may positively influence self-efficacy. For example, Linnenbrink and Pintrich (2003) and Seifert (2004) both highlight learning interventions that relate to thinking cognitions in regard to influencing motivation. In addition, reading research indicates the importance of encouraging

struggling readers to be self-regulated in order to self-generate perhaps obvious but practical strategies such as using a dictionary, sounding out words or asking questions (McGuinness, 1999; Oldfather, 1999; Reutzel & Smith, 2004). The evidence suggests that it is the self-identification process that is empowering and can influence learner perceptions (Schunk, 2003).

However, improving literacy skills and increasing self-efficacy is demanding because it is not easy for pupils to assess skills relating to literacy (Zimmermann & Martinez-Pons, 1990). Also as previously discussed, reading research indicates that reading strategies such as phonemic applications have to be initially explicitly taught or revised, particularly in relation to struggling readers within a structured reading programme (Hatcher et al., 2006). Moreover, recognised and effective phonics teaching programmes are highly structured with specific teaching instructions (Johnson & Watson, 2003; Russell, 1992). Therefore, although metacognition also has to be explicitly taught, a highly structured phonics programme could still to some extent be considered incongruent with metacognitive approaches.

2.4 Motivation and Pedagogy: Precision Teaching

Where metacognitive theories stress the importance of individual thinking processes irrespective of the task, research also emphasizes the value of task orientation as impacting on pupil involvement in learning and as a consequence motivation. Therefore developing explicit learning goals and feedback processes can influence motivation (Ainscow & Tweddle, 1979; Black & Wiliam, 1998, 2002). Congruent with this are the tenets of goal theory that propose more active learning takes place when learners are involved in the setting of task targets and as previously discussed such processes can result in increased skills influencing self-efficacy and learning outcomes (Locke & Latham, 2002).

The learning strategies mentioned before, such as encouraging metacognitive thinking or facilitating relevant attributions have universal application as well as perhaps being conceptually more abstract and, as such, have to be explicitly taught so as to be of use to the learner (Seifert, 2004; Flavell, 1987; Reutzel & Smith, 2004). However, other pedagogical methodologies, for example precision teaching, have motivation factors

embedded in the teaching programme. These include setting learning goals, feedback processes, and pupil involvement (Locke & Latham, 2002; Smith et al., 2005).

2.4.1 History

Precision Teaching is a highly systematic teaching approach that aims to promote mastery learning from accuracy and fluency assessments (Binder & Watkins, 1990; Binder, 2003). It is not a specific teaching programme and can therefore be applied to various learning situations. The essence of precision teaching originates from behaviourist theories, and the use of reward or punishment reinforcements to direct particular behavioural responses (Binder & Watkins, 1990). However, although precision teaching has features in common with behaviourism, the learning and teaching practices do not rigidly adhere to the behaviourist methods of operant conditioning relating to stimulus and response interventions (Raybould & Solity, 1988).

In the USA, precision teaching is widely implemented and there are university based research centres dedicated to the approach including numerous commercial enterprises (Johnson & Street, 2004). There have also been several large longitudinal studies conducted with positive results (Binder, 2003; Johnson & Street, 2004). In contrast, there has been limited support and implementation of precision teaching in the UK, although small scale studies have generally been supportive of its efficacy (Chiesa & Robertson, 2000).

Possible reasons that the UK has not embraced precision teaching may be related to the differences in cultural and political educational objectives. However, other reasons indicate more fundamental issues such as possible misinterpretation and negative connotations surrounding the behaviourist origins and the mechanical or rote learning emphasis. The acceptance of cognitive-based learning theories such as Howard Gardner's multiple intelligences (1993), or using learner directed metacognitive strategies, are now considered to facilitate more meaningful and creative learning (SEED, 2007).

2.4.2 Precision Teaching Principles and Processes

At this point it may be helpful to consider in more detail the principles of precision teaching, as even within its advocates there is debate of how to define and place it within teaching practices. Some state that precision teaching is a specific teaching methodology (Downer, 2007), others propose it as a measurement-based learning tool rather than a teaching method (Gallagher, Bones & Lambe, 2006; Kubina, 2005; Doughty, Chase & O'Shields, 2004). However, Binder and Watkins (1990) suggest that precision teaching is not a methodology but an educational approach with a unique philosophy. They suggest that effective precision teaching involves skilled planning, evaluating and modifying of the particular selected teaching programme and/or method on an ongoing basis.

Furthermore, precision teaching involves more than just monitoring or amending the technical aspects of a teaching programme. In order to be effective the teacher also has to embrace the philosophical underpinnings associated with precision teaching. These include the acceptance that all learners can make progress if the teaching programme is relevant (Johnson & Street, 2004; Raybould & Solity, 1988). Moreover, attention to detail and making small changes to a learning programme can make a difference to the learning outcomes (Downer, 2007). Teacher attitudes and beliefs have been highlighted earlier as particularly influential contextual motivation dimensions that can influence either positively or negatively successful task completion (Black & Wiliam, 1998; 2002; Fisher, 2005), and class teacher attitude and approach as well as procedural aspects are fundamental to precision teaching (Binder, 1988; 2004).

Precision teaching theorists argue that all such tasks, including those related to basic but necessary skills in literacy and numeracy, consist of a series of component parts that add-up to the complete composite task (Binder et al., 1990; Raybould & Solity, 1988). For example, a word is made up of letters and symbols, and learning how to 'read' the word could involve breaking the word into component parts related to letter names, phonic sounds, and grammatical rules with the composite aim of successfully reading the word.

Therefore, any precision teaching task involves setting relevant and precise learning targets involving breaking the task down into sub-skills or component parts. In order to do this the teacher must assess the learner's areas of specific difficulty. Thereafter, the learner's progress will be assessed daily and over a period of time for both accuracy and fluency (Gallagher et al., 2006). Thus, the teacher is checking for 'application', meaning that the learner is combining the component parts into the complete composite task. The monitoring process may result in modifications if the rate or accuracy of the learning is not at an appropriate pace (Binder, 2004; Chiesa & Robertson, 2000).

Precision teaching, like other objective-based teaching approaches, is only intended for the skill orientated closed-ended task (Raybould & Solity, 1988). It is closely linked to the curriculum and supports criterion-referenced assessment processes. Thus, there are measurable, defined criteria related to the curriculum which includes tasks that are objectively set with definitive correct answers (Gallagher et al., 2006). For instance, the criteria could relate to learning a set of phonic sounds and their correspondent alphabetic letters, and the measure would be the accuracy and fluency of applying those sounds to the letters.

Proponents of precision teaching indicate that learning a new skill has three stages comprising of the initial introduction and learning for accuracy, then practicing for fluency, maintenance and/ or endurance, with finally consolidation of or generalising the skill to other areas. It is suggested that stage two, relating to practice, is crucial, although it is the initial introductory stage that gets most attention with a quick progression to the final consolidation stages, therefore the much required stage two is minimised (Binder et al., 1990). This can result in learners not fully grasping key basic aspects of a task that could impact on future progress.

2.4.3 Key Precision Teaching Elements

The crucial elements of precision teaching relate to accuracy and fluency measures as well as recording techniques. Precision teaching advocates that successful mastery of a task correlates not only just to accuracy but also to fluency (Binder et al., 1990; Kubina, 2005). Moreover, Gallacher et al. (2006) states that achieving task fluency can increase on-task behaviour and reduce the likelihood of distractions interfering

with the task. In addition, precision teaching research also indicates being fluent on a task can increase continued motivation and task perseverance as a result of positive feedback through success (Binder, 2003). In contrast, requiring students to perform tasks where they are non-fluent can reduce learning acquisition (Gallacher et al., 2006). This could also be linked with self-efficacy research and learner beliefs of ability to complete tasks (Bandura, 1994). Fluency is also an essential skill and related to reading for meaning and being a proficient reader (McGuinness, 1998; 2004).

Recent UK studies include Chiesa and Roberston (2000) who introduced a precision teaching approach to a small group of pupils (n = five) at primary five stage who were struggling with basic number computations. The study adhered to the precision teaching processes and also explicitly involved the pupils in the monitoring and recording procedures. There were increases in attainment and also anecdotal evidence that the pupils enjoyed participating and were fully engaged on-task. However, with such a small sample size, it is difficult to generalise these results.

Dower (2007) involved precision teaching research across nursery, primary & secondary stages. Although this study had a larger sample size of 47, there were only a small number of pupil participants at each stage. The precision teaching intervention involved non-teaching staff, who would not have the teaching skills required to implement reading interventions (Guthrie & Davis, 2003). It was also difficult to ascertain the baseline data and the criteria for participant selection, while teaching stimuli varied between the class teacher and class assistant and was thus not controlled for. Nevertheless, increased sight word vocabulary was reported as well as pupil interest and enjoyment. Therefore, these studies cautiously suggest that precision teaching influences attainment, attitude and engagement on-task, behaviours that are associated with motivation and reading progress as well as influencing continued motivation and progress (Guthrie et al., 2006; Smith et al., 2005).

Given that the behavioural origins of precision teaching are less popular today including the associated rote learning and negative testing procedures previously conducted in classrooms, it is perhaps understandable that the approach is misconstrued (Binder, 2004; Doughty et al., 2004). In addition, the misunderstanding of the type of learning tasks that are applicable to precision teaching (i.e. closed-

ended literacy and numeracy skills) may also account for any disillusions with the approach (Gallagher et al., 2006).

2.4.4 Precision Teaching and Motivation Theory

Like motivation theory, precision teaching has developed from its original behavioural focus and behaviour applications to procedures and practices relevant to the learning curriculum within a mainstream classroom context. Nevertheless, the theoretical underpinnings and early principles of precision teaching remain the same and are still viewed as an effective learning intervention applicable across educational settings and particularly in relation to literacy and struggling readers (McGuinness, 1998; Snowling, 2002). It is interesting to note that motivation theory has changed to reflect internal learner beliefs as critical influences in learning engagement, whereas precision teaching, although modified, still relates to changing behaviour through external environmental factors such as task. This review has discussed and highlighted the research related to intrinsic learner beliefs demonstrating that such beliefs are critical to learning outcomes and on-task behaviour (Pajares, 1997).

Nevertheless, as precision teaching literature indicates accuracy, fluency and maintenance are desirable learning outcomes and as such are beyond the simpler less effective rote learning aims of accurate recall and good memory skills. Furthermore, while the type of learning task appropriate to precision teaching may be restricted it includes the acquisition of basic but necessary skills in literacy and numeracy such as the acquisition of phonics and number bonds (Chiesa & Robertson, 2000; Downer, 2007; Russell, 1992). Moreover, suitable goals can affect action and although such goals may be considered examples of less effective orientated extrinsic learning, such learning can lead to effort and persistence on task (Locke & Latham, 2002). Therefore, precision teaching is an approach that is applicable to increasing motivation and progressing learning.

2.4.5 Summary of Metacognition and Precision Teaching in relation to Motivation

The research thus indicates that both metacognitive interventions and precision teaching methodologies are recommended and effective approaches to progressing learning in general and struggling readers in particular. For example, the highly structured and goal directed precision teaching approach is desirable in the acquisition

or remediation of certain reading skills such as phonemic awareness (McGuinness, 2004; Russell, 1992; Snowling, 2002).

So too is encouraging critical thinking processes and learner autonomy that is applicable to metacognition and is also valid in supporting learning and reading (Frederickson & Cameron, 2004). For instance, encouraging struggling readers to think critically and view learning difficulties as challenges that can be overcome with the use of appropriate learning strategies, including strategies such as practice and listening (Flavell, 1987; Zimmermann et al., 1992). Although not just specific to reading, this as discussed is relevant to struggling readers and can result in autonomous and active learning increasing reading motivation of those learners who were previously disengaged (Cetinkaya & Erktin, 2002; Guthrie & Davis, 2003).

Accordingly, both interventions could be interpreted as relevant to, and reflective of, aspects of motivation theory. As stated above, precision teaching highlights the importance of relevant learning goals as well as feedback and monitoring processes (Binder & Watkins, 1990; Binder, 2004). This perhaps reflects the motivational dimensions associated with encouraging learner interest whilst ensuring task demands that can influence learner engagement are achievable (Harlen & Deakin Crick, 2002; Linnenbrink & Pintrich, 2003). Likewise metacognitive strategies stress the importance of critical thinking and questioning processes that are also significant in motivation to learn (Zimmermann & Martinez-Pons, 1990). For example learner directed task evaluation can lead to not only the identification of required learning strategies but importantly raises learner awareness and makes explicit that learning outcomes are controllable and changeable, consequently facilitating mastery learning processes that can lead to increased motivation (Dweck, 1999; Stevens et al., 2001; Zimmermann, 1998).

Although the evidence suggests that the interventions both reflect aspects of motivation theory, including increased learner motivations, there are perhaps important qualitative and conceptual differences. For example, precision teaching has many motivational factors embedded, such as suitable learning goals and pupil involvement (Raybould & Solity, 1988). That being said, the objectives are perhaps focussed only successful task completion and while this is a relevant intention it may

not increase self-beliefs in other areas (Black & Wiliam, 2002). Moreover, some instructional teacher practices designed to be supportive can if incorrectly implemented result in the focussing on ability and performance learning goals that can be de-motivating, particularly to learners who find learning difficult such as struggling readers (Binder et al., 1990; Locke & Latham, 2002; Schunk, 1990).

Importantly, the evidence discussed in the review relating to learner beliefs and metacognition suggests that the procedures involving such a highly structured, teacher dependant and goal orientated teaching programme could be incompatible with facilitating the meaningful pupil/ teacher interactions that may lead to the preferred autonomous mastery learning approach (Schunk, 1990; Zimmermann, 1990). Conversely reading research recommends structured reading programmes as beneficial interventions for reading remediation (McGuinness, 2004; Russell, 1992) with self-efficacy stresses focussing on specific tasks as a route to increase learner perceptions (Bandura, 1994) that ultimately influence motivation.

Therefore, it could be the case that precision teaching encourages automated task directed thinking and, while appropriate, it is the more intrinsic, stable and pervasive metacognitive learning processes involved in the learner directing the task that is preferable. Facilitating this type of learning could be more comprehensive with implications for longer term learning progress if the learner is intrinsically rather than task motivated. Although it may be that depending on the difficulties experienced and the type of teaching programmes required to ameliorate such difficulties for example those of struggling reader a combination or balance between the approaches is necessary.

2.4.6 Diagrammatic Representation of the Operationalised Teaching Programmes

Figure 2 represents the operationalisation of two contrasting teaching programmes (the teaching programmes are contextual causal motivation factors as detailed in Figure 1). Both of the teaching approaches aim to increase learning motivation including increased attainment and attitude. In the case of precision teaching, attending to 'what' to learn, through increasing task skills and hence impacting on self-efficacy. Or in the case of metacognitive teaching, attending to 'how' to learn through increasing self-regulated learning and thus increasing self-belief.

Both programmes reflect different specified motivation principles (as discussed earlier) and Figure 2 also shows what both teaching programmes combined may look like. The motivation principles reflected in each of the teaching programmes signify the theories and perspectives discussed in Section 1.

The model represents a flow diagram and reading from left to right indicates the processes involved in the teaching programmes. The strategic objectives describe the teaching programme goals. The inputs detail the requirements of the teaching programmes with the influences highlighting the key motivation factors that are involved and impact on the programme. The outputs relate to the outcomes of the particular learning task with the outcomes describing the overall aims of the teaching programmes.

Precision Teaching Programme (PT)

The strategic objective of PT is to increase learner attainment and attitude by improving learner skills and task efficacy. This is done by inputting a highly prescribed structured teaching programme and the learner is directed by the teacher and the task. The task will be influenced by the contextual motivation principles of SMART task setting reflecting *s*pecific, *m*easurable, *a*chievable, *r*elevant and *t*imed tasks. The output objective is the completed, prescribed task directed by the teacher with overall learning outcomes related to completion of tasks with accuracy and fluency.

Metacognitive Teaching Programme

The strategic objective of metacognitive teaching approaches is to increase learner attainment and attitude by increasing use of metacognitive learning strategies. This is done by inputting task self-evaluation related to questioning and assessment techniques and is influenced by the individual motivation factors related to learner self-belief. This process is directed by the learner and is not specific to any particular curricular task. The role of the teacher would be to facilitate the metacognitive processes encouraging eventual independence. The output objective is an independently completed non- prescribed task with overall learning outcomes related to increased independent self-regulated learning.

Precision and Metacognitive Teaching Combined

The strategic objective of combining PT and metacognitive approaches would be increased task efficacy, increased use of metacognitive learning strategies and more effective use of the skills learned from PT. The inputs to achieve this would relate to learner self-evaluation techniques and a teaching programme related to a prescribed task. The task would be influenced by the contextual motivation factors of the precision teaching SMART task targets and the individual motivation factors of learner self-beliefs. The output would be an independently completed prescribed task with the overall outcome aim related to self-regulated tasks completed with accuracy and fluency.

The essential differences between the three methods as highlighted in the diagram is that PT is teacher directed and aims to increase learner skills and learner self-efficacy in a prescribed task and is considered relevant to supporting learners who are experiencing difficulty. In contrast, the metacognitive approach aims to encourage independent learning including general facilitating of self-beliefs and is applicable to any task. Metacognitive teaching may be more difficult to apply where the learner is experiencing a difficulty with task skills. For example, research recommends a structured teaching programme for struggling readers (Snowling, 2002). However, encouraging self-belief and independent learning are also recommended (Reutzal & Smith, 2004).

Therefore, combining both PT and Metacognitive Teaching provides a prescribed teaching approach that supports struggling learners to increase skills and self-efficacy in the particular area of difficulty while also increasing independent learning processes and self-beliefs. Combining both teaching programmes could maximise different motivation factors that may be beneficial in relation to struggling learners than either teaching programme implemented in isolation.

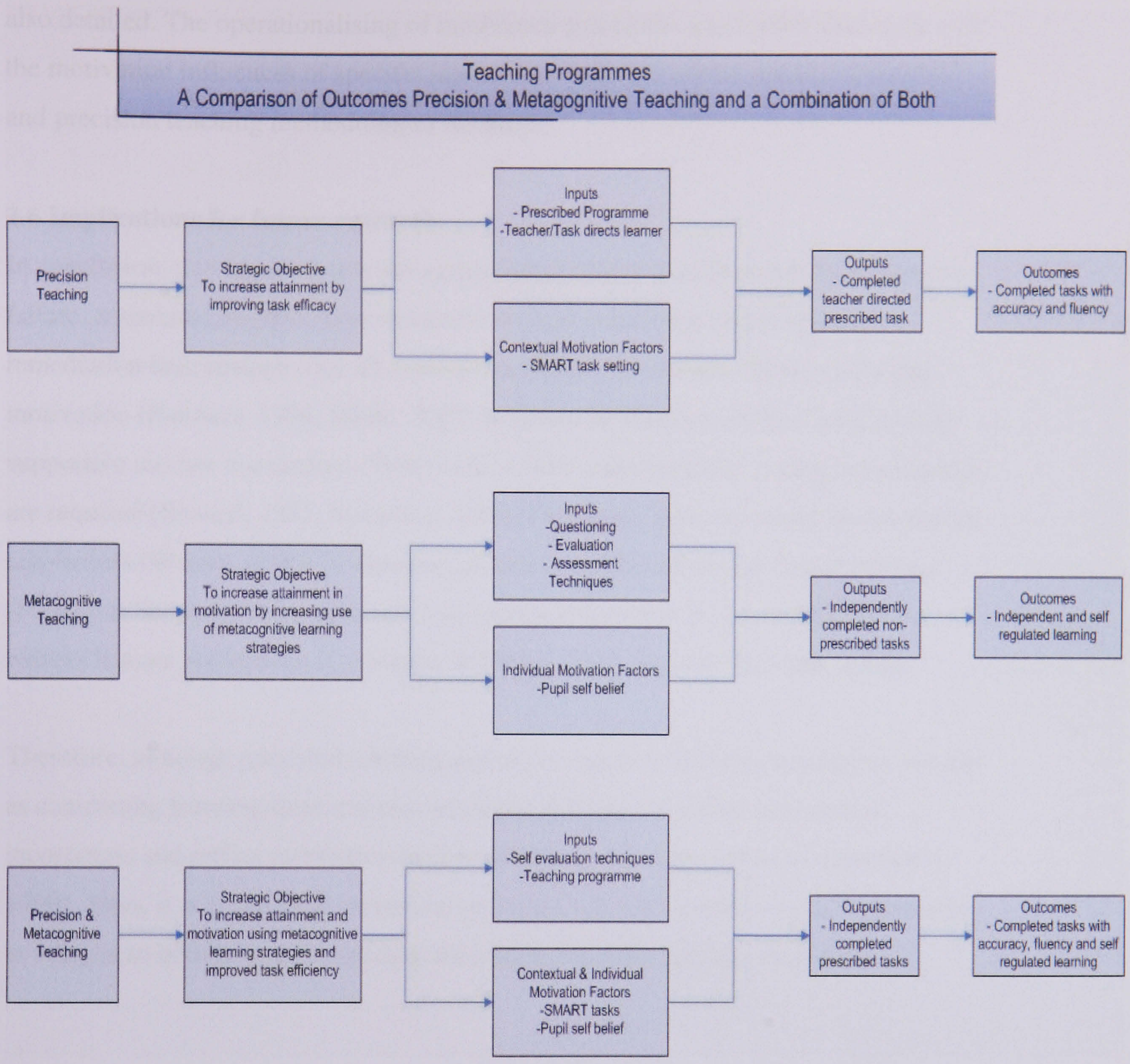

Figure 2 Teaching Programmes: A Comparison of Outcomes, Precision & Metacognitive Teaching and a Combination of Both

2.5 Summary

To conclude, this review explored the research and issues surrounding learning motivation, particularly in relation to struggling readers and associated learning interventions. The complexities of defining motivation and motivation concepts were considered, as were the importance of motivation in regard to effective learning. Thereafter, the motivation theories and interrelated factors that can influence individual learner perceptions and engagement with learning such as self-belief, gender, teacher interactions and teaching interventions were examined. Pedagogical and curricular practices, particularly the motivational impact of learning tasks were

also detailed. The operationalising of motivation principles was further discussed with the motivation influences of specific interventions such as metacognitive strategies and precision teaching methodologies debated.

2.6 Implications for future research

In conclusion, it is apparent that struggling readers have usually experienced frequent failure, associated negative peer comparisons, and sometimes inappropriate remediation interventions that all can have an impact on learner affect beliefs and motivation (Bandura, 1994; HMIe, 2007; Wigfield & Guthrie, 2003). Consequently, supportive teacher interactions (Wray et al., 2000) and structured reading programmes are required (Russell, 1992; Snowling, 2002). However, also addressing faulty learner self-beliefs (Weiner, 1985) is important as this has implications for future learning (Pajares & Schunk, 2001), although it is acknowledged that it is more difficult to redress learner perceptions (Cetinkaya & Erktin, 2002; Reutzel & Smith, 2004).

Therefore, although precision teaching and metacognitive interventions can be viewed as contrasting learning interventions, evidence indicates that both approaches incorporate and reflect motivation factors (Binder & Watkins, 1990; Zimmermann, 1990). Thus, it is argued that combining both interventions could have added benefits in relation to both increasing reading attainment and also reading motivation.

Introduction to Study

3.1.1 Background: Why Motivation is Important

Motivation is an essential factor in learning (Frederickson & Cameron, 2004), influencing attainment as well as affecting future learning progress (Black & Wiliam, 2002). A review of longitudinal studies indicates that pupils who experience lower attainments can be at risk from exclusion from school as well as having other behavioural and social problems (Cassen & Kingdom, 2007). Moreover, pupils who experience difficulties with learning can present as disengaged and task avoidant with such behaviour impacting on their learning outcomes (Smith, Dakers, Dow, Head, Sutherland and Irwin, 2005). Therefore although there is much literature surrounding motivation, how to engage pupils in the leaning process continues to be a relevant topic of research (McLean, 2003), including developing learning and teaching interventions.

What is more, nationally and world-wide there has been much research into reading acquisition, reading difficulties and reading interventions, and from this the relevance of motivation in reading at all levels has been highlighted (HMIe, 2007; National Reading Panel, 2000, 2006; SEED, 2005). Thus, teaching interventions that operationalise motivation principles could be beneficial when supporting struggling learners. Research has also indicated that a highly structured approach to the teaching of reading can have a positive impact, both preventing reading failures and supporting struggling readers (Snowling, 2002). This should be reflected in any learning and teaching programmes related to literacy.

3.1.2 Motivation: Theories and Perspectives

Motivation is defined by the level of engagement, including interest and persistence, of learning behaviour (Bandura, 1994) and is not solely based on the completion of tasks, successful or not (Black & Wiliam, 2002). Therefore, in class a motivated pupil is a learner who is actively willing to engage with learning and will persevere even when the learning task is more demanding.

In the motivation research literature there are a number of competing theoretical frameworks as well as different perspectives from different interested parties (Harlen & Deakin Crick, 2002; Linnenbrink & Pintrich, 2003). Furthermore, although

motivation factors remain constant they vary with the context (Seifert, 2004). Hence, different theoretical models emphasise different interactions between the numerous motivation factors (Linnenbrink & Pintrich, 2003).

For example, self-efficacy and self-concept theories have particular significance in learning motivation (Seifert, 2004), even more so when the learner experiences difficulty (Wigfield & Guthrie, 1997). However self-efficacy focuses on learner skills, whereas self-concept focuses on learner self-beliefs (Pajares & Schunk, 2001). In addition, the contextual motivation factors associated with teacher interactions and teaching programmes also vary depending on the context (Seifert, 2004). Therefore, these individual and contextual motivation factors influence and are influenced by interactions across and between each other (Linnenbrink & Pintrich, 2003). The focus of the current study is the role of motivation in the classroom context and whether adding a motivational element can enhance an existing intervention.

3.1.3 Current Study

Precision Teaching (PT) is a highly systematic teaching programme intended for skill orientated closed-ended tasks (Raybould & Solity, 1988) such as phonic acquisition (Russell, 1992). PT is teacher directed and relates to learning outcomes of accuracy and fluency on a specific task (Downer, 2007). It is considered a relevant teaching programme to support struggling readers (Russell, 1992).

Moreover PT reflects contextual motivation principles related to a particular learning task (Binder & Watkins, 1990). PT highlights the importance of relevant learning goals (Binder, 2004) including feedback and monitoring processes associated with learning motivation (Raybould & Solity, 1988). PT involves the development of learning task objectives that are specific, measurable, achievable, relevant and timed (Gallagher et al., 2006). These are learning objectives that are considered appropriate to supporting struggling learners and also encouraging learning motivation (Harlen & Deakin Crick, 2002).

Metacognition is described as 'thinking about how to think' (Flavell, 1979). Using metacognitive learning strategies promotes knowing how to learn and encourages self-regulated learning (Zimmermann et al., 1992). Moreover evidence suggests that

metacognitive learning strategies are applicable in most learning situations and can increase learning motivation (Flavell, 1979).

The two learning and teaching approaches both incorporate motivation factors and aim to increase attainment. In the case of PT attending to 'what' to learn through increasing task skills and hence impacting on self-efficacy. Or in the case of metacognitive learning attending to 'how' to learn through increasing self-regulated learning and thus increasing the learner's self-beliefs related to self-concept.
The essential difference between the two methods (see Figure 2) is that PT is teacher directed and aims to increase motivation within the domain of learner skills and learner self-efficacy in prescribed tasks. This is considered relevant to supporting learners who are experiencing difficulty. In contrast, metacognitive strategies aim to encourage independent learning including general facilitation of self-beliefs and are applicable to any task. This study considers the benefits of adding metacognitive motivation factors to PT.

3.1.4 Rationale for Design and Implementation Processes

The effectiveness of any intervention outcomes are dependant on the veracity of or adherence to the programme's procedures and philosophies, and are referred to as programme integrity and programme compliance respectively (Dane & Schneider, 1998). Thus, programme integrity and/or compliance is defined as the 'degree to which interventions are implemented or complied with and are integral to the evaluation process of any intervention' (Dane & Schneider, 1998: P23).

As discussed in the literature review effective programme implementation can be influenced by contextual factors such as those relating to teacher beliefs and pupil-teacher interactions. As such, the issues of programme integrity and compliance are particularly relevant to this study. For instance, the study conditions are reliant on teacher commitment to, and skill in implementing, the intervention programme. Programme integrity can be further compromised by a poorly conceptualised programme that does not fit between the context and the proposed intervention (Ellis, 2007). In relation to schools, this means the intervention has to be seen by school staff as practicable and relevant (Ellis, 2007; Greenway, 2002). Other programme compliance issues are related to quality aspects such as consistency of intervention

delivery including, how and how often interventions are delivered. Verification of programme processes through programme documentation or other monitoring procedures are required to support programme integrity and programme compliance (Dane & Schneider, 1998). Such processes and procedures were integral to this study and are described in the next sections.

To address these issues, a Critical Realist perspective was applied to this study, providing a contemporary and explicit social scientific methodology for psychologists working with applied research approaches outside the laboratory (Kelly, 2008). As Kelly (2008) states, Critical Realist approaches ensure that issues are considered in an interpretative, collaborative context and actively includes those involved. In practice this means that evidence is gathered at different levels and takes cognisance of the contextual influences (Kelly & Woolfson, 2008).

Critical Realism originates from philosophical principles indicating that there are both objective external real world representations and also different individual interpretations and perceptions of those representations (Robson, 2002). Thus Critical Realism is a combination of social constructionism and its beliefs related to perceptions and scientific positivism and the beliefs related to objectivity in reality (Kelly, 2008). The Critical Realist approach highlights the importance of perception as scientific data, and therefore emphasises the gathering of both perception related data and evidence, as well as measurable quantitative data from for example, standardised assessments (Robson, 2002).

Thus the Critical Realist approach facilitates the exploration and analysis of the complex processes, both theoretical and conceptual and those linked to values and perceptions involved in learning motivation. Therefore in this study adopting a Critical Realist methodology facilitated the gathering of external evidence from assessment processes related to reading attainment and attitude and also gathering evidence from the perceptions of all those involved. Applying this type of methodology is necessary to obtaining a comprehensive picture.

Importantly, adopting a Critical Realist perspective can deal with emergent events and outcomes that result from the combination of interactions. This includes the

interactions and responses of a classroom environment as well as the fixed organisational components related to school policies and procedures (Greenway, 2002). As Greenway (2002: p132) also comments, 'the classroom is not a social given but a cultural construction'. Thus, the classroom environment is not a fixed entity but dependant and reflective of the values, perceptions, and experiences of the pupils and teachers. This indicates that different schools and different classes within schools will have numerous constructions and interactions that lead to varied outcomes.

Therefore to deal with such issues and reflecting the principles associated with Critical Realist perspectives, this study used a mixed method design blending quantitative and qualitative methodologies. It used quantitative methods that are more effective in relation to the process of selecting participants and gathering of standardised information in relation to progress and attitudes (Robson, 2002). In addition, applying qualitative methods took cognisance of the different perspectives of those involved as well as providing further information associated with the dynamic context of the classroom environment (Greig & Taylor, 2002). This mixed design methodology ensured triangulation of data as well as implementing processes that supported programme integrity and programme compliance (Robson, 2002).

3.1.5 Hypothesis

The hypothesis of this study states: the implementation of a precision teaching approach including an added motivation factor related to metacognitive learning strategies will increase pupils' reading attainment and/ or reading attitude in comparison to precision teaching implemented in isolation.

Method

A pilot study preceded the main study, and both are outlined below. Most of the detailed descriptions of the assessments and materials are reported in the main study section, although where more appropriate there are also descriptions of materials detailed in the pilot study section.

3.2.1 Pilot Study

Both the precision teaching and metacognitive parts of the intervention required to be tested in a pilot study to ascertain that each part could be practically implemented in a class context. In relation to PT this was because the literature suggests that this type of teaching methodology is applicable to larger group settings (Binder, 2004), yet in practice it is more often implemented on a one-to-one basis outwith the classroom (Raybould & Solity, 1988; Russell, 1992). In addition, previous PT studies have used classroom assistants rather than teachers to implement any PT programmes (Downer, 2007). However, as discussed in the literature review, research suggests that interventions to encourage motivation in struggling readers should take place within the classroom context and involve the skills of the class teacher (Reutzel & Smith, 2004).

In regard to the metacognitive element of the intervention, metacognitive learning is defined as thinking about learning and is a dynamic and interactive concept (Zimmermann, 1990). Moreover, effective metacognitive interventions involve scaffolding techniques related to class teacher prompts such as open questioning that facilitate and introduce pupils to self-regulated learning (Hall & Harding, 2003; Topping & Ferguson, 2005; Fisher, 2005). Nevertheless, the literature reflects that there are varied applications and different types of metacognitive interventions. For example, thinking strategies to encourage reading comprehension (Wright & Jacobs, 2003), peer tutoring of thinking skills (McKinstery & Topping, 2003), and more general metacognitive strategies applicable to all learning such as Attunement Strategy (Stevens et al., 2001). As Wright and Jacobs (2003) further identify, the varied learning contexts involved and the different theoretical perspectives that the interventions are based can make replicating, modifying or adding to previous research interventions difficult.

Therefore a pilot study was conducted in order to: assess and resolve any methodological or practical issues related to assessment materials; identify an appropriate sample population; check that instructions, procedures and training related to the intervention conditions were comprehensive; and check that the intervention could be practically implemented within a classroom setting.

In the pilot study there were two conditions. This was in order that both parts of the main study intervention, precision teaching and the added metacognitive factor could be assessed independently of each other to remove any possible confounding effects, ensuring that each was relevant to the class context in relation to struggling readers. Condition 1 relates to a general reading intervention and operationalised metacognitive motivation intervention, and condition 2 relates to an operationalised precision teaching reading programme.

The pilot study sample size and intervention time period were such that statistical data analysis was not applicable. However, all the children, parents and teachers were given written feedback in relation to advice for the continued support and progress of the pupil participants.

3.2.2 Participants

Two primary schools within the same local authority area were randomly selected and then each school randomly assigned to one of the two conditions. Six, primary five stage pupils from each school with a mean age of nine years, two months participated.

3.2.3 Inclusion Criteria

The pupils selected were at the mid-primary stage as research has established this is a stage when struggling and disengaged readers are more apparent and can be more readily identified particularly in relation to low motivation to read (Powney, 1997; Wigfield & Guthrie, 1997). Pupils from the primary five stage classes were initially identified from the 5-14 National Tests Levels as having lower than expected reading attainments for their stage. Thereafter, those identified pupils whose school reports further indicated a reluctance to engage with reading activities were then selected as participants.

3.2.4 Materials

Materials used in both the pilot and main studies were selected on the basis of being standardised and relevant assessments for the age and stage of the pupil participants. There was also consultation and comments sought regarding the practical application and relevance of the proposed assessments with an experienced Headteacher, class teacher, and support for learning teacher independent to those participating in the studies. These discussions also included comments on the metacognitive materials developed.

In the pilot study, the Neale Analysis of Reading Ability Revised 1997 (NARA Π: Neale, 1997) was individually administered as a pre and post standardised reading attainment assessment. A systematic review of reading assessments supported this assessment as having good standardisation and good reliability (Stuart & Stainthorp, 2004). Reading motivation was measured using the Motivation for Reading Questionnaire (MRQ: Wigfield & Guthrie 1997). Other studies have found this to be a reliable and valid assessment (Rider & Colmar, 2006). These standardised assessments are discussed in more detail in the main study section.

The Phonic Code Cracker precision teaching programme (Russell, 1992, revised 2007) was implemented as the operationalised precision teaching method. Phonic Code Cracker is a comprehensive scheme for teaching phonics and phoneme awareness. It is a highly structured systematic teaching programme organised into 12 different learning stages. The programme reflects fluency and accuracy and is recognised as an operationalised precision teaching approach (Russell, 1992). A metacognitive questioning process (Appendix C) including teacher and pupil recording schedules (Appendices D & E respectively) based on previous metacognitive interventions (Walker, 2003; Zimmermann, 1990) was developed to promote motivation strategies.

In condition 1, the added metacognitive motivation factor related to specific verbal questions and prompts by the class teacher reflecting the principles associated with self-regulated learning including identifying learning strategies, monitoring and self-evaluation processes (Thomson, 1999; Wright & Jacobs, 2003). The process involved before, during, and after questions asked by the teacher during the reading task

(Appendix C), and at the end of the task there was a Pupil Record Form for the pupil to complete (Appendix E). The Record Form was a written reflection of the answers to the teacher-led questions during the reading task, and involved three specific questions. Question one related to identifying learning strategies used, including practice, effort, and listening to task instructions. Question two related to self-evaluation of progress and asked the pupil to assess the task outcome. The final question related to confirming the strategies used or identifying other strategies could be helpful. The pupil then recorded their progress and could note other comments if relevant.

As previously mentioned, the dynamic and varied nature of metacognitive learning strategies made it difficult to identify previously applied interventions that could be replicated and were also relevant to primary age pupils. Most metacognitive interventions relate to reading comprehension activities rather than identifying learning strategies (Wright & Jacobs, 2003) or involve older pupils (McInstery & Topping, 2003). However research by Stevens et al., (2001) implemented the processes used in the pilot study across different contexts including primary school age pupils. That being said, the questioning techniques used were more generally applied and not in relation to any specific tasks. Nevertheless the questioning processes adhere to the principles found in other research related to encouraging metacognitive learning as discussed earlier.

In condition 1 the reading task related to a class reading book that had been selected by the class teacher in consultation with the pupil participants and was relevant to the curricular reading levels of the participants.

Teachers in both the conditions were given written instructions and monitoring forms (Appendices F, G and D respectively).

3.2.5 Procedure

Ethical Approval

The methodology and procedures for the studies were subject to approval and supervision by Strathclyde University and Renfrewshire Educational Psychology Service Research Ethics Committees. These respectively require all research projects

to meet the standards set by the Strathclyde University Code of Practice on Investigations on Human Beings as per the University Ethics committee (Code of Practice 5.2), and the British Psychological Society (2006) *Ethical Principles for Conducting Research with Human Participants.* This also includes the *Joint Committee on Standards (1994) Programme Evaluation Standards.* This ensured that key issues such as confidentiality, anonymity, participants' rights and informed consent were recognized and managed appropriately. See Appendices A and B respectively, in regard to Parent Consent request letters used in the pilot study and main study.

Ethical approval to conduct the study was obtained as detailed above. Four randomly identified primary schools were contacted and the first two schools showing an interest were invited to participate. Information regarding the study was distributed to the schools and to the parents of pupils meeting the criteria, thereafter written parental and verbal pupil permission obtained. The pupil participants were then individually assessed for reading attainment and reading attitude using the NARA Π and MRQ respectively (see below for test details). This provided baseline assessment information and also confirmed the participants matched the study criteria.

The two class teachers from the schools involved had individual training that reflected the respective conditions. Therefore, one teacher had instruction in precision teaching methodology including using the Phonic Code Cracker materials. The other teacher had training relating to the metacognitive intervention. During each of the sessions the teachers had written handout instructions and opportunities to practice and ask questions. In addition, there was weekly contact and monitoring of the intervention including researcher's class observations to ensure programme integrity and intervention compliance and provide further opportunities to address any concerns. Therefore, although the condition groups differed operationally, the teachers were each required to follow an objective, measurable, and structured process.

As stated earlier, it was important to the study design that the interventions were implemented within the class setting and that the pupils were not removed from the class. In addition, the participants worked within designated groups and the regular class teacher implemented and monitored the intervention. This was because research

has shown that struggling readers improve more quickly when the intervention takes place within a peer group context (Wigfield & Guthrie, 1997) and also that teacher skills are required to support struggling readers (Topping & Ferguson, 2005). The interventions were required to be implemented four times per week for approximately 15 to 20 minutes per session, reflective of the literature relating to reading and precision teaching interventions (Russell, 1992; Torgerson et al., 2006).

In condition 1 the class teacher would use the before, during and after metacognitive orientated questions to direct and progress the reading activity related to the class reading book. This would take place in the participating pupil group within the class. In condition 2 the Phonic Code Cracker teaching programme would structure the activities and this would also take place within the class and within groups. The Code Cracker precision teaching programme has an associated assessment process, however it would be the overall pre and post standardised reading assessments that would be used to formally record reading attainment results. The pilot was scheduled to run for a four week period to facilitate evaluation of the materials and implementation processes.

3.2.6 Pilots study findings and implications for the main study

Participants:

It was apparent that it would be difficult to access an appropriate sample size of pupil participants at the primary five stage for the main study. However, the information from schools in the local authority area indicated that a larger number of primary four stage pupils met the criteria relating to struggling and reluctant readers. As this still reflected the mid-primary stage indicated in the research, the main study selected primary four stage pupil participants.

NARA Π standardised reading assessment:

The NARA Π was selected for the pilot study as Cronbach's Alpha reliability rate was good for this age group (detailed below) and it was also more appropriate for individual administration due to small number of participants involved (Stuart & Stainthorp, 2004). However, the necessity to select a younger sample of participants for the main study compared to the original pilot and the requirements for group administration meant that the Edinburgh Reading Test (detailed below) was selected

as a replacement standardised test. The ERT provided the reading information relevant to the study and also had good reliability for this older age group of participants (Stuart & Stainthorp, 2004).

Motivation for Reading Questionnaire (MRQ):

This was found to be a relevant and appropriate assessment. It was practical to implement, pupils found the questions interesting, and they were keen to engage with the task. It was reasonably quick to administer (taking approximately 25 minutes) and this could be done in a group situation, minimising disruption to class routines. The MRQ provided information across eleven scales including reading efficacy, reading challenge and reading curiosity, identified as important factors in reading motivation research (Harlen & Deakin Crick, 2002).

Phonic Code Cracker:

This was found to be a practical and relevant teaching resource that incorporated the principles of precision teaching (Binder & Watkins, 1990). For example, there are twelve different teaching programmes that reflect a progression through the different levels of phonics acquisition (McGuinness, 2004). Within the different levels, the final task outcomes are broken into component parts with each stage requiring specified accuracy and fluency objectives before moving on. The resource structure also facilitated flexibility and a variety of different consolidation activities and as such was relevant to reluctant and struggling readers (Topping & Ferguson, 2005). This is a published resource that was utilised by support for learning department within the local authority and was recognised as useful to supporting struggling readers. The package provides extensive teacher notes, easy to follow detailed instruction, graded levels of photocopiable materials and fluency tests. It was also fully revised and updated in 2007.

Motivation Intervention:

From the teacher and pupil feedback, and also the researcher's (Educational Psychologist) class observations (Appendix N), it was apparent that although the questioning process was appropriate and facilitated pupils' thinking about their learning as recommended in the research (Stevens et al., 2001; Zimmerman, 1990) the process was repetitious, making it overly complicated and as such required to be

modified. This technique would possibly be more easily applied to older learners and used over a longer period of time. That being said, consultation with experienced teachers had indicated that it would be relevant at this primary stage.

As previously mentioned, metacognitive strategies are varied and, although in this case the format was altered, the amended intervention still adhered to the principles surrounding metacognitive learning. Thus the amendments related to removing the before and during questioning and only asking the questions at the end of each daily intervention session. The recording form was altered to be more pupil friendly, giving more visual feedback and using less text (Appendix H). The altered form also required both pupil and teacher to sign each session, also providing an integral intervention monitoring process related to the requirement of teacher involvement.

Intervention Implementation:

The pilot study indicated a high level of intervention compliance in both the conditions and indicated that it was practicable and feasible for the study interventions to take place in the class, with the class teacher including the regularity required. Teacher feedback and class observations indicated that groups of six pupils were appropriate to facilitating learning and teaching at both individual and group level as indicated as being more effective for struggling readers (Topping & Ferguson, 2005). In addition, feedback from teachers and class observations during the pilot study also indicated that the training and instructions given to the participating teachers were constructive and comprehensible. At the end of the pilot study the researcher also conducted group discussions with all the participants reflecting each of the respective study conditions. Irrespective of the condition, all pupils were enthusiastic, positive and found the intervention to be helpful.

Although such feedback needs to be acknowledged, 'observer effects' (Robson, 2002, P328) can influence the situation being observed. In order to minimise this possible effect the researcher and where relevant in the main study, the Research Assistant, reduced interaction with the observed groups only interacting once the lessons had ended. Also, the regular attendance of an observer can result in observer habituation and this also reduces effects. In addition, as recommended there was triangulation of

data from other sources to be considered (Greig & Taylor, 2002). This influence of observer effects was also acknowledged when gathering data from the main study. The pilot study raised methodological issues in relation to the practicalities of the added metacognitive motivation intervention in condition 1. However the pilot study also elicited that a precision teaching programme can be implemented to larger groups of pupils within a classroom setting rather than the normal practice of extracting the pupils from the class on a one-to-one basis. In addition, although modifications were required to the metacognitive intervention this too was applicable to struggling readers within a class setting. As previously mentioned, introducing metacognitive learning approaches to struggling readers can be difficult (Wright & Jacobs, 2003).

The pilot study also had the further objective of assessing the feasibility of directly comparing PT with metacognitive teaching approaches. It was recognised that both have different theoretical perspectives, nonetheless it was thought that the commonality of reading tasks would facilitate the comparisons between two motivation teaching methods. However, the outcome of the pilot study indicated design issues that would be difficult to address. These related to the dynamic and variable nature of using metacognitive teaching approaches, and even with a highly structured intervention programme it would be difficult to control for the influences of individual classroom settings including the interactions of the teacher. As discussed earlier, different schools and classes reflect different class ethos and cultures (Ellis, 2007).

Therefore, as the main study involved different classes and class teachers, this could have confounded any findings and it would be difficult to relate any differences to the teaching method alone. Nevertheless, the pilot study did indicate that the fixed structure of the PT approach made it easier to monitor uniformity of implementation and this also made it amenable to adding other motivation factors. Furthermore, as each approach has distinguishing motivation factors, making a distinction between PT and PT with an added metacognitive factor possible.

3.2.7 Main Study

The aim of the main study was to examine whether an additional motivation factor increases reading attainment and/ or reading attitude compared to the motivation factors already present in precision teaching methods.

3.2.8 Design

The main study compared precision teaching and the same precision teaching programme with an added motivation factor. This involved pupil participants being randomly assigned to one of two teaching programmes. The intervention group refers to an operationalised precision teaching reading programme with an added metacognitive motivation intervention. The control, or non-intervention, group implements the same operationalised precision teaching reading programme as used in the intervention group but without any added motivation factors.

The study used a mixed-methods design gathering both quantitative and qualitative data. The intervention took place over an eight week period involving different schools and classes at the primary four stage.

The quantitative data gathered involved pre and post standardised assessments of reading attainment and reading attitude. This relates to the Edinburgh Reading Test (ERT) (University of Edinburgh, 2002) and the Motivation to Read Questionnaire (MRQ) (Wigfield & Guthrie, 1997) respectively. The qualitative data related to semi-structured teacher interviews (Appendix I), Teacher Feedback Forms representing both the study conditions (Appendix J and K), Parent Questionnaires (Appendix L), pupil discussions (Appendix M) and information from the researcher's monitoring process (Appendix N).

The design of the study selection and training processes also endorsed the principles of Critical Realism that elicit commitment and information gathering at different levels and involve different perspectives (Kelly, 2008). Accordingly, a consultation process with schools that involved Headteachers and class teachers was initiated. At the training sessions class teachers who would be implementing the intervention, as well as the schools' Headteachers and/ or Support for Learning Coordinators (usually Depute Headteachers), also attended and were actively included in the ongoing

feedback and monitoring processes. This facilitated the organisational networks that are recommended for supporting individual teachers, at class level, to implement new learning interventions (Ellis, 2007; Hall & Harding, 2003). In addition, the training sessions were reflective of the processes related to interaction, dialogue and reflection associated with quality aspects of intervention delivery and intervention compliance (Dane & Schneider, 1998; Ellis, 2007).

In regards to monitoring programme integrity and compliance, the researcher (Educational Psychologist) conducted class observations (Appendix N) during the intervention period. A Research Assistant (RA) supported the intervention, attending at teacher training sessions and conducting further class observations independent of the lead researcher. The same class observation schedule was used to record this information. The intervention also involved all the pupil participants completing the Code Cracker task work books. The participants in the intervention group were further required to complete Feedback Charts (Appendix H). Pupils kept the resource materials in their individual folders that were collected at the end of the study. This provided additional documentation evidence of programme integrity.

The analysis of the quantitative data involved a one-way between groups analysis of covariance (ANCOVA), with one independent variable (IV) at two levels (Precision Teaching and Precision Teaching with added motivation) and two dependent variables (DV). The DVs were reading attainment and reading attitude and these were separately analysed. The number of participants selected was based on a formula for calculating sample size needed for ANCOVA (Tashakkori & Teddlie, 1998). Hence the calculation of the minimum number of total participants required was 50 + (8 x number of IVs). Therefore the minimum required for this study design was 58 participants. The analysis of the qualitative data involved analysis of comments and answers to interviews and questionnaires and led to identifying emergent themes (Robson, 2002).

3.2.9 Participants

The seven randomly selected participant local authority schools were situated within the same local authority area. The total number of pupils in the classes ranged between 22 and 25 pupils. The two schools with the most participants were assigned

to the intervention group. This was to ensure that the intervention and non-intervention groups were in different schools to avoid any threats to internal validity from inadvertent diffusion between the conditions (Robson, 2002: p106). The two schools in the intervention group were matched in relation to socio-economic factors using government determined data indicators that included pupil eligibility to school meals and allowances for school uniforms.

In total, there were 77 primary four stage pupil participants, with a mean age of eight years, three months, identified as meeting the criteria and being eligible to participate in the study. The parents/carers of these pupils were provided with an information sheet detailing the aims and procedure of the study (Appendix B). Written consent was then sought from each parent/carer (Appendix B). The parents were asked to discuss the study with their child whose verbal consent was also then sought.

Endeavours were made to have equivalent representation of pupil participants in each of the teaching programmes, however, this was not possible due to circumstances relating to class organisation, pupil absences during the intervention period and contacting parents to obtain consent. This meant that the number of participants was reduced to 69 and resulted in 29 (42%) pupil participants in the intervention group and 40 (58%) pupils in the control group. In terms of gender ratios, there were 44 boys with 19 (43%) in the intervention group and 25 (57%) in the control group. In relation to girls, there were 25 girls with 10 (40%) in the intervention group and 15 (60%) in the control group. The 29 participants in the intervention group were spread between two primary schools. Thus 12 and 17 intervention group participants were in each of the two schools respectively. The school with 17 participants had two primary four classes with 12 participants in one class and five in the other. The other 40 participants were split between the five other primary schools in groups between five and seven.

3.2.10 Inclusion Criteria

As discussed earlier, the study concerned struggling readers at mid-primary stages who also presented with low motivation to read. The criteria related to pupils who were below the expected reading level for their age as indicated by the 5-14 National Test results, and were at least one year behind their peers as indicated by the

Edinburgh Reading Test, a standardised reading assessment. The pupil participants were then randomly assigned to either the intervention or non-intervention groups as directed by school.

Due to ethical considerations the schools involved did not wish to select pupils who met the inclusion criteria as a control group and who would thus not receive either of the interventions (Greenway, 2002). This inclusion criterion has implications in relation to regression towards the mean as it would be expected that all participants would improve (Robson, 2002). However the participants were randomly selected to two groups with the non-intervention group representing a control group for experimental design purposes. This addressed the issues surrounding regression to the mean as the intervention would only be judged effective if the intervention group increased significantly more in reading attitude and/or reading attainment than the non-intervention group (Robson, 2002).

As each pupil had an individualised programme of work including an individualised feedback and monitoring process, it was justified to consider the individual pupil as a unit of analysis. In addition, the procedure of teaching the pupils as individuals within a group and class context reflects previous studies that looked at individual progress within group situations (Torgerson et al., 2006). It is also associated with effective intervention to support struggling readers (Guthrie et al., 2006).

Thereafter, teacher information contained in end of term school report commenting on pupil engagement with reading activities was applied to those pupils selected as above, to further identify pupils who were also reluctant readers. The school report categories related to 'very good', 'satisfactory' and 'needed support'. Thus pupils whose effort was detailed as needed support were identified.

3.2.11 Materials

The following standardised assessments were used to measure reading ability and reading motivation in all the participants:

Edinburgh Reading Test (ERT)

Reading ability was assessed using the Edinburgh Reading Test (ERT), developed by the Education Assessment Unit, University of Edinburgh (2002). The ERT was updated in 2001 and included re-standardisation calculations. The ERT consists of a series of sub tests assessing a range of different literacy skills including vocabulary, syntax, sequencing, comprehension of main ideas, factual reading and context. The ERT has good reliability (Kuder-Richardson 20 ranged from 0.79-0.94: Edinburgh Assessment Unit, 2007). In the current study the reliability estimate for the full scale was 0.87 and sub-scale reliabilities ranged from 0.83 – 0.88. These estimates are similar to those reported in the ERT manual (Edinburgh Assessment Unit, 2007).

The information which can be obtained from the test includes a reading attainment score, a standardised score which relates the pupil's performance to that of the general population, diagnostic information, and a reading age. The ERT series consists of four tests, each suitable for a different age range, although the specified age ranges overlap in neighbouring tests. ERT1 is appropriate for 7-9 year olds; ERT2 is appropriate for children aged 8 years 6 months to 10 years 6 months; ERT3 is appropriate for children aged 10 years to 12 years 6 months and ERT4 is appropriate for young people aged 11 years 7 months to 16 years. For the purpose of the present study, ERT 1 was used. The ERT manual (Edinburgh Assessment Unit, 2007) indicates re-testing is appropriate to measure and evaluate teaching methods. There are no minimum re-test time periods stipulated in the manual.

Motivation for Reading Questionnaire (MRQ)

Reading motivation was measured using the Motivation for Reading Questionnaire (MRQ) (Wigfield & Guthrie 1997). The Motivation for Reading Questionnaire measures different aspects of children's reading motivation, primarily reading competence and efficacy. MRQ incorporates both intrinsic and extrinsic motivation. Generally, Cronbach's Alpha reliability index exceeds the recommended rate for reliability, which is 0.7 (Howitt & Cramer, 2005). In the current study the full scale reliability estimate was 0.91 and the subscale reliabilities ranged from 0.89 – 0.91. This is similar to the reliability estimates previously reported (Wigfield & Guthrie, 1997). MRQ consists of 54 items which children answer in relation to themselves on 1-5 point Likert scale. Scores for each item are summed to produce an overall scale

score between 10 and 40. Four of the items are omitted from this final score as they are related to reading avoidance levels. MRQ is a standardised scale designed for children aged 7-13 years.

Neale Analysis of Reading Ability Revised 1997

The Neale Analysis of Reading Ability Revised 1997 (NARA Π) (Neale, 1997) is an individually administered standardised test of reading ability. This is a good reliable and valid assessment with Cronbach's Alpha index indicating all assessments at or above 0.73 – 0.96 (thus exceeding 0.7, the recommended rate for reliability) (Stuart and Stainthorp, 2004). The results from the pilot study were not statistically analysed due to the small number of participants. The NARA Π measures word recognition, comprehension and reading rate. In the main study the ERT replaced the NARA Π as the standardised reading assessment due to the selection of older participants and group administration.

Phonic Code Cracker Programme (Russell, 1992)

Phonic Code Cracker is a comprehensive scheme for teaching phonics and phoneme awareness. It is published by the Quality in Education Centre, University of Strathclyde and is a recommended teaching resource in the local authority. It is a highly structured systematic teaching programme that reflects fluency and accuracy and is recognised as an operationalised precision teaching approach (Russell, 1992). Phonic Code Cracker details twelve different teaching stages organised into books that reflect a particular aspect of phonic acquisition. For example, Book One is letter to sound correspondence and Book Two is simple two letter blends. The books or stages do not have to be followed in chronological order and are chosen depending on the knowledge needs of the pupil. There are no time limits related to the completion of each book but successful completion of a book would be guided by the pupil progress in the fluency assessments and completion of other associated activities contained in the particular stage.

In this study, the pupils all started on Code Cracker Book Three as the criteria selection assessment process and baseline data collection indicated that the pupils required revision of phonic blending. Book Three deals with initial and final consonant blends of four letter words and the associated fluency tests. The teachers

were given general instructions as well as specific instructions related to implementing Book Three.

Metacognitive Motivation Materials

The added metacognitive dimension related to an individualised pupil Fortnightly Feedback Chart (Appendix H) developed to reflect the planning, monitoring and self-evaluation processes associated with self-regulated learning (Flavell, 1979; Zimmermann, 1990). The Feedback Chart was intended to prompt identified effective learning strategies, encourage self-evaluation of task outcomes, provide visual and written feedback information and be appropriate to the age of the pupil participants (Stevens et al., 2001; Walker, 2003). At the end of every precision teaching session the participants in the intervention group were required to complete their individual Feedback Chart with support from the teacher. The Feedback Chart prompted the participants to identify the learning strategies they had used, reflect if the strategies used were helpful and consider what other strategies could be used.

The Feedback Chart highlights practice, listening and effort as key learning strategies (Zimmermann, 1990) although the pupils can detail other strategies if they wish. The participants are further asked to chart their progress on a graph that relates to their self-assessment of the task outcome and also serves to provide visual feedback (Walker, 2003). Once familiar with the process this part of the intervention should take only five minutes to administer and complete.

3.2.12 Procedure

During the daily precision teaching sessions, five to seven pupils would partake at any one time (in both the intervention and non-intervention groups). The Phonic Code Cracker materials determined the length of the sessions and this would be approximately 15 minutes independent of the number of pupils in the groups and therefore the time spent on the intervention was similar across all the participant groupings.

The pupil participants in the intervention group would then take an additional five minutes to reflect on their learning and complete the motivation Fortnightly Feedback Chart. Thus, over the eight week intervention period each pupil would complete four

Fortnightly Feedback Charts and there would be eight entries on each reflecting the four times weekly sessions. Each session would be signed by both the teacher and pupil. Prior to the start of the study the participants were assessed for base line measures of reading attainment and reading attitude using the standardised assessments as aforementioned. Both the ERT and MRQ were carried out in groups of between five and seven pupils and took around an hour and 15 minutes to complete. In accordance with the ERT instruction manual, a break of 15 minutes was allowed between sections one and two of the test. Pupils were read the questions for both the ERT and MRQ to ensure accurate understanding. Post-testing was completed eight weeks later and was carried out in the same manner as pre-testing.

There were eight class teachers involved and all received the required operationalised precision teaching training and instruction. Three of the eight teachers were also in the intervention group (one of the intervention group schools had two primary four classes and thus two teachers involved) and they received separate instruction in relation to the additional motivation intervention. There was one training session for all eight of the teachers related to the Code Cracker based precision teaching programme. This facilitated instruction, modelling of the intervention and opportunities to practice and become familiar with the materials. There was also written instructions and handouts (Appendices F and P). The three teachers in the intervention group received additional instruction (Appendix O) in the added motivational intervention including related motivation theory and instructions in implementing the pupil Fortnightly Feedback Chart (Appendix H).

Thereafter, in the first week of the intervention period the researcher visited each school and conducted general class observations to check that implementation instructions had been understood and were being accurately complied with. There was also the opportunity for all of the teachers to raise any issues or clarify any queries in relation to the intervention. The researcher also took this opportunity to confirm and reassure the teachers that they were implementing the intervention as required. At this time no issues or further clarification were needed. All teachers were reminded of the researcher's contact details (phone number and e-mail address) and encouraged to contact her should any issues become apparent.

Both groups received operationalised precision teaching interventions four times a week, generally in groups of an average of six (although sometimes it could be either five or seven pupils) within the class setting and delivered by the regular class teacher for approximately 15 minutes. In addition, the intervention group with support from the teacher completed their recording schedule at the end of every precision teaching session. As previously stated, the interventions were required to be implemented four times per week taking approximately 15 minutes per session, reflective of the literature relating to reading and precision teaching interventions (Russell, 1992; Torgerson et al., 2006). The participants in the intervention group had an additional five minutes to complete the recording schedules. All the pupil participants had individual folders to keep their work in and this assisted with the administration and systematic monitoring of the intervention throughout the study.

The systematic monitoring processes in place in relation to programme integrity and intervention compliance involved the researcher with support from the RA. These included class observations (Appendix N) and monitoring of the individual pupil folders containing the participants completed Code Cracker Books and the Fortnightly Feedback Chart. As highlighted earlier, steps to reduce 'observer effects' during observations were taken, such as minimum interaction during lessons and observer habituation through regular visits to the classes (Robson, 2002: P328).

All the pupil participant folders were collected at the end of the study. Also at the end of the study there were individual semi-structured interviews with all eight of the teachers. There were also discussions with five of the groups of participating pupils in the middle and at the end of the intervention, and this included all of the intervention groups. A questionnaire was sent to all parents. All the teachers also agreed to consult with parents at Parents' Night meetings to access any further relevant feedback information and to feedback verbally the study outcomes. This was arranged in order to address any literacy issues that may have impacted on parent completion of questionnaires and /or understanding the follow-up written feedback at the end of the study. Written feedback was also given to the school head teacher and participating teacher on completion of the study.

Results

The results involve both quantitative and qualitative findings. The quantitative data refers to standardised assessments in reading attainment and reading attitude, ERT and MRQ assessments respectively. The qualitative data involves semi-structured interviews with teachers, Teacher Feedback Forms, Parent Questionnaires and pupil discussions (Appendices I, J, K, L and M). Educational Psychologist (researcher) reflections in regards to monitoring the programme integrity of the intervention are also detailed (Appendix N). This mixed method design ensured triangulation of data, providing a more complete picture recognising contextual factors and acknowledging the different perspectives of those involved (Robson, 2002). Using a combination of quantitative and qualitative data also helped with providing supplementary information as well as possible explanations to the outcomes of the statistical analysis by the provision of narrative accounts (Robson, 2002).

An Analysis of Covariance (ANCOVA) was utilised in relation to the quantitative data. This type of analysis was used in order to address variation effects resulting from the participant groups' different starting points in reading ability and reading attitude scores. This means the DVs' pre-test scores are used as a covariate, hence the DV mean scores are adjusted accordingly. Variation in the participants starting points could not be accounted for by calculating difference scores from the pre and post data and then, for example, performing an ANOVA (Brace, Kemp & Sneglar, 2006).

However, the elimination of variation effects by using an ANCOVA allows for the focus to be on the effect of participating in one of the two teaching conditions. Therefore facilitates the research question of whether the intervention is effective regardless of reading ability and reading attitude. The same rationale also applies when considering the results in relation to gender. Thus the question is whether the intervention is effective regardless of gender. Hence the effects of the intervention will be represented by the post score comparisons and will not be influenced by the participants' prior abilities, attitudes or gender (Brace et al., 2006).

3.3.2 Gender Differences

As discussed in the literature review there is some evidence to suggest that gender may be an influential factor in learning and motivation (SEED, 2006). Gender was therefore considered and ANCOVA analyses were conducted in relation to reading attainment and reading attitude. The results, reported below found no gender effects in either reading attainment or reading attitude. Therefore gender was not considered in the subsequent statistical analyses.

A one-way between groups ANCOVA was conducted to assess the impact of gender with post- ERT scores as the dependent variable, gender as the independent variable, and pre- ERT scores as the covariate. This demonstrated that there was no significant effect, $F(1,66) = 0.000$, $p>0.05$ (0.985), *partial* $\eta^2 = 0.000$.

A one-way between groups ANCOVA was conducted to assess the impact of gender with post- MRQ scores as the dependent variable, gender as the independent variable and pre- MRQ scores as the covariate. This demonstrated that there was no significant effect, $F(1,66) = 0.275$, $p>0.05$ (0.602), *partial* $\eta^2 = 0.004$.

Table 1 below displays the descriptive statistics calculated for the pre- and post- data collected from the two group conditions, i.e. those who received intervention and those who did not. As explained above, the pre-score means on the DVs have been adjusted (using computer software, Statistical Package for the Social Sciences (SPSS)) to remove variation effects in order that the effect of the intervention programme can be explored. Therefore, it is the comparison of gains made between the intervention and non-intervention group post mean scores that are of interest in relation to any differences. Examination of post- ERT mean scores in Table 1 indicates a gain of 1.09 points in the intervention group. There is also a gain of 1.7 points in the post- MRQ means in the intervention group.

Table 1: Adjusted means and standard deviations for group differences between Edinburgh Reading Test ERT and Motivation to Read (MRQ) scores

	ERT		MRQ	
	Pre	**Post**	**Pre**	**Post**
Intervention Group	82.61 (7.76)	88.17 (7.48)	31.27 (6.59)	32.49 (5.43)
Non Intervention Group	83.68 (7.12)	87.08 (6.20)	29.87 (5.78)	30.77 (6.43)

A one-way between groups ANCOVA was conducted with post- ERT scores as the dependent variable, intervention condition as the independent variable, and pre-ERT scores as the covariate. This demonstrated that there was a significant difference between the overall pre- and post- ERT scores $F(1,66) = 46.23$ $p < 0.001$, *partial* $\eta^2 = 0.412$. However, there was not a significant effect of intervention, $F(1,66) = 1.72$, $p > 0.05$, *partial* $\eta^2 = 0.025$.

A one-way between groups ANCOVA was conducted with post MRQ scores as the dependent variable, intervention condition as the independent variable and pre- MRQ scores as the covariate. A similar pattern of results emerged; demonstrating a significant difference between the overall pre- and post- MRQ scores $F(1,66) = 15.39$, $p<0.001$, *partial* $\eta^2 = 0.189$. There was no significant effect of intervention, $F(1, 66) = 0.70$, $p>0.05$, *partial* $\eta^2 = 0.010$.

3.3.3 Individual Components of the ERT

In order to ascertain whether or not there were any between group differences in the individual components of the ERT test, the pre and post- test scores on individual components were analysed. Table 2 below displays the descriptive statistics of adjusted mean scores for the ERT components for the intervention and non intervention groups. Examination of the descriptive statistics indicates that there are slight gains in the intervention group post-test means for syntax (0.36), sequence (0.35) and comprehension (0.47). However, the mean gain is more in the non-intervention group for vocabulary (1.03).

Table 2: Descriptive statistics (adjusted mean scores) for group differences between the components of the ERT

Component		Pre-score Mean (SD)	Post-score Mean (SD)
Vocabulary	**Intervention Group**	13.34 (3.78)	15.17(3.95)
	Non intervention Group	13.13 (4.52)	16.20(3.57)
Syntax	**Intervention Group**	14.34(6.30)	18.86(5.59)
	Non intervention Group	14.75(5.45)	18.50(4.74)
Sequence	**Intervention Group**	2.95(5.78)	14.38(3.54)
	Non intervention Group	2.90(4.04)	14.03(3.96)
Comprehension	**Intervention Group**	9.00(4.37)	12.90(3.31)
	Non intervention Group	10.15(4.48)	12.43(3.47)

Four separate one-way between group ANCOVAs were also carried out with post-component scores as the dependent variables, intervention condition as the independent variable, and pre-component scores as the covariate. These analyses focused on multiple comparisons between related variables, therefore, a bonferroni correction was carried out by dividing 0.05 by 4 to give us a p value of 0.0125. These ANCOVAs revealed that the post-test difference between the two group scores on the different components were not statistically significant. Vocabulary $F(1,66) = 2.69$, $p > 0.0125$; syntax $F(1,66)=0.29$, $p > 0.05$; sequence $F(1,66)= 12.69$, $p > 0.0125$ and comprehension $F(1,66)=1.10$, $p > 0.0125$.

3.3.4 Individual Components of the MRQ

Table 3 displays the descriptive statistics of adjusted mean scores for MRQ components for the intervention group and the non-intervention group. Examination of the post-mean scores indicate slight gains in the intervention group for reading challenge, reading compliance, reading recognition, reading for marks and social reasons for reading. Both reading involvement and reading importance have slightly higher gains of 0.49 and 0.43 respectively. The mean score gain for reading competition is 0.16 more in the non-intervention group.

Table 3: Adjusted means and standard deviations for group differences between the components of the MRQ

Component		Pre-score Mean (SD)	Post-score Mean (SD)
Reading Efficacy	**Intervention Group**	2.95 (0.97)	3.20 (0.83)
	Non intervention Group	2.90 (0.88)	3.16 (0.79)
Reading Challenge	**Intervention Group**	3.11 (0.90)	3.10 (0.93)
	Non intervention Group	2.70 (0.95)	2.94 (0.82)
Reading Curiosity	**Intervention Group**	2.90 (0.98)	3.18 (0.78)
	Non intervention Group	2.77 (0.82)	3.12 (0.80)
Reading Involvement	**Intervention Group**	3.08 (0.92)	3.19 (0.84)
	Non intervention Group	2.82 (0.92)	2.79 (0.91)
Reading Importance	**Intervention Group**	3.64 (0.86)	3.66 (0.67)
	Non intervention Group	3.49 (0.79)	3.23 (0.98)
Reading Compliance	**Intervention Group**	2.83 (0.45)	3.13 (0.57)
	Non intervention Group	3.00 (0.78)	3.00 (0.57)
Reading Recognition	**Intervention Group**	3.19 (0.76)	3.44 (0.63)
	Non intervention Group	3.24 (0.92)	3.23 (0.75)
Reading for Marks	**Intervention Group**	3.24 (0.89)	3.54 (0.52)
	Non intervention Group	3.22 (0.82)	3.15 (0.87)
Social Reasons	**Intervention Group**	2.65 (0.69)	2.78 (0.71)
	Non intervention Group	2.59 (0.74)	2.67 (0.92)
Reading Competition	**Intervention Group**	3.28 (0.84)	3.15 (0.85)
	Non intervention Group	3.06 (0.91)	3.31 (0.80)

Ten separate one-way between group ANCOVAs were carried out on the post component scores of the MRQ with post- component score as the dependent variable, intervention condition as the independent variable, and pre-component score as the covariate. Applying the bonferroni correction can be too restrictive (Brace et al., 2006). Therefore to account for a Type 1 error, the significance level was reduced from 0.05 to 0.01 for the multiple comparisons. Results demonstrated that there were no significant differences post-intervention between components.

Efficacy $F(1,65)$ =	0.01, $p > 0.01$,	*partial* $\eta^2 = 0.000$
Challenge *F(1,65)* =	*0.00*, $p > 0.01$,	*partial* $\eta^2 = 0.000$
Curiosity *F(1,65)* =	*0.00*, $p > 0.01$,	*partial* $\eta^2 = 0.000$
Involvement $F(1,65)$ =	2.25, $p > 0.01$,	*partial* $\eta^2 = 0.000$
Compliance $F(1,65)$ =	*0.84*, $p > 0.01$,	*partial* $\eta^2 = 0.013$
Recognition $F(1,64)$ =	*1.70*, $p > 0.01$,	*partial* $\eta^2 = 0.026$
Social reasons $F(1,65)$ =	*0.07*, $p > 0.01$,	*partial* $\eta^2 = 0.001$
Competition $F(1,65)$ =	0.93, $p > 0.01$,	*partial* $\eta^2 = 0.014$
Reading for marks $F(1,65)$ =	4.37, $p > 0.01$,	*partial* $\eta^2 = 0.063$
Reading importance F(1,65) =	4.38, $p > 0.01$,	*partial* $\eta^2 = 0.063$

3.3.5 Summary of Quantitative Results

The statistical analysis of the quantitative data indicated that there was no significant difference between the intervention group (PT with added motivation factor) and the non-intervention group (PT) in either reading attainment or reading attitude scores as measured by the ERT and MRQ assessments respectively. Nor was there any significant difference found in relation to gender. Thus, there were no effects found in relation to the intervention.

3.3.6 Qualitative Results

The qualitative data gathered included Parent Questionnaires, semi-structured teacher interviews, Teacher Feedback Forms and pupil discussions. There were also researcher reflections in relation to the monitoring and observations processes associated with programme integrity (Dane & Schneider, 1998; Robson, 2002). Qualitative data is crucial and helpful in analysing outcomes including directing future research, particularly when statistical analyses are non-significant. The comments and emergent themes from qualitative data analysis are reported below.

3.3.7 A. Parent Questionnaires

77 pupils were selected from the same inclusion criteria to participate in the study and 69 parents gave informed consent. This response rate of 90% is considered a high response rate indicating the generalisability of any results (Robson, 2002).

A questionnaire at the end of the study was administered to all of the 69 parents after the study. Of the 69 questionnaires, 20 (29%) were returned, 6 (8%) of those related to the intervention condition. However, a return rate of at least 70% is required in order to be considered a representative sample (Robson, 2002). The low return rate may be related to parents' reading difficulties (Robson, 2002).

This was expected as research indicates that pupils' poor literacy skills can be linked to parents' literacy skills (Black & Wiliam, 1998). This study endeavoured to account for this by also requesting teachers to ask parent's the questions from the questionnaires. Other research has used this approach (Greenway, 2002). However there was no reliable data obtained from this method as teachers either forgot or did not accurately record the information. Future research may consider use of focus groups or semi-structured individual interviews to address this issue (Robson, 2002).

Due to the anonymous nature of the parents' questionnaires further analysis related to comparison between individual pupil attainment scores and individual parent questionnaires was not possible.

<u>Differences in children's reading /spelling progress</u>

There were no differences in comments noted between the intervention and non-intervention Parent Questionnaires in relation to reading/ spelling progress.

75% of parents felt that they have noticed a difference in their children's reading/spelling progress since undergoing a precision teaching intervention. Areas where many parents commented that they had noticed a difference related to increases in their child's confidence:

"I feel (child) is more confident with reading and spelling"

"(Child) appears more confident in ability to read out loudly"

"(Child became) more confident in reading and better at spelling"

Some parents also felt that since the intervention their children had become more interested in books and had been reading more at home. Parents reported that children had been reading with more ease and had been taking the time to really think about their reading.

"(Child) reads more frequently at home and with less difficulty"

Differences in attitude to reading

There were no differences in comments noted between the intervention and non-intervention Parent Questionnaires in relation to attitude to reading.

90% of parents felt that their child's attitude to reading/spelling had improved as a result of being involved in the precision teaching project. In particular, parents mentioned changes in their child's motivation to read and also the amount of enjoyment that their child got from reading. Some parents felt that they no longer had to force their children to do their reading:

Table 4: Parent's Questionnaires

Themes	Parents' Comments
Differences in children's progress	• Parents felt that they had noticed a difference in their children's reading and spelling progress since the intervention. • Parents commented that they had noticed a difference in their child's confidence • Since the intervention children had become more interested in books and had been reading more at home. • Parents also reported that children had been reading with more ease and had been really thinking about their reading.
Differences in children's attitudes	• Parents felt that their child's attitude to reading/spelling had improved as a result of being involved in the project. • In particular, parents mentioned changes in their child's motivation to read and in the amount of enjoyment that their child got from reading.

3.3.8 B. Teacher Interviews

In order to elicit teacher views of the project, semi-structured interviews were carried out with all of the participating teachers (see Appendix I for interview schedule). Semi-structured interview questions were based on the following themes:

- Pupil outcomes
- Practicalities of implementation
- Classroom reflections

The teachers who participated in the project within their establishments were invited to participate in semi-structured interviews. In total, seven teachers were invited to

take part in semi-structured interviews about their experiences and all teachers agreed to take part. All interviews were conducted face to face and took approximately 25 minutes.

I. Precision Teaching Only (Non-intervention group)

Progress

Responses from teachers suggest that since the intervention, there have been noticeable differences in pupils' literacy rates. Due to the nature of the intervention, whereby pupils can measure their own progress, many of the pupils could perceive their own improvements and teachers felt that this motivated them and gave them more confidence in their own abilities. An increased emphasis on group work also encouraged positive peer relationships within the classroom:

"Would say there was an overall improvement in literacy in that group"
"When they could see they were getting better they were quite happy"

"Noticed an increase in confidence and peer relationships"

On-Task Behaviour

Some teachers commented that they noticed improvements in pupils' concentration and on-task behaviour since taking part in the intervention. Teachers felt that this could be due to the prescriptive nature of the task and the fact that children know what they have to do and know exactly the time that they have to do it in:

"Some boys in the group are rascals, but when they do Code Cracker they kept on task and concentrated much better."

"Concentration has improved…as the children know what they have to do and stay on task by themselves"

Peer Interactions

Comments from teachers suggest that the children enjoyed taking part and some teachers felt that peer relationships improved through the group work undertaken. Although a competitive component was noted, teachers felt that the children were

respectful of their peers and did not compete with each other in a negative way. Teachers perceived the children to be interested in beating their own scores as well as their peers:

"The children all enjoyed doing the timing in the groups and they didn't tease each other in competition, were more focussed on beating their own previous scores."

"They are very keen to try to beat each other, also to beat their own score. There was no negative competition, teasing".

Goal setting

Teachers felt that children really enjoyed target setting and working towards beating their own times and personal goals. The timed component encouraged some children to learn their words and do better. Indeed, some teachers felt that given this added incentive to learn their words some pupils concentrated much better. Some teachers did however worry that the incentive to improve their time was greater for some than the incentive to learn their words:

"When I left them to practice they enjoyed timing each other and beating their pal, not in a teasing way, but in a way that they were beating their own score"

"Beating their own time was an incentive to learn the words and do better, but I did feel they were keener to improve their time than learn the words."

Development of transferable skills

Some teachers commented that the intervention had equipped children with transferable skills and strategies which they can now use in other subject areas without prompting. However, some teachers had not noticed pupils' newly acquired skills being used in other areas:

"It is giving them a strategy to read words, children are now using this without prompting"

"I think there is increased confidence in Code Cracker work but have not noticed this being transferred to normal work"

No difference

Although most teachers did perceive some differences in children throughout the duration of the project two teachers felt that they could not attribute changes purely to the intervention. Some felt that perceived improvements may simply be due to teaching practices:

"The improvement I did notice is that of which I would have expected just through teaching"

"I am not sure how much is down to Code Cracker, and how much is through teaching in general".

Programme Implementation

Most teachers reported finding the intervention easy to implement within the classroom environment. Class teachers focused on small groups of pupils within the larger classroom and reported that this was easy to do. However, some teachers commented that if they were doing it again they would like to involve the whole class with particular focus on a small group of struggling pupils:

"I found practical to implement it in a group setting in the class and by the class teacher."

"I found it relatively straight forward to apply to a small group …I would have liked to have done it with whole class and just concentrated on the ones who were struggling"

Challenges to programme implementation

Some teachers felt that without the support of a classroom assistant implementation of the project would have been more challenging. This generally related to the time commitment required. Other teachers felt that if they were to continue with the intervention they would like to involve the children's families more, in for example, homework tasks. This way the children would get optimal benefit from involvement.

"… If I had no support with the class I would find it very difficult to implement"

"Feels that although some children may not have home support, many of the children would benefit from home support."

Reflections

Teachers reported that they had enjoyed taking part in the intervention as it had given them a chance to work one on one with children that they had perhaps not previously worked closely with. Working more closely with certain children had also given them a greater awareness of how much effort some pupils have invested in their reading and some teachers felt that they had gained a better awareness of how to best support pupils. Teachers also reported that pupils enjoyed taking part:

"I am now more aware of the effort he puts in and how I can support all the children in the complex process of reading."

"I have found it nice having time to hear this group of children reading, as I don't often get a chance to work one on one with them for long periods of time."

Working with the Education Psychology Service (EPS)

Teachers were overwhelmingly positive about their experiences of working with the EPS. Many of the teachers reported that working with the EPS had added to their knowledge and skills and this had been a positive experience, especially for those who had not previously worked with the EPS:

"I was and still am more than happy to work with EPS, it is great to benefit from your expertise and I realise that they need teachers to be more forthcoming."

"I am not long out of university and feel that any knowledge adds to my skills."

Table 5: Summary of Teacher Comments: Precision Teaching Only

Themes	**Teachers' Comments**
Progress	• Teachers noticed increases in children's literacy rates. • Increases in pupils' motivation and confidence. • The fostering of positive peer relationships in the class.
On task behaviour	• Improvements in concentration and on-task behavior were noted.
Peer interaction	• Peer relationships improved through group work. • A competitive component was noted but pupils remained respectful of peers.
Goal setting	• Children enjoyed target setting and working towards their personal goals. • The time component encouraged children to concentrate more and learn their words. • Some teachers worried that the incentive to improve their time was greater for some pupils than the incentive to learn their words.
Development of transferrable skills	• Children had developed transferable skills and strategies which they can use in other subject areas. • Some teachers had not noticed these skills being used in other areas.
No difference	• Two teachers could not attribute any changes in the children to the programme and felt that perceived improvements may simply be due to teaching practices.

Table 5 (Cont.): Summary of Teacher Comments: Precision Teaching Only

Programme Implementation	• Teachers reported finding the intervention easy to implement in the classroom environment. • Class teachers focused on small groups of pupils.
Challenges to programme implementation	• Some teachers felt that without support of a classroom assistant implementation would have been more challenging. • Teachers felt that if they were to continue with the intervention they would like to involve the children's families.
Reflections	• Teachers enjoyed taking part in the intervention • It gave some of them a chance to work with children that they had not previously worked closely with. • Teachers gained a better awareness of how to best support certain pupils. • Teachers reported that pupils enjoyed taking part.
Working with EPS	• Many teachers reported that working with the EPS had added to their knowledge and skills and this had been a positive experience.

II. Precision Teaching with Added Motivation Factor (Intervention group)

Progress

One of the main areas where teachers saw improvements in pupils related to their levels of confidence during literacy tasks. One teacher reported that he intends to continue using the intervention with his classes in following years. It was also noted that children's ability to work cohesively in groups improved throughout the duration of the project:

"We have no intention of stopping"

"It is difficult to say what has transferred but confidence has definitely increased"

"I would say there has been an overall benefit, the children work much better together"

On-task behaviour

Teachers felt that the intervention's emphasis on timing tasks caught the children's attention and helped to motivate them. One of the teachers commented that even the most difficult to reach children responded to the intervention:

"Timing is a great motivating factor, catches attention."
"Even the least cooperative children are motivated by time."

Peer Interactions

Teachers reported that there was a competitive element to the intervention whereby children were continuously striving to improve their own scores and their groups score. Teachers felt that on the whole this was beneficial to pupils as it motivated them to improve and fostered group cohesion as everyone was working towards the same goal:

"They help each other with the words as well – well the ones who are generally helpful do help…."

"There is an element of positive competition – more effort to sound out the words between them."

Development of transferable skills

Teachers reported that the methods children were learning for the purpose of the intervention could be used and were being used in other areas of learning.

"They are using the methods they are learning for other tasks, such as spelling tests..."
"The children can now use the code cracker steps to help them break down other words."

Programme Implementation

Teachers felt that the intervention was worthwhile and two teachers reported that they would continue to use the teaching practices next year with their new classes. Another teacher felt that it helped pupils know 'how' to practice, and was a concrete way of explaining the notion of 'practicing'. One of the teachers stated that when they implemented the intervention again they would try to set some of the work undertaken for homework tasks in order that children can get even more practice of their words.

Teachers reported that they found the PT element of the intervention more practical to implement and one teacher commented that children do not have to be removed from the classroom environment to take part:

"Would also send it home for homework"

"Found that it can work in a classroom setting and they are more motivated as not taken out of class."

Challenges to programme implementation

One of the main challenges identified was the time required to implement the intervention. In particular two of the teachers found the motivation sheet time consuming as they had to go round each child individually to ensure they were filling it out correctly. One of these teachers said that she sometimes asked the pupils to verbally express what strategies they had used. She felt this was easier and quicker and had the same impact. All the teachers also felt that children's responses became repetitive and that they were either filling in the same things every day or filling in what the teacher had told them rather than what they thought themselves:

"(The motivation sheet) they tend to fill in the same thing everyday, don't really understand it."

"The motivation sheet...is very time consuming as you have to go round a lot of them individually."

Reflections

Teachers felt that the one on one work that the project required has been beneficial in helping them to identify specific problems with individual children. One reported that they would transfer what they had learned to children in following years. Teachers thought that children particularly enjoyed the timing aspects of activities which made learning more fun for them rather than something they were forced to do. It was noted that although children struggled with the motivation aspect, it did help them to think about their reading and what they could do to improve:

"You begin to realise the specific problems with children."

"Children saw it as an activity more than work or learning."

"Children struggled with motivation aspect but it did help them to think about what and why they are doing reading."

Working with the Education Psychology Service (EPS)

Teachers reported that it was beneficial for them to work with the EPS. Reports suggest that teacher's valued the opportunity to gain another view on what may work for the children in their class:

"Found it beneficial, it is great to have another idea of what to do with them."

"Yes found it beneficial."

Table 6: Summary of Teacher Comments: Precision Teaching with Added Motivation

Themes	**Teachers' Comments**
Progress	• One of the main areas where teachers saw improvements in pupils related to their levels of confidence during literacy. • It was also noted that children's ability to work cohesively in groups improved throughout the duration of the project.
On task behaviour	• Teachers felt that the intervention's emphasis on timing tasks caught the children's attention and helped to motivate them. • One of the teachers commented that even the most difficult to reach children responded to the intervention. • It was thought it made explicit 'how' to practice.
Peer interaction	• Teachers noted that the competitive element of the teaching was beneficial to pupils as it motivated them to improve and fostered group cohesion as everyone was working towards the same goal.
Development of transferable skills	• Teachers reported that the methods children were learning were being used in other areas of learning.

Table 6 (Cont.): Summary of Teacher Comments: Precision Teaching with Added Motivation

Programme Implementation	• Teachers felt that the intervention was worthwhile and both reported that they would continue to it next years. • One teacher stated that when implementing the intervention again they would set some of the work for homework task. • Teachers reported that they found the PT part more practical to implement.
Challenges to programme implementation	• One of the main challenges identified was the time required to implement the intervention, in particular the teachers found the motivation sheet time consuming. • Teachers felt that children's responses became repetitive and that they were either filling in the same things every day.
Reflections	• Teachers agreed that the project has been beneficial in helping them identify specific problems with individual children. • Teachers stated that involvement had been worthwhile and one reported that they would transfer what they had learned to children in following years.
Working with EPS	• Teachers reported that it was beneficial for them to work with the EPS. • Reports suggest that teacher's valued the opportunity to gain another view on what may work for the children in their class.

3.3.11 C. Teacher Feedback Forms (Appendices J and K)

None of the teachers returned these forms. They all stated that the issues had been covered during the semi-structured interviews. Time demands were also given as a further reason regarding non-completion of the forms.

3.3.12 D. Pupil Discussions

Pupil discussions involving five of the seven participating groups took place on two occasions, in the middle and at the end of the study. This included pupils in all of the intervention conditions. The questions related to the themes of task enjoyment, task usefulness and strategies used during the task. These reflect the literature surrounding reading motivation and the MRQ assessments administered (Wigfield and Guthrie, 1997). The discussions involved a random selection of pupils on each occasion. General questions included:

- What do you like about this new reading activity?
- Do you think this has helped your reading?
- Can you tell me how this has this helped your reading?

All the pupils responded positively and enthusiastically to all of the questions during each of the discussion sessions.

I. Precision Teaching Only (Non-intervention group)

What do you like about this new reading activity?

"It's fun"

"I enjoy it – I like the timing"

Do you think this has helped your reading?

"Yes – I can read more words"

"I like working with my friends"

Can you tell me how has this helped your reading?

"I don't know"

"I'm not sure"

Table 7: Summary of Pupil Comments: Precision Teaching

Themes	Pupils' Comments
Enjoyment of Task	• Pupils enjoyed the reading tasks and commented on the variety of tasks such as saying sounds and drawing a picture to represent the sound. • Completing and keeping their work in their own folder also was mentioned. • Most of the pupils mentioned the timing aspect of the task and saw this as a helpful goal. • No pupils said that they disliked the timing goal or found it stressful. • Pupils made positive comments about working with the teacher and their friends.
Usefulness of Task	Pupils' comments indicated that most thought they could now read more words and also faster.
Strategies Used	• Pupils found this a difficult question to answer and the vague comments reflect this.

II. Precision Teaching with Added Motivation Factor (Intervention group)

What do you like about this new reading activity?

"It's good fun – I like the chart"

"We get to do it with the teacher"

Do you think this has helped your reading?

"Yes – I know my sounds now"

"I have got faster"

Can you tell me how has this helped your reading?

"I took my time"

"I can practice more and keep trying till I can remember more words"

Table 8: Summary of Pupil Comments: Precision Teaching with Added Motivation

Themes	**Pupils' Comments**
Enjoyment of Task	• Pupils were enthusiastic and commented positively about all aspects of the task. This included PT materials and the Feedback Chart. • Pupils liked working with the teacher and other pupils on the tasks. • Most commented on the timed aspects of the task. • No pupils said they disliked the task.
Usefulness of Task	• Pupils commented that they could read words faster. • Knowing and being able to identify phonic sounds was also highlighted.
Strategies Used	• Pupils identified working hard and practising more. • Pupils also mentioned asking the teacher or a friend for help as another strategy to use. • Most pupils could give a strategy they used.

3.3.15 E. Researcher's (Educational Psychologist) Reflections Regarding Programme Integrity

The researcher conducted three class observations in each of the participating classes at the start middle and end of the intervention period. This was in relation to monitoring processes associated with programme integrity and programme compliance. The RA also completed additional observations. The findings of both the researcher and RA were similar. The Class Observation Monitoring Form (Appendix

N) refers to the nature of the observations. As previously highlighted both the researcher and RA were aware of possible observer effects that can influence the observed situation. All the pupil participants completed Code Cracker work books and the intervention group completed Fortnightly Feedback Charts. This documentation provided further information in relation to the quality and frequency of the programmes implementation processes.

Class observations: Precision Teaching

The class observations indicated that the implementation of PT using the Code Cracker materials was approached in a similar way by the teachers across the two conditions and in the different classes. This included the frequency of delivery, completion of the work books and organisation of the pupils and lesson delivery. All the pupils in both conditions regularly completed the work books associated with the PT Code Cracker intervention. The observations indicated that the teacher and pupils were familiar with the task. The pupils all appeared to enjoy the task. The teachers also reported that they found the task beneficial. It was noted during the observations that implementation took approximately five minutes longer than had been accounted for as a result of the information obtained during the Pilot Study. This was due to organisational factors, i.e., gathering the pupils and their folders together in preparation to start the lesson.

Class Observations: Precision Teaching With Added Motivation

As stated above, the PT part of the intervention was uniformly administered across both conditions. The teachers did all administer the added intervention part during all the class observations and with a similar uniform approach following the instructions detailed in the training sessions and summary information sheets (appendices F and O). However, from the teacher-pupil interactions it was evident that there was less attention and importance placed on this part of the intervention and there were quality differences in the delivery of the intervention. The nature of the variability was related to whether the teacher prompted each pupil individually or prompted the pupils as a group to complete their Feedback Charts. Also, the amount of time that the pupils had to complete the Feedback Charts varied. This seemed to be dependant on how long the PT session took as some sessions took longer than others. At this time pupils who

had finished their charts would also start to clear away their folders thus disrupting or prompting other pupils to finish more quickly than they would have done.

The returned Pupil Feedback Charts indicated that they were not regularly completed and included Feedback Charts that were only partially completed. This may indicate that this part of the intervention was not delivered with the same attention as the PT part of the intervention. As reported above, it was noted during the observations that implementation took approximately five minutes longer

In both conditions, all of the PT work books were completed regularly. In the intervention condition none of the added motivation Feedback Charts were fully completed, although all were partially completed. From the comments that the teachers made to the researcher during the class observations, the difficulties appeared to relate to time issues as well as teacher's belief about how beneficial this was. One teacher commented that 'as long as the children learned the word sounds, that was the most important bit'. Although another teacher stated 'children need to know how to use strategies and not always ask the teacher for help, but it took time to complete the Feedback Chart Form'. This teacher also said that she sometimes asked the pupils to verbally express what strategies they used and she felt that this was just as effective and less time consuming.

However, discussions with the Support for Leaning Coordinator (Depute Headteacher) of one of the intervention schools indicated that the pupil participants had achieved more than expected on a whole class routine spelling test and she felt this to be related to the intervention including the added motivation aspect. She further commented that the pupils were more enthusiastic in relation to their approach to this spelling task. In addition, another teacher in this school who was not involved in the study had expressed an interest in the intervention for future use as they felt it had been beneficial.

Table 9: Summary of Researcher (Educational Psychologist) Reflections

Themes	Comments
Implementation of Intervention	• All teachers implemented the PT part uniformly and regularly as per instructions. • All teachers implemented added motivation part during class observations. • Teachers' approach, comments and pupils actions indicate variability of implementing the added motivation factor. • Pupils' work folders support observations in relation to fully completed PT work books and partially completed Feedback Charts. • Pupils were enthusiastic and enjoyed the tasks.
Nature of Variability	• Time spent on task; the emphasis teachers' placed on the importance of the metacognitive task; using verbal processes rather than the written feedback.
Summary of Teacher Comments	• Added motivation task takes too much time; pupils do not understand the task; pupils answers repetitive and therefore not reliable; can see why it is important to know what strategies to use; makes 'how' to practice concrete to pupils.

3.3.16 Summary of Qualitative Results

The data obtained from the qualitative analysis was mixed and therefore any distinctions between the two conditions should be interpreted cautiously. In addition there was a low return rate of Parent Questionnaires. Overall teacher interviews, discussions with pupils and parent questionnaires were positive for both conditions. All of the returned Parent Questionnaires noted positive differences in the children's

reading progress and attitude. However, there were no differences in comments noted between the intervention and non-intervention conditions.

Teacher interviews were positive for both conditions, with teachers commenting on increases in literacy rates, levels of concentration and on-task behaviour. Most of the teachers also found both conditions to have been worthwhile and supportive. In the intervention group teachers' noted that the pupils were more aware of using learning strategies. However the teachers in the intervention group also identified challenges to programme implementation. This related to time implications and uncertainty of the usefulness of the metacognitive task.

Discussions with pupils from both the conditions indicated that they enjoyed taking part and found the tasks to be helpful. The pupil comments indicated that the pupils' felt they could read their words faster and knew all their phonic sounds. Teacher reports and Researcher observations further indicated that the pupils were all enthusiastic and none of the pupils were reluctant or hesitant in participating. The main difference highlighted was that the intervention group were more able to volunteer what learning strategy they had used for the task.

Discussion

4.1.1 Aims of study

Facilitating motivation to learn is essential to learning progress (Frederickson & Cameron, 2004) and more so with learners who are struggling readers (Guthrie & Davis, 2003). However, the research literature also highlights that motivation is a multi-stranded concept with learning outcomes influenced by complex interactions between the motivation factors of both the individual learner and the learning context. This is reflected in the various different and competing motivation theories and perspectives. For example, theories that place the individual learner at the centre of motivation frameworks include self-efficacy (Bandura, 1994) and self-concept theories (Linnenbrink & Pintrich, 2003). Theories related to attribution and goal theory also identify contextual factors such as the learning task as being influential motivation dimensions (Dweck, 1999; Locke & Latham, 2002; Weiner, 1985).

The factors and interactions relating to motivation continue to be well researched, however the dynamic and transactional nature of motivation perhaps makes consistent and controlled studies in specific task areas more difficult (Greenway, 2002). Moreover, as other studies have also found, the implementation of motivation interventions are difficult to sustain and monitor (Ellis, 2007; McInstery & Topping, 2003). Therefore, although general strategies to encourage reading motivation are well documented (Reutzel & Smith, 2004), there is an absence of studies relating to particular teaching programmes involving comparisons between specific motivation factors.

This study focused on the motivation factors of particular teaching methodologies. This involved adding a supportive motivation component to an intervention which has already been favourably evaluated (Binder, 2003; Gallagher et al., 2006) and thus detecting added value would be difficult. Nevertheless, it was thought that the findings from such an intervention could elicit further information in relation to facilitating learning motivation with implications for the development of future learning and teaching hypotheses.

Therefore, the aim of the study was to explore whether adding a metacognitive intervention to a structured precision teaching phonics programme could have further added benefits to struggling readers, particularly in relation to impact on learning motivation. Figure 2 in the Literature Review (p55) represents the different motivation models of each approach including a combination of both.

4.1.2 Quantitative Analysis

The reading attainment results indicated that there was no significant difference between the intervention group and non-intervention group, thus there was no intervention effect. In terms of motivation, the results indicated that there was no significant difference between the intervention group and non-intervention group, thus there was no intervention effect. The non-significant results for reading attainment and reading attitude in both conditions were irrespective of gender.

While no statistically significant results were found, there are some observations that can be made. The results indicate that both girls and boys responded similarly to both the conditions and is contrary to some research that suggests boys and girls have different learning approaches in general (McLean, 2003). Specifically, boys are more inclined to a performance orientated approach, particularly in relation to literacy tasks (Rogers, Galloway, Armstrong & Leo, 1998), which would have suggested that they would have benefited more from the non-intervention condition.

Research also indicates general gender differences in learning attitudes and attainments (Harlen & Deakin Crick, 2002) and also that in particular girls present as more motivated to read (Pecjak & Peklaj, 2006). Nonetheless, there was no significant difference found in either reading attainment or motivation to learn between males or females. However, a study by Rider and Colmar (2006) involving primary four equivalent stage pupils also failed to find any differences between genders. It was suggested that, similar to this study, the participants were from low socio-economic backgrounds and that such environmental factors can have a negative impact on literacy of both genders. Nevertheless, a longitudinal study by Johnson and Watson (2005b) of primary stage pupils found that boys had a more negative attitude to learning phonics. That said, the study by Johnson and Watson (2005b) was not specifically focused on pupils who had reading difficulties and involved participants

from different economic backgrounds. Thus, this study (Johnson & Watson, 2005b) may explain differences in findings because it was not of a similar pupil population either in socio-economic terms or learning factors.

In this current study, teachers' semi-structured interviews tended to highlight boys' on-task behaviour. They also reported an increase in on-task behaviour in boys during the interventions. This may be explained by previous research that indicates teachers can be more focused on boys' on-task behaviour (Wray et al., 2000). Gender research may also explain the larger number of male participants in this study, as it has been shown boys have lower reading attainments (SEED, 2006) and more negative attitudes towards reading (Marsh, Smith & Barnes, 1985; Pecjak & Peklaj, 2006). Therefore, it would be expected that more boys than girls would meet the participant selection criteria.

4.1.3 Qualitative Analysis

In order to ascertain teacher and parent perceptions of pupils' progress, semi-structured interviews were conducted with teachers, and questionnaires were sent to all parents. There were also pupil discussion sessions. The comments from all the interested parties were positive, and in agreement, highlighting progress in both attainment and attitude in regards to each of the conditions. The qualitative findings also highlighted differences between the conditions that will be further discussed in the following sections. These further add to and inform the quantitative results.

Interestingly, although each of the interventions are considered supportive teaching interventions, previous research indicates that they have contrasting philosophical and evidential bases which may not be complimentary. For example, Reutzal and Smith (2004) and Guthrie et al. (2006) argue against using rote type or closed-ended learning tasks, such as those proposed as relevant to precision teaching (Raybould & Solity, 1988), as it is suggested that this can decrease reading motivation in struggling readers. In contrast, Snowling (2002) and Russell (1992) stress the importance of a highly structured phonics programme as a reading remediation intervention. Hence, it is interesting to note the results from the qualitative data. This includes positive comments from the teacher interviews and discussions with pupils in both the conditions. These positive comments perhaps indicate that such contrasting

interventions can be combined. However there is no additional evidence to suggest the effectiveness of the combined intervention. Furthermore there was no evidence from this study to suggest that combining these interventions also leads to increased reading attitude or attainment.

4.1.4 Teacher Results

In both conditions, the teachers noticed positive changes in relation to more focused task behaviour as well as helpful interactions between peers including pupils working more effectively in groups. All the teachers commented on an increase in motivation to complete tasks. However, teacher comments specific to the intervention group included pupils thinking about what and why they were reading as well as pupils applying the learning strategies to other areas of learning. This is the outcome hoped for when implementing metacognitive interventions and is suggested as facilitating more effective learning (Zimmermann, 1998).

Interestingly, the intervention group also highlighted that being taught within the class setting was motivating. This is supported in research indicating that interventions to support struggling readers and encourage those who may also be reluctant readers should be inclusive within the classroom setting (Guthrie & Davis, 2003; Reutzal & Smith, 2004). In addition, the teachers in the intervention group mostly considered the motivation component to be worthwhile and helpful. Comments applicable to both groups included requests from the participants to take their work home to practice as well as enthusiasm to undertake the required daily literacy tasks throughout the intervention period. Thus, there is evidence of an increase in reading motivation behaviour including more of an awareness of using learning strategies in the intervention group. This perhaps supports this study's aim of encouraging explicit use of metacognitive learning strategies.

4.1.5 Parent Results

Parents also noticed a difference in their children's reading progress. The comments particularly mentioned increased motivation to complete homework, and also increases in confidence as well as a more general interest in reading activities. It was difficult to ascertain from the questionnaires any differences between the experimental groups. However, the questionnaire results reflect reading research that

indicates as pupils' reading improves so too does their motivation (Stanovich. 1986). The motivation research also indicates use of self-regulated learning strategies influences self-beliefs and motivation to learn (Pintrich & Schunk, 1996).

4.1.6 Pupil Results

Discussions with pupils also indicated that both of the groups found the interventions helped with their reading progress. The pupils' comments would suggest that they liked the structure of the activities including the timing aspects of the PT programme. In the intervention group, pupils mentioned that they enjoyed charting their progress. This reflects aspects of the self-regulating process as indicated from previous research and relates to actively involving the learner in their learning processes (Walker, 2003). This also includes encouraging the learner to think about the strategies they are using and by recording their progress whether these are useful learning strategies (Downer, 2007).

The pupils in the intervention group also mentioned using strategies such as sounding words out or practising selected words and is perhaps further evidence of awareness in using metacognitive learning strategies (Walker, 2003). However, teacher interviews also indicated that the pupils' responses were perhaps repetitious and thus maybe not a reflection of using thinking skills. That being said, metacognitive strategies can take more time compared to concrete curricular tasks to embed (McKinstery & Topping, 2003) and other research indicates that giving expected or repeated responses is a first step in the familiarisation process of using metacognitive techniques (Stevens et al., 2001).

4.1.7 Results Summary

The quantitative results from the standardised assessments indicate that there is no intervention effect. The qualitative evidence from the teacher interviews, parent questionnaires and pupil discussions are mostly positive, suggesting that both conditions are beneficial to supporting pupils' motivation to read. Moreover, the teacher interviews and pupil discussions also indicate that the intervention group were more aware of explicitly using learning strategies. This reflects both the PT research in general (Binder, 2003) and PT research in relation to supporting struggling readers (Russell, 1992; Torgesen, 2002). The qualitative results are also reflective of general

metacognitive motivation research (Pajares, 1998; Zimmermann, 1998) including the research surrounding self-regulated learning strategies relating to struggling readers (Reutzal & Smith, 2004; Walker, 2003).

The discussion highlights the influence of motivation on reading attainment and reading attainment on motivation. The motivation literature suggests that increasing reading motivation is the predominant factor in increasing reading attainment (Guthrie et al., 2006; Reutzal & Smith, 2004). However the literature considering increasing attainment includes applying appropriate learning programmes that would impact on learning motivation (McGuiness, 1999; Russell, 1992). Therefore it is difficult to separate and determine whether increased reading motivation or increased reading attainment is the predominant causal variable. This consideration of learning motivation causal factors and their interactions is illustrated in Figure 1 (p26).

4.1.8 Programme Implementation: Precision Teaching

There was high intervention compliance in both the conditions when implementing the PT component part of the study. The supportive evidence from the qualitative results is interesting to note, as despite considerable international research that recommends precision teaching there is reluctance in the UK to implement this type of learning and teaching pedagogy (Gallagher et al., 2006). Nevertheless, when PT methodology is used it has at times been misinterpreted and misapplied, perhaps adding to the negative connotations (Chiesa & Robertson, 2000; Gallagher et al., 2006). This has been found in other learning programmes such as the paired reading programme (Topping & Lindsay, 1992) where the over-generalisation has led to the labelling of any joint reading venture as 'paired reading'. Such deviations have implications for the perceived effectiveness of the original intervention (Topping & Bryce, 2004). Similarly, misapplication could reduce PT to a rote learning task, thus neglecting the underlying contextual motivation factors associated with PT methods (Gallagher et al., 2006).

That being said, the programme compliance in this study could be due to the well structured nature of this PT programme that included delivering a customised type of learning programme that is shown to be more favoured by teachers (Black & Wiliam, 2002). Therefore, the results from this study highlight training implications including

raising teacher awareness of the processes underlying precision teaching that has implications for learning and teaching hypotheses. Moreover, the study confirms the type of learning programme that teachers respond positively too and thus has implications for pupils learning.

It has also been found that interventions with ongoing monitoring and support, similar to that offered here, are more likely to be successful (Ellis, 2007), although this can be difficult to maintain in the longer term. Further research indicates that collaborative working with colleagues has also been found to foster greater teacher efficacy and empowerment (Ross, 1994). Related to this is research indicating that it is teacher skills that are critical to pupils' learning and motivation to learn rather than curriculum approaches or specific learning packages (Hall & Harding, 2003). Thus, perhaps the teacher interviews indicating that they found the support from the Educational Psychology Service (EPS) beneficial supported the study implementation process and also attributed to the commitment to the more demanding implementation of the less concrete metacognitive interventions.

4.1.9 Programme Implementation: Precision Teaching With Added Motivation

Although the qualitative results were mainly positive the programme monitoring processes and teacher interviews indicated that the added motivation factor was more demanding to implement. However (and as further explored in the next section) research has indicated that implementing metacognitive interventions can be more demanding and can take time to embed (Wright & Jacobs, 2003). Indeed, comments made by the teachers highlighted reservations about the benefits of the metacognitive component and thus may have influenced their compliance in delivering the interventions that would impact on any results (Dane & Schneider, 1998).

A reason for the teacher comments could be that the PT component was considered by the teachers as being particularly beneficial. This can be seen from the very positive comments in relation to the PT part of the intervention. The grounds for this could be that the motivation factors related to PT including relevant task setting facilitating positive feedback meant that the PT component yielded visible and also swift good task outcomes. These are results that teachers are familiar with, look for and place importance on (Black & Wiliam, 2002).

Due to the nature of the metacognitive motivation component, these outcomes are perhaps not as transparent and not as directly related to the concrete task outcomes of PT that are associated by teachers as reflecting successful learning. This would explain why the teachers' perceptions are perhaps not as certain as to the value and benefits of this added motivation factor.

Similarly, two of the teachers also based their perceptions of the effectiveness of the added motivation factor on the pupils' responses in the Feedback Chart. They viewed the repetitious answers as an indicator that the intervention was not understood by or helpful to the pupils. During the training sessions it was explained to the teachers that this is an initial phase and to be expected whilst becoming familiar with and effectively using metacognitive strategies (Walker, 2003; Wright & Jacobs 2003). Nonetheless, during the intervention period this appears to have influenced the teachers' interpretation and assessment of the metacognitive part. This could also be a reason for the less positive comments and the partially returned Feedback Charts suggesting programme integrity factors.

The researcher monitoring processes indicated that both conditions each took five minutes longer to implement than was accounted for and teachers also commented that time was an issue. Moreover, other research has shown that time can effect intervention implementation (McKinstery & Topping, 2003) and may further explain the challenges of intervention compliance. The monitoring processes also indicated that one of the teachers sometimes promoted verbal rather than written pupil responses and this may account for the partially completed Feedback Forms and could also have implications for any results or intervention effects. However, as previously mentioned, the design of the intervention was based on previous research (Walker, 2003) as well as a pilot study and consultation with experienced teachers as to the reliability and validity of the intervention. Furthermore, these are the procedures recommended to support programme integrity to ensure relevant and practical interventions (Dane & Schneider, 1998; Robson, 2002).

It was recognised that having the added motivation part at the end of another supportive motivation teaching programme could impact on the intervention

outcomes (McKinstery & Topping, 2003). However, making the metacognitive part of the intervention integral to the PT component could have implications in relation to adhering to the principles of both PT and metacognitive approaches. Therefore, such a design may not be reflective of either approach whilst also making the distinction between the added value of each component part more difficult to ascertain.

These are only possible explanations for the intervention outcomes and it has to be noted that these reflect the comments of one or two of the teachers at different points of the intervention. Moreover, the evidence from teachers' comments, Feedback Charts and monitoring processes indicate that both the PT and metacognitive components were mostly implemented according to instructions and seen to be worthwhile. However, given the exploratory nature of this study it is important to consider all effects.

Other factors concerning programme compliance with the implementation processes could be related to teacher attitude. This is discussed in the next section.

4.1.10 Programme Implementation: Teacher Attitude

From the semi-structured interviews and the Researcher observations it seemed that teachers in the intervention group were uncertain of the benefits of the added motivation. Studies have indicated that teacher beliefs and teacher skills are influential in effective learning and teaching programme implementation (Fisher, 2005; Greenway, 2002; Topping & Ferguson, 2005). What is more, teachers can be reluctant to implement new and different learning programmes if such programmes are not already customised and therefore require adaptation for their specific classroom practices (Black & Wiliam, 2002). Additionally, while there is supporting theory surrounding metacognition and its role in learning motivation (Flavell, 1987; Zimmermann, 1998) and also its role in supporting struggling readers (Reutzel & Smith, 2004), introducing metacognitive interventions into classroom practices can be challenging.

Other research involving implementing metacognitive interventions have also found difficulties relating to intervention fidelity and compliance (Allington & Johnston, 2000; Greenway, 2002; McKinstery & Topping, 2003; Topping & Bryce, 2003; Topping & Ferguson, 2005). Such difficulties with intervention compliance and the

consequences for research outcomes are recognised (Frederickson & Cameron, 2004). These findings also reflect research surrounding teacher influences in implementing learning and teaching programmes and is associated with teacher perceptions, skills and also their beliefs about the concept of ability (Black & Wiliam, 2002; Fisher, 2005). In this study there was a high level of compliance in relation to the PT part of the intervention. However Researcher classroom observations indicated that this was less so with the added metacognitive part. For example teachers were hurried in their administration of the metacognitive intervention and there was less emphasis placed on the importance of this part of the intervention. The return of partially completed Feedback Charts (Appendix H) confirms this. Therefore, the partial compliance of some of the teachers involved would have impacted on effective programme compliance and influenced the studies results (Dane & Schneider, 1998).

The teacher interviews conducted at the end of the implementation period were mainly positive and this could be reflective of the more motivated on-task pupil behaviours. This behaviour possibly results from the pupils' experiences of task success as a result of the PT programme. The resulting on-task behaviour could then have influenced and facilitated positive teacher attitudes towards both the pupils and each of the group conditions (Black & Wiliam, 2002). In addition, the mainly positive interviews could also reflect the teachers' investment of time and effort, thus they would be keen to report the successes (Ellis, 2007). This again highlights the complex nature of motivation to learn including the interactions between contextual motivation factors associated with the learning task and teacher relationships as well as individual factors related to self-belief (these interactions are represented in Figure 1 of the Literature Review, p26).

In particular, the teacher comments made special mention of the more focused on-task behaviour of boys. It is difficult to associate these comments in relation to any possible added benefits of the intervention group, however it is interesting to note the positive changes in both pupil and teacher attitudes during the intervention period. This is also reflective of the literature surrounding teacher beliefs and attitudes in regard to learning including perceptions and attention given to boys' behaviour (Fisher, 2005; Hutchinson, 2004; Tatar, 1998). Thus, the dynamic and organic nature

of motivation to learn has to be accounted for when developing learning and teaching hypotheses.

4.1.11 Programme Implementation: Pupil Attitude

In relation to the intervention group, the teacher comments and pupil discussions indicated that the metacognitive prompts assisted pupils in understanding how to use the strategies and made more concrete the notions of practicing or listening. For example, pupils could explain and demonstrate how they practiced. This included looking over specific words they had indentified as being more difficult to learn or remember. This perhaps also implies that the pupils were persistent in their learning even when faced with a demanding task and could thus be an indicator of being more motivated (Linnenbrink & Pintrich, 2003). Moreover, research indicates that the practices related to modelling and demonstration of learning is associated with using metacognitive skills (Wray et al., 2000).

Also, the pupils accredited 'practising' as a reason for their progress, again reflective of motivation theory linked to positive attributions about ability (Dweck, 1999; Weiner, 1985). Similarly, teachers highlighted that the intervention pupil participants would independently spend time revising the relevant word activities whereas the control pupils relied on teacher led direction as to what words to practice. This information perhaps indicates that the pupils in the intervention group have an understanding of applying metacognitive learning strategies leading to more self-regulated learning. Therefore, perhaps the added metacognitive component made explicit both what and how the pupil could practice and therefore facilitated more effective active learning including learner persistence and learner involvement in the learning process (Wray et al., 2000; Wright & Jacobs, 2003;).

The pupil comments also suggested that 'asking the teacher for help' was viewed as a useful strategy, whereas previous research has indicated such teacher support can be seen negatively by both the pupil and/ or the teacher as an indication of lower ability and helplessness (Dweck, 1999; Schunk, 1990). In addition, pupil discussions indicated that they recognised this strategy as one of a number of different strategies to use.

In contrast, when the non-intervention group pupils were asked 'can you tell me how this has this helped your reading?' they could not or did not state use of any applied learning strategies. Although PT will probably involve pupils implicitly applying learning strategies by virtue of the learning and teaching processes (Downer, 2007), there is no specific encouragement to explicitly explore or identify such strategies as being learning strategies. And it is possibly this awareness of meaningfully understanding metacognitive learning strategies that can facilitate learners to apply useful general literacy strategies (Sideridis, 2005) and phonological strategies in particular (Wright & Jacobs, 2003).

Importantly, research would also suggest that the skills involved in metacognitive learning can lead to making positive learning attributions (Weiner, 1985) and thus increase self-efficacy and learning motivation (Bandura, 1994). This learning process is particularly important to struggling readers as research suggests such learners have poor metacognitive skills in contrast to more able readers (Guthrie et al., 2006) and as a result may use ill formed learning strategies that can impact negatively on learning outcomes and future motivation to learn (Sideridis, 2005).

4.1.12 Strengths

This study was representative of an inclusive intervention reflecting the literature surrounding supporting struggling readers within the class context including promoting skilled instruction from the class teacher while attending to individual learner needs (Guthrie et al., 2006; Reutzal & Smith, 2004). The findings indicate that as well as being perceived to have had positive effects, the intervention was well liked by both teachers and pupils. The teacher interviews indicated that some were going to continue with the intervention programme. Thus, findings from this study may have implications for implementing reading remediation programmes within the mainstream class and involving class teachers.

This research analysis has also made explicit the motivation components in both precision teaching and metacognitive learning, developing them into a practical intervention that again reflects inclusive practices and can be implemented within the class context. It was expected that metacognitive strategies would demonstrate motivation teaching practices. However, the study further highlighted the motivation factors and associated pedagogy involved in PT. For example, it is well documented

that contextual factors associated with task relevance and setting are important to successful task outcomes (Frederickson & Cameron, 2004). Nonetheless, this study emphasised the motivation elements rather than the learning aspects of these contextual factors and the influence this has on the individual learner's self-efficacy that then impacts on task skills and learning attainments. Thus, this study indicated that PT too can be considered a motivation teaching approach.

The findings also indicated that the programme was mostly successfully implemented and this maybe linked to the programme structures, training and researcher support and supports previous research (Ellis, 2007; Greenway, 2002). This includes the role of the Education Psychology Service in implementation and facilitating commitment to research and learning and teaching interventions (MacKay, 2002).

The implementation results support the study design that reflects a contemporary Critical Realism philosophy (Kelly, 2008; Robson, 2002). This approach recognises and addresses the issues surrounding conducting research in complex organisations such as schools (Kelly & Woolfson, 2008). For example, the materials developed, assessments used and the training processes and procedures implemented involved consulting with experienced teacher practitioners. Thus, taking into account the different perspectives of not only theory and previous research but also referencing it to the particular primary school context and curricular area to be studied. Moreover, the structure of the study addressed issues related to programme integrity and programme compliance (Dane & Schneider, 1998).

The added metacognitive motivation component that was developed may be considered too prescriptive in format. However, it reflected previous recommended metacognitive strategies (Reutzal & Smith, 2004; Walker, 2003; Wright & Jacobs, 2003). Moreover, the structure possibly addressed issues highlighted in past research surrounding the efficacy and beliefs of teachers that can influence effective implementation of teaching programmes (Black & Wiliam, 2002; Fisher, 2005).

4.1.13 Limitations

The standardised assessments provided rigour in the way of statistical reliability and validity. Nevertheless they may not accurately reflect increases in reading attainment

and reading attitude. For instance small gains over a shorter time period may not be detectable in a standardised test (Robson, 2002). In addition participant error may also lead to test unreliability as pupils' performance in a test situation can fluctuate from occasion to occasion for a variety of reasons including tiredness and test anxieties (Robson, 2002).

Moreover, although using metacognitive learning strategies is beneficial, research indicates that it is more difficult for struggling readers to accurately reflect and assess their learning processes (Zimmermann et al., 1992). In addition, implementing metacognitive interventions can take time for teachers to become familiar with the programme (Greenway, 2002; Black & Wiliam, 2002) and for pupils to meaningfully understand how to apply the metacognitive learning strategies (Wright & Jacobs, 2003).

Therefore it would perhaps be unrealistic to expect pupils to effectively self-regulate their learning over a short time period, such as the eight week intervention period, and it is an approach that would require ongoing coaching from the teacher (Topping & Bryce, 2004). This is perhaps reflected in the teacher interviews that highlight implementation difficulties in the intervention condition. Thus, it would perhaps be beneficial to have a longer intervention period, however in this case the period of time was directed by previous similar reading interventions (Torgerson, Brooks & Hall, 2006) and PT studies (Downer, 2007).

It would also have been interesting to have compared the overall differences found in the study with a comparison group of struggling readers who were given no additional support. However, withholding an intervention that has known benefits, such as PT, from a pupil cohort that would benefit from this intervention does have ethical implications (British Psychological Society, 2006). This has also been found to be the case in other literacy studies involving struggling readers (Greenway, 2002; Wright & Jacobs, 2003)

Increased number of returned completed parent questionnaires could also have provided more information and contributed to the results. However it may be that the low level of parental engagement in returning completed questionnaires is due to

parent literacy difficulties (SEED, 2007). This was noted at the start of the study when difficulty obtaining written consent from parents was experienced.

4.1.14 Future Research

The literature review informing this study demonstrated strong evidence to support PT and metacognitive approaches as each being effective learning and teaching interventions which support struggling readers (Reutzal & Smith, 2004; Wright & Jacobs, 2003; Gallagher et al., 2006). Both of these teaching methodologies are based on principles associated with theories relating to motivation and increasing learning motivation (Raybould & Solity, 1988; Zimmermann, 1998), particularly in relation to struggling readers (Russell, 1992; Guthrie et al., 2006). However, the statistical results in this study did not support any increases in reading attainment or reading attitude. The qualitative evidence although positive in relation to both conditions was mixed in regards to the intervention condition.

Therefore given the previous supportive research and the mixed results obtained from this study, more research needs to be carried out before any firm conclusions can be drawn to either, dismiss or confirm the added benefits of including a metacognitive component to precision teaching methods. For example, it was discussed that teachers' skills are crucial to the successful implementation of new teaching approaches (Black & Wiliam, 2002; Ellis; 2007). Moreover teachers can find implementing new interventions challenging (Black & Wiliam, 2002); in addition implementing metacognitive interventions is difficult (McKinstery & Topping, 2003). Thus future research should consider how best to support teachers implement less familiar and less structured metacognitive interventions.

Similarly the research demonstrated that teachers' attitudes and perceptions are also influential factors when implementing new interventions (Black & Wiliam, 2002; Dweck, 1999). In relation to this, the findings from this study indicated that some teachers did not agree with or perceive the benefits of encouraging self-regulated learning. Research has shown that it is particularly important to encourage metacognitive skills, such as self-regulated learning with struggling readers (McGuinness, 1999). Hence, finding ways to support teachers implement the more demanding metacognitive interventions should also promote positive teacher

perceptions regarding self-regulation as a beneficial learning outcome for all pupils (Greenway, 2002).

Thus, although this study endeavoured to include teachers at all stages of the intervention, more attention to facilitating teachers who are delivering the intervention to be actively involved at the early development stages could have been helpful (Ellis, 2007). In addition, although there was support throughout from the Researcher, research indicates that teachers having training and ongoing support from other teachers makes a difference to successful implementation of interventions (Ellis, 2007; McLean, 2003). So involving a teacher to support other teachers could influence findings. Also, teachers to have a time allocation in their individual timetables for consolidation, familiarisation and delivery of the interventions could influence the outcomes of future research (Mckinstery & Topping, 2003).

In addition, this study found that struggling readers have poor metacognitive skills and thus can use ill formed learning strategies (Guthrie et al., 2006). It is also known that effectively using metacognitive learning approaches takes time to embed (Greenway, 2002). The qualitative evidence from this study that supports these findings emerged from the teacher interviews and pupil discussions related to the intervention group. Moreover, teachers in the intervention group, reported pupils' responses as being uncertain and repetitious. This can also be found in the first stages of using metacognitive strategies (Wright & Jacobs, 2003). Therefore as well as training and supporting teachers, future research should consider different ways of introducing the use of metacognitive approaches to struggling readers. This would include teachers spending more time modelling *how to practice* learning tasks (Walker, 2003).

This research combined two contrasting learning and teaching interventions involving adding a metacognitive factor to the end of PT. Thus, a further explanation of this study's mixed results could be that, the quick, concrete and more measurable PT part of the intervention was more in keeping with teacher expectations than the metacognitive factor (Black & Wiliam, 1998). In addition, these teacher expectations and also the primacy of the PT part of the intervention could have impacted on the way teachers' implemented the second metacognitive part of the intervention and

influenced results (Robson, 2002). Therefore future research may consider a different combination of implementing PT and metacognitive methodologies that is more integrated.

4.1.15 Conclusion

The literature review explored and analysed the theories and complexities surrounding motivation, an organic and interactive concept. The analyses included the different motivation strands, both theoretical and conceptual and those linked to values and perceptions. It was concluded that self-efficacy and self-concept are the most influential factors in learning motivation (Linnenbrink & Pintrich, 2003; Seifert, 2004). Moreover, that self-efficacy relating to the learner's skills and self-concept relating to the learner's will are both required for effective learning progress (Linnenbrink & Pintrich, 2003). The motivation factors, effect dimensions and outcomes were presented within the theoretical model displayed in Figure 1(p26).

The review also considered motivation dimensions in relation to learning and teaching interventions. This included the application of motivation theory into classroom teaching practices to support all learners and in particular struggling readers. It was concluded that struggling readers have usually experienced frequent failure, associated negative peer comparisons and sometimes inappropriate remediation interventions that all have an impact on learner motivation (HMIe, 2007; Wigfield & Guthrie, 2003). Moreover, the research indicated that structured reading programmes and interventions to encourage learner self-regulation were required to support struggling readers (Snowling, 2002; Pajares & Schunk, 2001).

Consequently, precision teaching and metacognitive approaches were discussed in relation to beneficial remediation interventions to support struggling readers. However, research suggests that precision teaching and metacognitive methodologies are contrasting approaches (Binder & Watkins, 1990; Zimmermann, 1990). Nevertheless, the review argued that despite this, combining both methodologies could have added benefits in increasing reading attainment and also reading motivation. Figure 2 (p55) represents the operationalisation of each of these two contrasting approaches as well as a combination of both.

The review specifically highlighted the motivation principles underpinning Precision Teaching. Yet, despite the evidence of its benefits, precision teaching is an approach that has been misinterpreted and misapplied (Gallagher et al., 2006). This has resulted in it being criticised and seen as a rote learning method (Downer, 2007).

Thus, the exploratory study following the literature review asked an original question about the nature and effects of PT. Moreover, the study operationalised motivation principles into a practical teaching intervention while also combining contrasting teaching methodologies.

The methodology reflected the principles of Critical Realism, a contemporary social scientific methodology, necessary for all psychologists working with applied research approaches outside the laboratory. The mixed methodology produced mixed results and the explanations surrounding this were discussed. These related to teacher skills and perceptions, the difficulty in implementing metacognitive interventions and the challenges for struggling readers to effectively use metacognitive strategies.

Previous research (McKinstery & Topping, 2003, Greenway, 2002) indicates that a longer term intervention facilitates the embedding of metacognitive approaches. However there was no evidence from this study to suggest further time spent on metacognitive strategies would lead to increased attainment. Nevertheless, the qualitative evidence indicates that the intervention had positive effects and was well liked by both teachers and pupils. Despite the lack of conclusive results, this study was representative of an inclusive teaching intervention and reflected the literature surrounding supporting struggling readers within the class context, including facilitating skilled instruction from the class teacher (Reutzal & Smith, 2004).

In conclusion, the exploration for alternative learning programmes to progress struggling readers remains a current and desirable objective. The evidence from this study suggests that Precision Teaching and metacognitive motivation methodologies combined could be a powerful effective learning and teaching intervention to progress struggling readers.

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Appendix A Parent Consent letter – Pilot Study

Address Here

Dear (***insert parent's name***)

As you may be aware your child's school are participating in an initiative related to the analysis of different teaching methods. Ellen Ferguson, Educational Psychologist will be undertaking this project as part of a commitment to the learning and teaching within Renfrewshire Education Psychology Service.

The project will involve examining different teaching approaches to encourage pupils' progress in reading attainment and reading motivation.

A pilot study to ascertain the benefits of the teaching programme, the teacher training, particular questionnaires and reading assessments is to be carried out. The study will also involve your child's class teacher delivering a particular teaching approach.

If you and (**Insert pupil's name here**) agree, the project will involve your child and 3 to 4 other members of the class working in a small group on literacy tasks in school but outwith the classroom. The pilot study will run for 4 to 5 weeks and will take place 4 times a week, each session lasting for about 20 minutes. There will be assessment processes at the start and end of the pilot study.

As well as working in a small group, participating in the project will involve gathering information related to:

- Questionnaires.
- Individual interviews.
- Reading assessment.
- The collection of other relevant information related to curricular progress.

Any information that is used will be made anonymous and it will not be possible to identify any pupils involved from anything written in reports.

If you do not want to participate, or if your child does not want to participate, you do not have to. There will be no negative repercussions at all. You and your child will also be able to withdraw at any time.

Your co-operation with this would be greatly appreciated and If you and your child agree to take part in this research project could you please complete and return the tear off slip below.

If you have any further queries please contact me at the above telephone number.

Yours sincerely

Ellen Ferguson, Educational Psychologist

-✂----------

CONSENT FORM

I agree to take part in the research study to evaluate teaching methods.

I have also discussed the study with **(Insert pupil's name here)** who agrees to take part in the project.

I understand that confidentiality is assured. I have been informed that all participation in this study is entirely voluntary.

I understand that I or my child can withdraw at any time during the project.

Parent's Name..... Signature.....

Child's Name..... Signature.....

Address..... Tel No:.....

Please use the self-addressed envelope to return to Ellen Ferguson, Educational Psychologist. Abbey House, 8 Seedhill Road, Paisley. Telephone No. 0141 840 3777

Appendix B Parent Consent Letter – Main Study

Dear Parent

As you will be aware your child's school are participating in an initiative related to the analysis of teaching methods. Ellen Ferguson, Educational Psychologist will be undertaking this project as part of a commitment to the learning and teaching within Renfrewshire Education Psychology Service.

The project will involve examining a teaching approach to encourage pupils' progress in reading attainment and reading motivation. The project is aimed at pupils who are currently finding reading difficult and as a result they could be less motivated to read.

If you and your child agree, the project will involve your child and some other members of the class working in a group on specific literacy tasks with their class teacher. The project will run over an 8 – 10 week period and the teaching sessions will take place 4 times a week, each session lasting for about 10-15 minutes.

There will be assessment processes at the start and end of the project related to reading assessments and motivation questionnaires. At the end of the project there may also be focus groups involving some pupils who took part to ask what they thought of the project.

Any information that is used will be made anonymous and it will not be possible to identify any pupils involved from anything written in reports.

If you do not want to participate, or if your child does not want to participate, you do not have to. There will be no negative repercussions at all. You and your child will also be able to withdraw at any time.

Your co-operation with this would be greatly appreciated and If you and your child agree to take part in this research project could you please complete and return the tear off slip below.

If you have any further queries please contact me at the above telephone number.

Yours sincerely

Ellen Ferguson, Educational Psychologist

-✂----------

Appendix B Parent Consent Letter – Main Study

CONSENT FORM

I agree to take part in the research study to evaluate teaching methods.

I have also discussed the study with my child who agrees to take part in the project.

I understand that confidentiality is assured. I have been informed that all participation in this study is entirely voluntary.

I understand that I or my child can withdraw at any time during the project.

Parent's Name..... Signature.....

Child's Name..... Signature.....

Address..... Tel No:.....

Please return to school or Ellen Ferguson, Educational Psychologist. Abbey House, 8 Seedhill Road, Paisley. Telephone No. 0141 840 3777

BEFORE YOU START…….

- What is this task about?
- What do you think you have to do?
- Do you remember how to do this?
- Do you think this will be difficult? (If yes, which bits?)
- Which bits do you think will be easy?
- How long do you think it will take you?
- What will you do if you get stuck?

DURING THE TASK…….

- How much do you think you will be able to finish now?
- How well do you think you are doing?
- How long will this part take?
- What strategies are you using?
- Do you think you are working hard?

AFTER YOU FINISH…….

- What was the task about?
- Did you manage to finish?
- Do you think it was right?
- How long did it take you?
- Have you worked hard?
- What are you better at now?

Attribution Questions

- Why did you succeed?
- How did you manage to do the difficult bits?
- Why do you think you have less mistakes?

AFTER YOU FINISH…….

- What was the task about?
- Did you manage to finish?
- Do you think it was right?
- How long did it take you?
- Have you worked hard?
- What are you better at now?

Attribution Questions

- Why did you succeed?
- How did you manage to do the difficult bits?
- Why do you think you have less mistakes?

Appendix D Motivation Teacher Recording Schedule

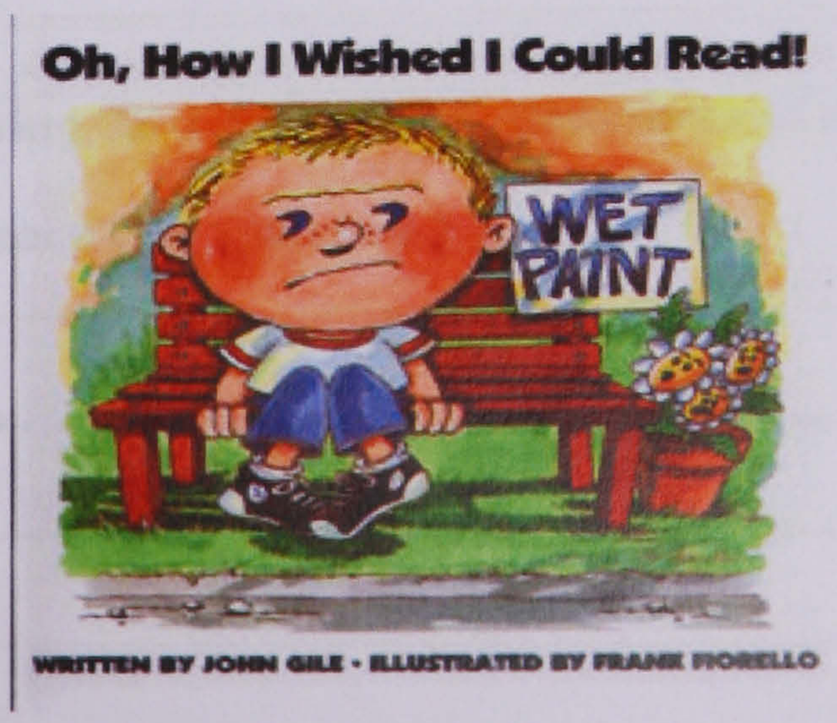
MOTIVATIONAL TEACHING APPROACH

Overview

- Motivation crucial to successful learning – however not explicitly taught like other curricular activities.
- Motivation to learn is influenced by:
  - Goals – learner aware of learning task & purpose.
  - Self-efficacy – learner can accurately evaluate their skills.
  - Attributions – learner can explicitly identify 'why' they did well.

Using the motivational approach

- With the pupil participants selected implement the approach as described in the handout with at least 4 sessions per week for approximately 15 – 20 minutes each session.
- Using the reading resource selected identify:
  - How many pages to be read in total.
  - How the pupils will take turns.
  - Use the 'before, during & after' questions during each session to encourage pupil involvement, scaffolding for the task & opportunities for the pupils to evaluate 'how' they will approach the task and 'why' they were successful or making progress.
- Complete checklist overleaf.



Appendix D Motivation Teacher Recording Schedule

CHECKLIST - Week No.1

Sessions	**Before 'Q' (please ✓)**	**During 'Q' (please ✓)**	**After 'Q' (please ✓)**	**Comments (If required)**
No. 1				
No. 2				
No. 3				
No. 4				

Week No.2

Sessions	**Before 'Q' (please ✓)**	**During 'Q' (please ✓)**	**After 'Q' (please ✓)**	**Comments (If required)**
No. 1				
No. 2				
No. 3				
No. 4				

Week No. 3

Sessions	**Before 'Q' (please ✓)**	**During 'Q' (please ✓)**	**After 'Q' (please ✓)**	**Comments (If required)**
No. 1				
No. 2				
No. 3				
No. 4				

Week No. 4

Sessions	**Before 'Q' (please ✓)**	**During 'Q' (please ✓)**	**After 'Q' (please ✓)**	**Comments (If required)**
No. 1				
No. 2				
No. 3				

Pupil Record Form

Pupil's Name:

Please answer the questions below (you can tick more than 1 box).

1. **I (see below) to help my learning**

I worked hard ☐ ✔ | I practiced a lot ☐

I took my time ☐ | I listened well ☐ ✔

2. **I feel I did well with my learning because…**

I worked hard ☐ ✔ | I practiced a lot ☐

I took my time ☐ | I listened well ☐ ✔

3. **I could do even better by…**

Practicing ☐ | Taking my time ☐ ✔

Concentrating hard ☐ | Listening hard ☐

I feel I could also do better by……

PRECISION TEACHING (CODE-CRACKER) SUMMARY INSTRUCTIONS

***** The objective is for children to re-visit phonics with tasks that are specific, motivating and encourage accuracy AND fluency - crucial to effective reading.*

The pre & post external assessment process is not dependant on the number of code cracker books completed. Confidence, motivation and consolidation of learning are the important factors being addressed.

The Code Cracker materials are only a guide - you know the children - therefore use the precision teaching principles in whatever way is best for your pupils. **

1. For the purposes of this project ALL pupils will start at Book 3.
    - This is a fairly basic level of phonics that will *support* pupils and teachers familiarisation of the process.
    - It will allow for pupils to experience success in reading activities that they are perhaps wary of and de-motivated to engage with.
    - You can use book 2 for support & revision.

2. Although each pupil may then progress at different rates and thus be on different levels they can still work within a group setting.
    - Working with peers is beneficial to their progress.
    - Working with peers in the class is motivating.
    - Pupils enjoy this learning process including the 'timing' activities.
    -

3. Example: Implementing Book 3
    - Explain lesson objective using booklet: we are going to be learning how to join 2 letters together to make 1 sound, 'b' & 'l' = 'bl'
    - The teacher will demonstrate the process and involve the pupils, saying the words out loud, supporting the children practising in their group & timing each other.
    - Pupils can help each other at all times (this is to be encouraged) other than during recorded 'fluency' tests with teacher. The pupils can have informal tests.
    - While working within level 3 – you can move forwards or backwards through the book, using the reinforcement exercises and any other appropriate resources you may have (see information in pack).

4. Use your judgement to keep moving and keeping the tasks interesting whilst ensuring the learning is consolidated.

5. Fluency Test: at end of practice sessions – there is no specific time limit – thus pupils may have 2 fluency tests in one week and only 1 the following week. When administering the fluency test you can administer in different directions to avoid memorising and should only take a few minutes. *It is important not to move onto next level too quickly.*

6. You can move between books – the levels are not generally incremental and each level can stand alone representing 'sound families'.

7. To be administered 4 times a week spending only 10 minutes on the task. Pupils to have their own folder. All work to be completed in the class.

PRECISION TEACHING (PT) PROJECT PACK
Checklist

- Project 'help' Information Sheets
- Project 'help' Information Sheet – Feedback Chart (*only if relevant*)
- 'Fortnightly Feedback Chart' Booklets (*only if relevant*)
- Teacher 'reflective comment' sheet
- Code Cracker – copies of Books 3
- Code Cracker – copies of books 4
- Code Cracker – copies of books 5
- Presentation Handouts
- Supplementary phonic resources & web information
- Timers (if available)
- Pupils' Folders
- Pupil Participant list for individual schools.

Appendix G Researcher Instructions to Teachers (Pilot Study)

EXPLANATION FOR MOTIVATION TEACHING STRATEGY TRAINING

1. 'Motivation' crucial in relation to effective learning processes and increased through:
- ✓ Promoting active learner involvement – (ie. helping learners recognise that progress and skills are incremental and influenced by task, strategies used and attitude).
- ✓ Task choice/ relevance.
- ✓ Practical feedback

2. A structured motivational approach/ scaffold that can be applied to any teaching task & adheres to the motivational principles.

3. Reading interventions – For optimum result need to be implemented consistently 3/4 times weekly for approximately 15-20mins.

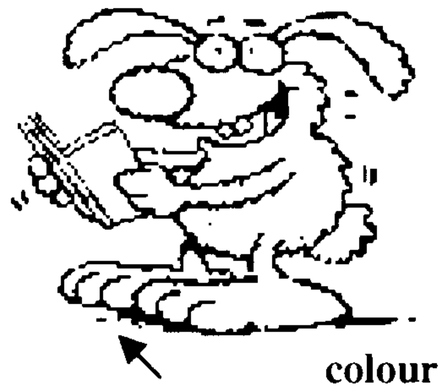
4. Pupil progress measured with standardised assessments: Neale Analysis (fluency, word attack skills, comprehension), Motivation to Read questionnaire.

5. Discuss:
- ✓ Motivation handout.
- ✓ Aide Memoir prompts.
- ✓ checklist.

6. Relate to specific identified reading resource.

7. Model/ practice motivation approach using the specific reading resource until teacher confident in implementation of approach.

8. Emphasise that consistency of implementation necessary in relation to evaluation and thus recording of process helpful.

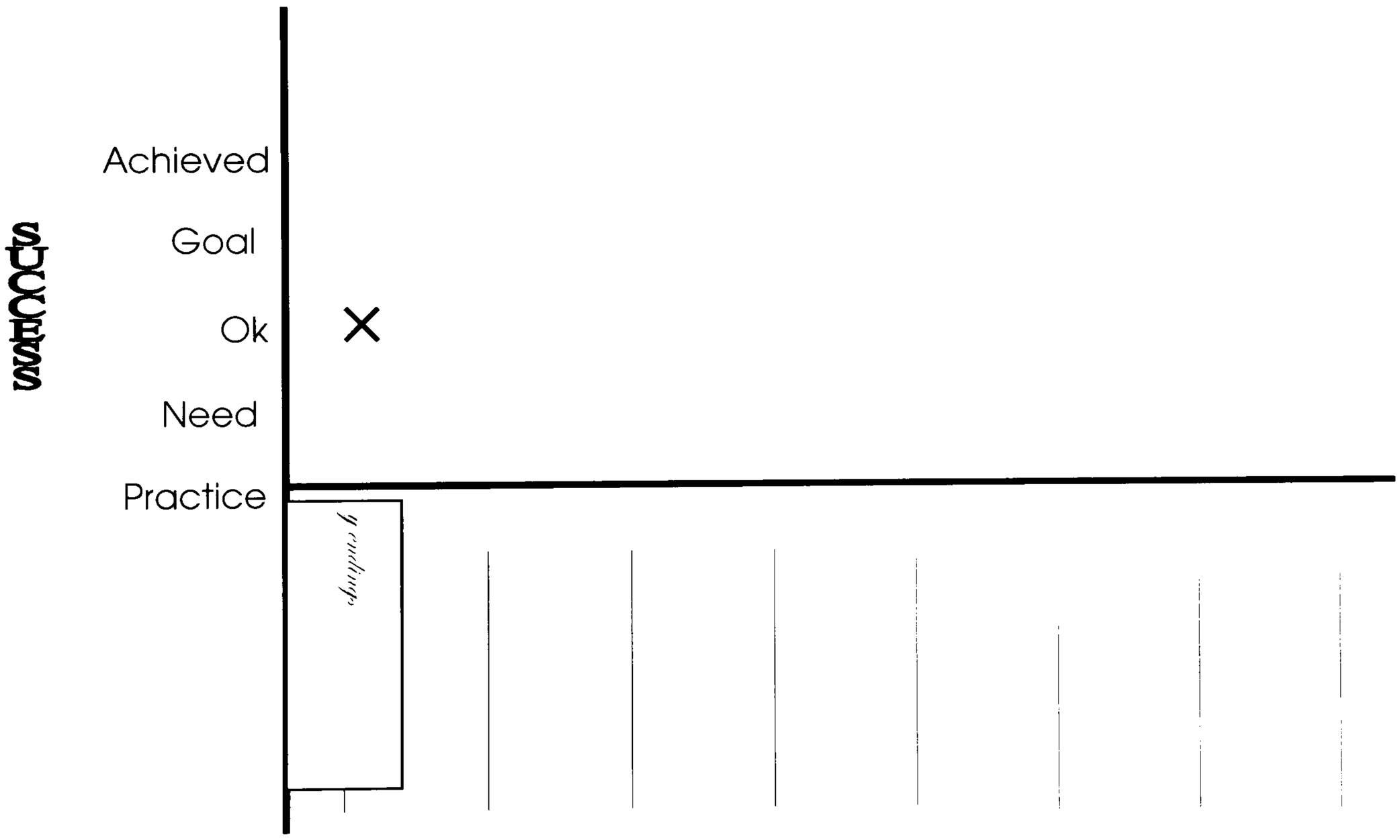


Fortnightly Feedback Chart

Pupil's Name: ..... *John Smith* .....

Book/Level Working On: ..... *3* .....

How I feel I did today…



Work

Pupil: *write the name of the section you are working on, on one of the lines at the bottom of the chart. Put a cross on the chart for how you feel you did today.*

Pupil: *Please answer the questions below (you can tick more than 1 box).*

Pupil and Teacher: *sign and date the section below to show you have understood and completed the task.*

Book: ___3_____

1. **I feel I did well with my learning because…**

I worked hard ☐ ✔

I practiced a lot ☐

I took my time ☐

I listened well ☐ ✔

2. **I could do even better by…**

Practicing ☐

Taking my time ☐ ✔

Concentrating hard ☐

Listening hard ☐

I feel I could also do better by……

Please sign below:

Pupil: __John Smith_____ *Date:* __12/11/07_____

Teacher: _____Mrs Murray_____ **Date:** ___12/11/07_____

Appendix I Teacher Semi Structured Interview Schedule

Precision Teaching Project

Classteacher Semi-structured Interview

1. Pupil Outcomes

- Do you think there has been an overall/ general benefit from participation? (ask for & note examples ie. confidence, peer relationships, group working, more retention of literacy concepts, increased attention/ concentration/ completion of task, literacy enjoyment, motivation).

- Do you think there any specific literacy benefits? (examples ie. improved spelling tests, more/less 'hands-up', reading fluency, reading progress).

- Does this relate to all/ some of the pupil participants?

- Do you think there was a benefit to pupils from working within the class? And from working with the classteacher? (examples – confidence, self-esteem, more motivated; teaching skills re task).

- Would it be appropriate to include in any feedback letters to Parents that 'From teacher reports the reading project has been successfully implemented, was of benefit to the pupils and that it has supported there was a general improvement in reading skills'?

2. Practicalities of Implementation

- Working within class with a specific group of children?

- Time management?

- What would you do differently that could make the intervention even more effective?

3. Classteacher reflections

- Has this added to your pedagogical knowledge in any way?
- Do you view reading difficulties any differently?
- Overall comment re any aspect?
- How valuable did you find working collaboratively with EPS in this research?

4.

- **Is there anything else you would like to add**

Teacher Feedback Sheet

The purpose of this feedback sheet is to gather information about Precision Teaching as a teaching approach, NOT about 'Code Cracker' programme or materials specifically.

Please answer the questions below (continue on a separate sheet if required)…

What aspects did you like about Precision Teaching?

What are the practical implications of delivering Precision Teaching in relation to literacy, within a class context?

Any ideas how these could be addressed in order to support children's difficulties in class?

What benefits did you notice in terms of pupil progress and approach to learning? i.e. confidence, relationship with peers, literacy skills etc

Ongoing Comments:

Signed (optional):..... *Date:.....*

Teacher Feedback Sheet

The purpose of this feedback sheet is to gather information about Precision Teaching and Motivation as a teaching approach, NOT about 'Code Cracker' programme or other materials specifically.

Please answer the questions below (continue on a separate sheet if required)…

What aspects did you like about Precision Teaching including the added motivation factor?

What are the practical implications of delivering Precision Teaching and added Motivation in relation to literacy, within a class context?

Any ideas how these could be addressed in order to support children's difficulties in class?

What benefits did you notice in terms of pupil progress and approach to learning? i.e. confidence, relationship with peers, literacy skills etc

Ongoing Comments:

Signed (optional):..... *Date:.....*

Appendix L Parent Questionnaire

Precision Teaching Project - Parent Questionnaire

Child's Name: **School**:

Your child recently participated in a Precision Teaching & Motivation Reading project. It would be helpful if you could answer the following questions. Circle answer where appropriate.

- Have you noticed a positive difference in your child's reading/ spelling progress?
  Yes/ No
  (if 'Yes' can you give further details)

- Have you noticed a positive difference in your child's attitude to reading/ spelling?
  Yes/No
  (if 'Yes' can you give further details)

- Any other comments?

Thank you for your help and support.

Please complete with your child's teacher at Parent's night.

Any completed forms to be returned to:

Ellen Ferguson
Educational Psychologist
Abbey House, 8 Seedhill Rd, Paisley PA1

Pupil Discussion Questions

Question prompt designed to address the following themes:

- Enjoyment of task
- Usefulness of task
- Strategies used

1. What do you like about this new reading activity?

2. Do you think this has helped your reading?

3. Can you tell me how this has helped your reading?

Researcher Comments

Appendix N Class Observation/ Monitoring Schedule

Class Observation/ Monitoring Schedule

Intervention Condition: **Teacher/ Class:**

Observer:

1. **Teacher Following PT/ Motivation procedures**
    - (Note: how teacher implementing; how many pupils in group; teacher explanations; pupils familiarity with process; where folders kept; pupil attitude)

2. **Any difficulties observed** (practical; implementation process)

Additional Comments/ Observations (variability; teacher comments; pupil comments)

Precision Teaching (PT) With Added Motivation Summary Instructions

****** The objective for the added motivation factor is for children to re-visit phonics with tasks that are specific, motivating and encourage accuracy AND fluency – crucial to effective reading.**

ALSO: children, particularly children who struggle with reading need to be able to accurately reflect on their progress and attribute their progress to particular learning strategies they use and not just those of 'luck' and 'chance'. This added motivation part of Precision Teaching aims to encourage this. ****

1. This part is added after the Precision Teaching session has taken place (please refer to the summary PT instructions).

2. Every child has a Fortnightly Feedback Chart that requires to be filled out after each PT session. This should take about 5 minutes to complete once both pupils and teacher are familiar with the process.

3. The purpose is too make learning strategies explicit and to encourage pupils to identify strategies that help or could help with their learning.
    - Makes explicit common learning strategies of 'working hard'; 'practicing'; 'taking time' and 'listening'.

4. Teachers should discuss and model and allow practice completing the Fortnightly Feedback Chart with pupils (as demonstrated in the training session by the EP and Research Assistant).
    - Discuss, model and allow for practice – make sure pupils understand concept of 'learning strategies'.
    - Highlight to pupils there are no right or wrong answers – it is about their learning.

5. Both Teacher and Pupil to sign Chart (as indicated on the form) after each PT session. The Chart to be kept in their PT folder.
    - This is pupils' own Chart and they should be encouraged to colour it and make it their own.
    -

6. Although pupils will have practiced and discussed Chart with their teacher – this is a new approach and will take time for pupils to get used to. Do not worry if initially pupils seem to just be answering repetitively.
    - Encourage pupils, prompt them to complete the Chart by asking questions such as 'have you worked hard?'; 'why did you get this right?'; 'why do you think you have got better?'.
    - Encourage discussion between pupils if helpful.
7. You know your pupils, best encourage the form to be completed with the prompts and explanations you feel is best for meeting the task demands.

PRECISION TEACHING PROJECT

Overview

- The Code Cracker programme has been used successfully in Renfrewshire schools with struggling readers to support phonics & reading acquisition.
- Code Cracker is a precision teaching approach & is generally implemented by support staff outwith the class.
- However this study aims to involve the class teacher and also include more rigorous adherence to the principles of precision teaching.
- Class teacher involvement is crucial as research indicates that the involvement of the class teacher is important to pupil perceptions and can increase *motivation* particularly with tasks the individual pupil finds difficult.
- Motivation is crucial to successful learning – however is not explicitly taught like other curricular activities.

The current project will run for 8 weeks starting in October 2007

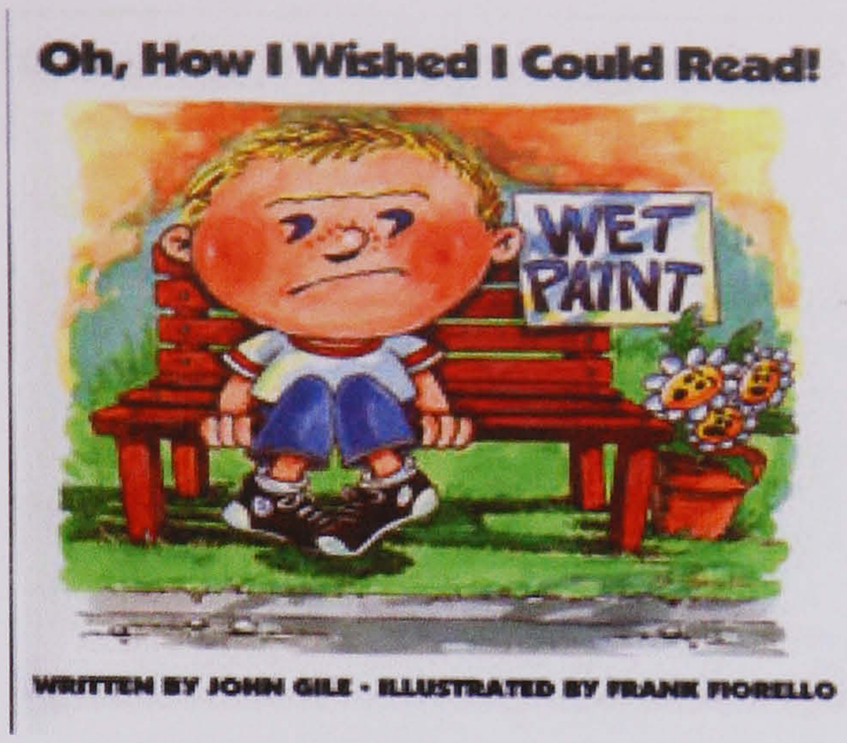
- The study will focus on P4 struggling readers with poor motivation
- Class teachers will be trained in the Code Cracker programme and will administer the program to groups of identified children in accordance with training instructions, for 10-15 minutes per day.

The class teacher will be committed to

- One training session (2-3 hrs). This will take place during or at the end of a school day and could constitute CPD. Additional support will be provided where required
- Identifying eligible children and delivering the programme over an 8 week period, 3-4 times a week for 10-15 minutes.

Previous research has shown that struggling readers can benefit from taking part in similar short scale precision teaching interventions. It is therefore expected that participants in the study will experience gains in reading, as measured by pre and post standardised assessment tools.

In order to quantify changes in reading ability pre and post assessments of pupils' reading and motivation to read will be conducted by the Educational Psychology Service (EPS). Consent to participate, and to undergo pre and post assessments, will be gathered from parents and children, by the EPS prior to testing. Following completion of the project, feedback for all those taking part will be provided.



Please contact me if any further information is required.

Ellen Ferguson, Educational Psychologist, Abbey House, Paisley.

Telephone No. 0141 840 3777 or

e-mail address: ellen.ferguson@renfrewshire.gov.uk