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Research Report 33

# Self-regulated learning: a literature review

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Centre for Research on the Wider Benefits of Learning

WBL is a research centre at the Institute of Education

# SELF-REGULATED LEARNING:

# A LITERATURE REVIEW

**Kathryn Duckworth, Rodie Akerman, Alice MacGregor, Emma Salter and John Vorhaus**

**July 2009**

Published by: Centre for Research on the Wider Benefits of Learning
Institute of Education, 20 Bedford Way, London WC1H 0AL
www.learningbenefits.net



ISBN: 978-0-9559488-4-8

Individual copy price: £10.00

This report was produced by the Centre for Research on the Wider Benefits of Learning (WBL) and funded by the Department for Children, Schools and Families (DCSF). WBL investigates the benefits that learning brings to the individual and to society as a whole. The centre's main objectives are to clarify, model and quantify the outcomes of learning so as to inform the funding, implementation and practice of educational provision through the life course. The views that are expressed in this work are those of the authors and do not necessarily reflect the views of the DCSF. All errors and omissions are those of the authors.

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# Executive summary

## Introduction

This review explores the concept of self-regulation – which includes the ability to concentrate, become involved in group activities, restrain disruptive and impulsive behaviour, and work autonomously – and its impact on learning and attainment. It also considers the high levels of interest in self-regulation, and provides a policy and educational context. The focus is on children aged 5–16.

There is a growing level of policy interest in self-regulation and its impact on learning and attainment. From the early years, throughout the school system and in out-of-school activities, those who work with children and young people are expected to help them develop self-regulation skills, with the aim of enabling them to enjoy their childhood, fulfil their potential, achieve well and become employable adults.

The 'social and emotional' or 'personal, learning and thinking' skills, cited increasingly in policy literature, include a clear focus on self-regulation. This is illustrated by *The Children's Plan* (DCSF, 2007), which announces a 'new focus' on 'social and emotional skills', in order to 'develop greater resilience and preparedness for change, both in learning, and socially'.

This review should be seen alongside a review by the Learning and Skills Network, *Independent Learning: Literature Review* (Meyer *et al.*, 2008). That review explores the concept of independent learning – related to but different from 'self-regulated learning'. The conclusions of both reviews are broadly consistent. Both reveal the difficulties of reaching clear and agreed definitions, while emphasising the strategic importance of achieving this. And both stress the importance of curriculum strategies for improving self-regulation that have a broad remit, encompassing cognitive skills (memory, attention, problem-solving), metacognitive skills (understanding one's own learning and thinking processes), and affective skills (monitoring and regulating one's moods, feelings and emotions).

## Key findings: overview

The literature shows that self-regulation skills have important benefits for the learning and attainment of children and young people, and that these can be developed and improved with appropriate teaching and support.

- There is a positive **overall** relationship between self-regulation and academic achievement. Children and young people with more adaptive personal skills and learning resources are more likely to succeed academically (Duncan *et al*., 2007; McClelland *et al*., 2000).

- **Individual elements** of self-regulation – e.g. attitudes towards learning, attention and persistence – are also related to academic achievement (Yen *et al*., 2004).

- Although the size of the effect of self-regulation is small compared to that associated with prior attainment, it exists independently of prior attainment.

- Aspects of self-regulation such as attention, persistence, flexibility, motivation and confidence can all be improved as a result of effective teaching and learning practices (Diamond *et al*., 2007).

- Metacognition – understanding one's own cognitive skills, including memory, attention and problem-solving – is a key element and driver of self-regulation.

- Substantial evidence gaps mean we know little about how the benefits of self-regulation develop over time or about sub-group variation. Those few studies to date which do look at interactions with background characteristics indicate that the potential benefits of, and innate capacity for, self-regulation do not vary systematically with socio-economic background, ethnicity or gender.

- However, additional stresses associated with low income, such as residential instability, psychological distress among adults and low-quality childcare settings, may hamper the development of self-regulation skills.

## Self-regulation: meaning and importance

Self-regulation refers to 'thoughts, feelings and actions that are planned and adapted to the attainment of personal goals' (Zimmerman, 2000).

Self-regulated learning includes:

- setting goals for learning
- concentrating on instruction
- using effective strategies to organise ideas
- using resources effectively
- monitoring performance
- managing time effectively
- holding positive beliefs about one's capabilities (Schunk and Ertmer, 2000).

Self-regulation is a broad concept encompassing a number of interdependent aspects. It includes both **affective** capacities – moods, feelings and emotions – and **cognitive** capacities – beliefs, perceptions and knowledge. Learning and attainment are best understood when we acknowledge the interactions between affective and cognitive processes. Self-regulation also includes **metacognitive** skills (Flavell, 1979) – that is, understanding one's own cognitive skills, including memory, attention and problem-solving. This enables learners to make the best use of their knowledge and skills (Pressley, 1995).

In order for metacognitive strategies to be effective, students need to show a willingness to learn and to practise. Setting realistic goals and monitoring progress towards these goals involves **self-efficacy** – that is, believing in one's ability to organise and carry out the actions required to achieve one's goals (Bandura, 1997).

Self-regulation is a dynamic concept: it suggests activities and thinking processes that learners can engage in and which are amenable to change, rather than fixed traits that individuals either possess or lack. For example, self-regulation focuses on how learners **actively manage** their feelings and motivations to learn. And self-regulation improves with practice: learners draw on previous experience to build a repertoire of beliefs and strategies that enhance learning.

## Self-regulation and its impact on learning and attainment

### Introduction

Studies highlight the relationship between self-regulation and academic achievement. Children and young people with more adaptive personal skills and learning resources are more likely to succeed academically (Duncan *et al*., 2007; McClelland *et al*., 2000). Although the size of the effect is considerably smaller than that associated with prior attainment, it exists independently of prior attainment and can be supported through appropriate policy and practice.

Not all students are well placed to develop self-regulation skills. Students who struggle to know whether a given strategy will be successful are likely to have difficulties in assessing whether further effort is worthwhile (Efklides *et al*., 1999). Others adopt 'defensive' approaches to learning (Paris and Newman, 1990), avoiding failure by procrastinating, choosing easy tasks or avoiding work altogether.

### Early years

The early childhood years are important for the development of self-regulation abilities such as attention, inhibition and working memory (Anderson, 2002; Blair, 2002). These early skills provide the foundation for positive classroom behaviour.

Not only are young children able to regulate their own engagement in learning (Perry, 1998), but it is also possible to foster these skills during the early years, with positive benefits for their academic self-belief and achievement (Fantuzzo *et al*., 2007). The acquisition of these skills can have long-lasting effects. A study examining the relationship between early classroom adjustment and school performance (Alexander *et al*., 1993) found that the child's interest and active participation in classroom activities, as well as good attention spans, were positively associated with subsequent attainment in reading and mathematics tests. Moreover, children who are engaged and interested and who pay attention not only spend more time on their tasks, but also spend higher-quality time on these tasks.

### Middle childhood and adolescence

During middle childhood and adolescence, self-regulation can become increasingly skilful, building on earlier foundations and being directed to more complex problem-solving. A key element of self-regulation at this stage is the development of learning strategies. Self-regulated learners make greater use of learning strategies and achieve better than do learners who make little use of such strategies (Zimmerman *et al*., 1992). Instruction that encourages pupils to develop, modify and reflect on their own methods, as well as to make sense of the strategies employed by their peers, helps to promote higher levels of understanding and stronger connections between understanding and attainment (Hiebert and Wearne, 1996).

Skilled self-regulated learners exhibit a high sense of efficacy in their capabilities; this influences the knowledge and skill goals they set for themselves, along with their commitment to fulfil these challenges (Zimmerman, 1989, 1990). It is therefore important that programmes should seek to improve both self-regulatory competence and self-efficacy. Students with self-regulation skills are unlikely to use them proficiently if they have doubts about their learning capabilities. Conversely, high self-efficacy will not produce skilful self-regulation among students who lack knowledge of skills or who believe that self-regulation is not beneficial.

### Adult outcomes

There is a growing literature which highlights the importance of aspects of self-regulation for labour-market outcomes (Carneiro and Heckman, 2003). This evidence suggests that individuals' motivation (Goldsmith *et al*., 1997), sense of their own competence and locus of control – that is whether individuals have a sense of control over their own lives and circumstances (Osborne, 1999; Coleman and DeLeire, 2000) – and difficulties regulating emotional behaviour in adolescence (Cawley *et al*., 2001) each have predictive power with respect to wages in adulthood. Follow-up studies of children identified as having attention-related problems also found that as adults they have lower levels of educational attainment, occupational rank, job performance and self-esteem (Mannuzza and Klein, 1999).

## What predicts students' self-regulation and its benefits?

Research has shown that metacognition is a key element of self-regulation, but there remain substantial gaps in the evidence for predictors and outcomes of self-regulation. There is also a paucity of longitudinal analysis, so we do not know much about how the benefits of self-regulation develop over time. The limited research that does exist finds that associations between early attention-related skills and later reading and mathematics performance are similar for boys and girls, and also for children from high and low socio-economic backgrounds (Duncan *et al*., 2007), suggesting that the potential benefits of self-regulation are the same regardless of gender or background. Additionally, Yen *et al*. (2004) explored learning behaviours in 6–17 year olds, and the findings did not vary across groups differing by gender and/or ethnicity.

Children from socially disadvantaged groups are more likely to have difficulties with attention and externalising behaviour (Entwisle *et al*., 2005; Miech *et al*., 2001). Evidence on socio-economic contexts and emotional self-regulation suggests that infants and children from socially disadvantaged backgrounds are more likely to be exposed to multiple sources of stress. These include residential instability, psychological distress among adults, low-quality childcare settings and other factors that put children's emotional adjustment in jeopardy (Brooks-Gunn *et al*., 1997).

However, research on low-income groups finds that children's use of self-regulation strategies – such as protecting themselves from distractions – is equivalent to those from middle- and high-income groups (Gilliom *et al*., 2002). Taking all these findings together, this suggests that the **capacity for** (and potential benefit of) self-regulation does not vary significantly across income groups, but that additional stresses associated with low income may hamper the development of these skills.

## What strategies can be used to improve self-regulation?

Self-regulation can be improved through appropriate guidance, modelling of effective strategies and creating supportive and challenging contexts (Boekaerts and Corno, 2005; Perry and Vandekamp, 2000). Many of these strategies develop from early childhood well into adolescence (Boekaerts, 2006). Evidence from neuroscientific research (Blakemore and Frith, 2005) supports this: adolescence is a time of extensive neurological change, during which the aims of education may be as well placed to focus on self-regulatory skills as in earlier periods.

The optimal conditions for developing self-regulation occur when children and young people have an opportunity to pursue goals that they themselves find meaningful; they will also be invited to develop their skills by selecting their own activities, taking initiative, engaging in challenging and collaborative learning experiences and making their own decisions (Boekaerts and Corno, 2005; Fredricks *et al*., 2004).

**Autonomy** is an important dimension of self-regulation. Students who own their goals – because they enjoy the activity or because it fits with their values – devote more time to their tasks, show greater concentration, process information more deeply, and show greater levels of persistence (Ryan and Deci, 2002). On the other hand, when individuals feel coerced to achieve a goal, they do less well, scoring lower on a number of academic outcome measures (Lemos, 2002; Nolen, 2003).

Classrooms high in self-regulated learning practices are those in which teachers engage students in complex, open-ended activities, involving them in evaluating their own and others' work (Perry, 1998; Perry and Vandekamp, 2000; Winne and Perry, 2000). Teachers in these classrooms ensure that students acquire both the subject and strategy knowledge needed to complete tasks independently. Teachers encourage the pursuit of more challenging goals, and present errors as important opportunities for learning. Continuity between children's home and school learning environments is important.

Students in learning classrooms which emphasise self-regulation exhibit high levels of concentration and attitudes directed towards educational and personal progress. Even low-achieving students exhibit relatively high self-efficacy – they believe that they can learn and improve, and they do not shy away from the more challenging tasks.
On the other hand, in classrooms where teaching practice largely involves simple, closed activities, focusing on a narrower range of skills, low-achieving students actively avoid challenging tasks and reveal perceptions of low ability.

Research on **collaborative learning** shows that peers play an important role in creating a positive learning environment and in promoting self-regulation behaviour. Webb (1991) describes how students tended to help one another when they worked in small groups; intellectually able students deepened their learning by explaining concepts to peers, and lower-achieving students benefited from the additional support offered by peers. 'In order to explain, students have to organize the information, put it into their own words, think of examples and test understanding by answering questions. These are excellent learning strategies' (Woolfolk, Hoy *et al*., 2001).

## Conclusions

There is little doubt that self-regulation has a positive effect on academic attainment, while also making a positive contribution to student behaviour, discipline and self-belief. Although the effect is often small by comparison with the impact of socio-demographic characteristics, self-regulation is amenable to support and intervention. Current policy already provides a number of opportunities for such support to take place, but there remain a number of issues. Schools and other institutions need to be encouraged to take up these opportunities. And there needs to be greater clarity in the terminology and messages used by policymakers and other national stakeholders to describe the skills of self-regulation and the means by which they are developed. Even the term 'self-regulation' has limited appeal. There may be alternatives – 'self-management', for example – that more effectively convey messages about self-regulation to policy and practice communities.

One of the major benefits of self-regulation as a framework for learning is that it connects programmes that are focused on learning strategies and thinking skills with the wider wellbeing agenda in schools. We would argue that a closer alignment is needed between programmes concerned with thinking skills and learning strategies, and interventions that focus on learners' self-efficacy. While students are taught strategies for better learning, they also need support in developing the belief that they **can** learn more effectively.

Studies of interventions designed to increase self-regulation show how self-regulated learning can be operationalised in schools. Self-regulation provides an organising framework for exploring relationships between skills, attitudes and processes that are integral to effective learning. The evidence favours a combined approach to curriculum planning: thinking strategies, together with strategies for promoting self-efficacy and self-esteem, are often best developed as part of a wider teaching and learning programme, as opposed to being taught separately and pursued as ends in themselves.

There is also potential to extend self-regulation beyond the immediate school environment. Children benefit when parents are involved in support for their learning. Parents would benefit from having an opportunity to learn the skills of self-regulation in order to support their children at home more effectively. This suggests a more extensive role for extended schools and programmes such as Family SEAL.

Finally, there are clear gaps in the research evidence. First, there is a need to investigate the impact of enhancing self-regulated learning beyond the immediate effect on academic attainment, to examine its implication for wider indicators of wellbeing and adjustment. Second, there is a need for longitudinally derived evidence on the nature and impact of self-regulation across different phases of childhood, and on how interventions might be tailored for different age groups.

## Acknowledgements

This report has benefited from useful comments and feedback on draft material from our expert advisory panel (see Appendix 4), for which we are very grateful. We are also very grateful to staff at the Centre for Research on the Wider Benefits of Learning for their useful comments on this report, and to Rachel Barker, Stephen Witt and colleagues at the Department for Children, Schools and Families (DCSF) for their input and helpful suggestions.

We would like to thank the DCSF for its financial support on this project.

## Contents

# 1. Introduction

## 1.1 Context and scope

Across the social sciences there is a growing recognition of the importance of a wide range of skills, competencies and attitudes that individuals need in order to thrive in their personal, educational and professional life. These are variously referred to as 'non-cognitive', 'soft', 'personal' and 'social and emotional' skills, categories taken to include anything from attention and trustworthiness to reliability, independence and creativity.

At the time of preparing the original brief for this report it was considered valuable to establish more clearly the content and boundaries of the 'non-cognitive' category as a whole. However, it soon became apparent that this category was unlikely to serve any useful purpose; this is because it is unclear whether the term 'non-cognitive' succeeds in delineating a discrete class of skills or related attributes, as our exploration of the aspects of learning which have been termed 'non-cognitive' makes apparent (see Appendix 3). We therefore elected to focus on a related and more clearly defined subject, one which incorporates significant non-cognitive elements, and which also has undoubted significance in its own right: the capacity for self-regulation.

## 1.2 Self-regulation: an academic and policy priority

The concept of, and evidence on, self-regulation is well established, having attracted extensive and cumulative commentary in the research literature. The development of self-regulation can be expected to support learning progress and educational attainment. It includes the ability to concentrate, to become involved in group activities, to restrain disruptive and impulsive behaviour, and to work autonomously. A growth in the capacity for any or all of these is likely to increase the time during which children are engaged and participating in academic endeavour. And children who are engaged, interested and paying attention spend more and higher-quality time on learning-related tasks.

It is therefore not surprising that there is a growing level of policy interest in this area. The 'social and emotional' or 'personal, learning and thinking' skills cited increasingly in policy literature include a clear focus on self-regulation, along with a range of interpersonal skills. From the early years, throughout the school system and in out-of-school activities, those who work with children and young people are expected to enable them to develop these skills, with the aim of enabling children to enjoy their childhood, fulfil their potential, achieve well and become employable adults.

The creation in 2007 of the Department for Children, Schools and Families (DCSF) served to emphasise children's all-round development, as distinct from their academic achievement alone, and this is reflected in *The Children's Plan* (DCSF, 2007), which underlines the need for services to contribute to children's wellbeing. Sure Start children's centres, for example, and the Early Years Foundation Stage that underpins their activities, aim to enhance young children's intellectual, social and physical abilities on the grounds that each domain contributes to a child's readiness for school and their overall developmental competence. In most primary (and some secondary) schools, the Social and Emotional Aspects of Learning (SEAL) programme is expected to play a key role in helping children to gain the skills that will support educational attainment, success in the labour market and wellbeing. The Independent Review of the Primary Curriculum (2008) has recommended that the Qualifications and Curriculum Authority (QCA) should develop a framework based on SEAL, setting out the personal skills and attitudes that children are expected to develop through their schooling, and how these can be fostered across the curriculum. Likewise the new secondary curriculum, and Diplomas for 14–19 year olds, already include a framework of Personal, Learning and Thinking Skills, designed to help develop some of the skills thought to be valuable to employers: communication skills, reliability, perseverance, teamwork, independence and creativity. Participation in positive activities and personalised learning also feature in the policy literature as examples of how the skills of self-regulation might be developed.

## 1.3 Aims and structure of the report

Our review of the literature on self-regulation does not pretend to be exhaustive. Rather, there are two aims: to provide a detailed theoretical and empirical account of the concept of self-regulation and its impact on learning and attainment; and to explain the high levels of interest in self-regulation, and to put claims made on behalf of these skills in a policy and educational context.

We first present a summary of theoretical and conceptual issues (**Chapter 2**), in which we discuss the meaning of self-regulation, a number of influential theories, and the relevance of self-regulation to other key concepts in the academic and policy literature on the wider aspects of learning. In particular, we highlight the close connections between self-regulation and such related concepts as self-efficacy and thinking skills. This is followed in **Chapter 3** by a review of the empirical evidence on the relationship between self-regulation, learning progress and educational attainment between the ages of 5 and 16. We focus on outcomes for the individual in the context of compulsory education. In **Chapter 4** we describe the implications for policy, and identify the recent initiatives in which self-regulation has featured most prominently. We draw conclusions and make suggestions for further work in **Chapter 5**. Finally, we present a summary of programmes and initiatives related to the concept of self-regulation (**Appendix 1**), a summary of terms and concepts encompassed under the category of the non-cognitive (**Appendix 2**) and a discussion of the concept of non-cognitive skills and some of the associated literature (**Appendix 3**).

# 2. Self-regulation: conceptual and theoretical issues

## 2.1 Introduction

This chapter begins by discussing the meaning of self-regulation, highlighting in particular the theories of self-regulated learning cycles developed by Pintrich and Zimmerman. We then suggest some reasons why the concept of self-regulation provides a useful focus for educational research and policy-making. Drawing on Zimmerman and Pintrich's theories, we explore how self-regulation relates to other key concepts in the academic and policy literatures about the wider aspects of learning. We highlight the close connections between self-regulation and ideas such as self-efficacy and thinking skills.

Although we make brief reference to empirical evidence about the impact of self-regulation, this chapter focuses primarily on theoretical and conceptual issues. In particular, we seek to locate the idea of self-regulation in relation to alternative concepts and frameworks for thinking about the wider aspects of learning. Chapter 3 provides a more detailed review of empirical evidence about the role of self-regulation in learning.

## 2.2 What is self-regulation?

Self-regulation refers to 'self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals' (Zimmerman, 2000). Theories of self-regulation have been developed and applied in a range of contexts, including clinical psychology and the management of chronic conditions, but this chapter focuses on theories of self-regulation as they relate to learning.

In popular discourse, the term 'self-regulation' suggests self-control or self-discipline. However, research into self-regulated learning extends beyond the issue of how learners resist impulses or regulate their concentration. Self-regulated learning includes processes such as: 'setting goals for learning, attending to and concentrating on instruction, using effective strategies to organise, code and rehearse information to be remembered, establishing a productive work environment, using resources effectively, monitoring performance, managing time effectively, seeking assistance when needed, holding positive beliefs about one's capabilities, the value of learning, the factors influencing learning and the anticipated outcomes of actions, and experiencing pride and satisfaction with one's efforts' (Schunk and Ertmer, 2000).

Choice and control are central to self-regulated learning: learners can self-regulate only if they have options available to them and they control aspects of their learning. Thus self-regulation research supports long-standing movements to encourage students to take responsibility for their own learning, such as reciprocal teaching (Schunk and Ertmer, 2000).

A distinctive body of psychological research into the self-regulation of learning emerged from a movement to integrate studies of learning strategies, metacognition, self-concepts and self-control (Zimmerman, 2008). An inclusive definition of self-regulated learning was developed, to encompass this spectrum of research: 'the degree to which students are metacognitively, motivationally and behaviourally active participants in their own learning process' (Zimmerman, 2008).

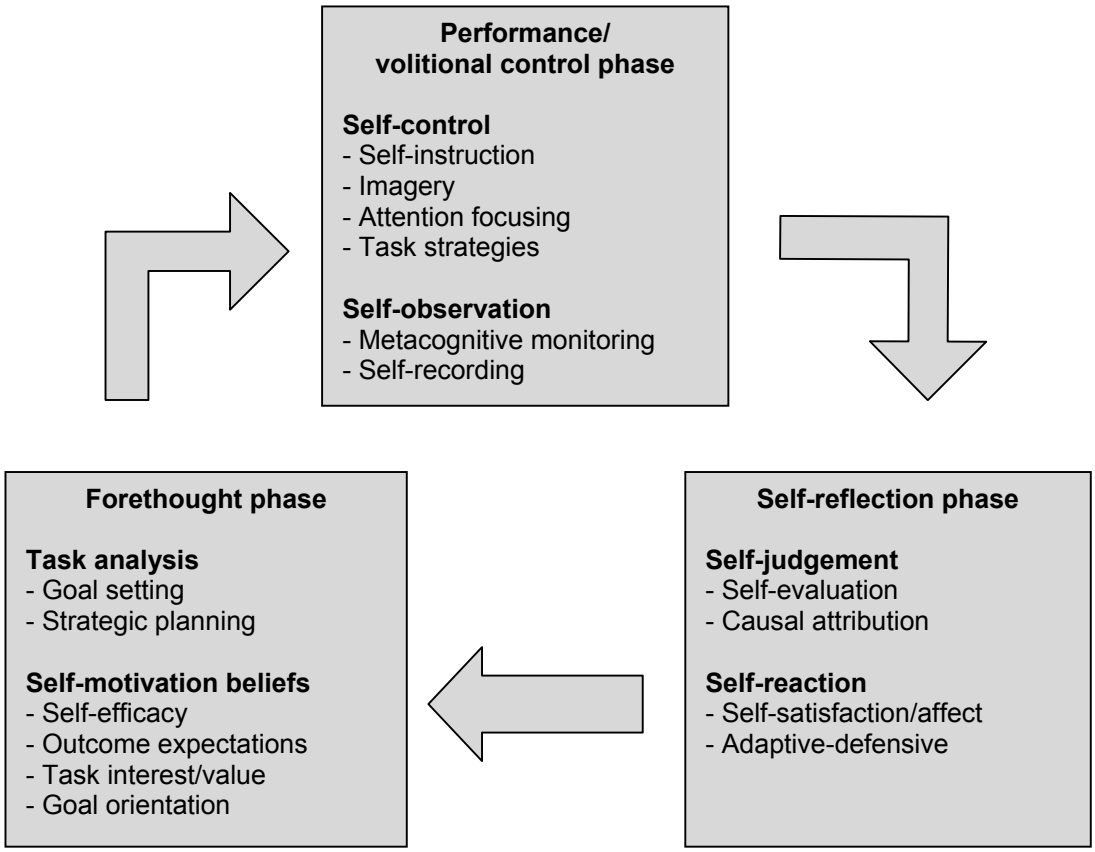
One of the hallmarks of research into self-regulated learning is a focus on self-concepts, motivational feelings and beliefs, as well as on learning strategies and metacognitive skills (i.e. the knowledge and control that individuals have over their own thinking processes). For example, Zimmerman has urged researchers to expand their view of self-regulation beyond metacognitive knowledge and skill, to encompass 'an underlying sense of self-efficacy and personal agency and the motivational and behavioral processes to put these self beliefs into effect' (Zimmerman, 1995). Self-regulation is therefore not just concerned with 'thinking skills' in a narrow sense; it also encompasses questions about the role of emotion, motivation and self-concept
in learning.

Different researchers have emphasised different components of self-regulation, for example the regulation of motivation (Wolters, 2003) or goal orientation (Pintrich, 2000). Thus the broad concept of self-regulation, as the active participation of individuals in their own learning, has been further defined and measured in a range of ways. Despite these differences in emphasis and approach, there is a common core idea within the self-regulation research: of a set of proactive processes and self-beliefs that enhance learning. Studies of self-regulation therefore seek to answer the question: 'How do students become masters of their own learning processes?' (Zimmerman, 2008).

## 2.3 A cyclical model of self-regulated learning

Students may self-regulate different dimensions of learning, including their motives, aims, learning methods and the resources they use (Schunk and Ertmer, 2000). These dimensions are captured in Zimmerman's (2008) three-phase model (see Figure 1), which describes the role of self-regulation over different stages of a learning cycle. The **forethought phase** precedes engagement in learning and includes the processes that set the stage for learning, in particular the **task analysis** that learners engage in and their **self-motivation beliefs**. The **performance phase** involves processes of **self-control** and **self-observation** that occur during learning. Finally, the **self-reflection phase** occurs when learners respond to their efforts with **self-judgements** and **self-reactions** (Schunk and Ertmer, 2000). Feedback from prior performance is used to make adjustments during current efforts, in a 'self-regulatory cycle' (Schunk and Zimmerman, 1998). Therefore self-regulated individuals must continually adjust their goals and choice of strategies. Zimmerman's cyclical theory suggests that self-regulation is likely to improve with practice: successful self-regulators will draw on their previous learning experiences to build a growing repertoire of beliefs and strategies that enhance learning.

**Figure 1: A cyclical model of self-regulated learning (from Zimmerman, 2008)**




This cycle involves self-regulation of behaviour (adjusting performance processes, such as method of learning), of environment (adjusting environmental conditions) and 'covert self-regulation' (monitoring and adjusting cognitive and affective states) (Zimmerman, 2000). The model is grounded in social cognitive theory, which emphasises the interaction of personal, behavioural and environmental factors (Schunk and Ertmer, 2000).

A similar cyclical model of self-regulation has been developed by Pintrich (Schunk, 2005). Pintrich's theory identifies four phases of self-regulation, with four possible areas for self-regulation in each phase (see Table 1).

**Table 1: Pintrich's model of self-regulation (Schunk, 2005)**

| Phases of self-regulation | Areas for self-regulation |
|---|---|
| Forethought, planning, activation | Cognition |
| Monitoring | Motivation |
| Control | Behaviour |
| Reaction, reflection | Context |

Like Zimmerman's work, this model highlights the interactions between cognition, motivation, environment and behaviour over different phases of a learning cycle.

Cyclical models of self-regulation, such as those developed by Pintrich and Zimmerman, emphasise the interdependence of the different aspects of self-regulation. For example, individuals lacking confidence in their own learning capacity are unlikely to use effective task strategies. Consistent with this theory, a number of empirical studies have shown positive correlations between self-efficacy for learning and use of effective learning strategies (Schunk and Ertmer, 2000). Thus, Schunk and Ertmer argue that programmes should seek to enhance both self-regulatory competence in the performance phase and self-efficacy, rather than addressing these issues in isolation: 'Students who possess self-regulatory skills are not apt to use them proficiently if they have doubts about their learning capabilities. Furthermore, high self-efficacy will not produce skilful self-regulation among students who lack knowledge of skills or believe that self-regulation is not beneficial.' Self-regulation needs multi-faceted, integrated support, so that all its elements can be developed effectively.

## 2.4 Why focus on self-regulation?

There are several reasons for choosing self-regulation as the subject of an extensive review:

- There is a well-established body of academic research into self-regulation. This includes extensive empirical research, as well as theoretical literature. There is a particularly strong focus within this research on the self-regulation of learning.

- Self-regulation is a composite concept. It allows us to consider the interrelationships between key concepts such as self-efficacy and motivation within a single framework, rather than exploring these areas in isolation.

- Self-regulation is explicit in its inclusion of a range of both affective (i.e. relating to mood and emotion) and cognitive components. It therefore avoids any unhelpful (and illusory) separation between the affective and cognitive that is created by the idea of 'non-cognitive' skills.

- Self-regulation shifts our focus from emotions and motivations, to how learners **actively manage** their feelings and motivations to learn.

- While definitions of self-regulation vary to some degree, there is a common core idea within the self-regulation research: of a set of proactive processes and self-beliefs that enhance learning.

- Self-regulation is a dynamic concept: it suggests activities and thinking processes that learners can engage in and which are amenable to change, rather than fixed traits that individuals either possess or lack.

- Finally, focusing on self-regulation provides us with a helpful perspective on the academic and policy literatures. Self-regulation is closely related to a number of other key concepts in current research and policy thinking, for instance thinking skills, self-esteem and wellbeing. The next section of this chapter considers these relationships in more detail.

## 2.5 How does self-regulation relate to other key concepts in the academic and policy literatures?

In this section, we identify related areas of research, such as Dweck's work on a 'growth mindset', that overlap with, and support, studies of self-regulation. We also identify theoretical and empirical weaknesses in some alternative frameworks, and suggest ways in which a self-regulation framework may help to address these difficulties.

### 2.5.1 A 'growth mindset'/incremental self-theory

There is a strong body of research showing that a 'growth mindset' (Dweck, 2007), or the belief that intellectual ability can be developed through effort and education, is positively associated with motivation, resilience and educational attainment. Students who believe they can develop their intelligence are less constrained by worries about how intelligent they will appear and are more willing to tackle challenges and to persist with them. This mindset has also been described as an 'incremental self-theory' (Dweck and Grant, 2008). In contrast, students with a 'fixed mindset', who believe they have a set amount of intelligence, 'become excessively concerned with how smart they are, seeking tasks that will prove their intelligence and avoiding ones that might not. The desire to learn takes a back seat' (Dweck, 2007). They seek to hide mistakes rather than correct them and they do not recover well from setbacks. They also believe that intelligent people should not need to make an effort, so exerting effort makes them feel stupid.

There is evidence that simple, low-cost interventions can help to foster a 'growth mindset' among students. One study focused on students with falling grades who were struggling with the transition to seventh grade (Dweck, 2007). One group of students received a study skills intervention, including time management strategies and memory techniques. The other group received the study skills intervention plus a 'growth-mindset' intervention, in which they learnt about their brains and how new connections can be developed through effort and learning. Despite the study skills intervention, the grades of students in the control group continued to decline, whereas students in the 'growth mindset' groups improved their grades. Teachers, who were unaware that the two interventions differed, identified three times as many students from the 'growth-mindset' intervention as showing increases in motivation.

This research has provided insights into forms of praise that support learning and types of praise that can inhibit learning. Research has shown that praise for intelligence tends to put students in a fixed mindset, whereas praise for effort tends to foster a 'growth mindset' (Dweck, 2007). Dweck also found that, when given a choice, most students who were praised for intelligence wanted to work on an easy task, whereas students who were praised for effort wanted a challenging task that they could learn from. When both groups of students worked on some challenging problems, those who had been praised for intelligence lost confidence and enjoyment as they began to struggle. Furthermore, when the problems were made easier, students praised for intelligence performed worse than they had initially on the same types of problems, having lost confidence and motivation. Students praised for effort continued to improve. Finally, nearly 40 per cent of students praised for intelligence falsified their results when asked to report them anonymously, compared to only 10 per cent of effort-praised students.

Research into the value of a 'growth mindset' shows how core views about the nature of intelligence (whether it is a relatively fixed or malleable quality) set up different patterns of responses to learning challenges and setbacks (Blackwell *et al*., 2007). This research highlights the impact of some key dimensions of self-regulation. In particular, research into a 'growth mindset' demonstrates the importance of the kinds of causal attributions of achievement that students make in the self-reflection phase, and how this affects subsequent motivation and self-efficacy in the forethought phase. Strategy attributions are effective in sustaining motivation: 'Because strategies are perceived as correctable causes, attributions to their use protect against negative self-reactions and foster a strategically adaptive course of subsequent action' (Zimmerman, 2000). Students with a 'growth mindset', who make strategy attributions, do not experience failure as a challenge to their identity in the same way that fixed mindset students do; they are more likely to try new learning strategies and are less likely to give up.

Dweck's work on the impact of different forms of praise also suggests that self-regulation interventions are likely to foster the 'right kinds' of feedback. Programmes designed to enhance self-regulation require students and teachers to focus closely on modifying how learners approach and tackle the learning process (e.g. Cleary and Zimmerman, 2004). Thus self-regulation interventions shift attention away from ideas of fixed ability, towards considering the implications of different learning strategies.

### 2.5.2 Thinking skills

Higgins *et al.* (2005) conducted a meta-analysis of 29 studies that evaluated the impact of thinking skills programmes in schools. Thinking skills interventions are defined as 'approaches or programmes which identify for learners translatable, mental processes and/or which require learners to plan, describe and evaluate their thinking and learning' (Higgins *et al*., 2005). Programmes include Feuerstein's instrumental enrichment and cognitive acceleration through science education (CASE).

Higgins *et al*. find that thinking skills programmes have an above average impact on learning outcomes compared to other researched educational interventions. They also report that interventions explicitly focused on metacognitive skills and strategies (i.e. those promoting individuals' awareness of, and control over, their own thinking processes) have a greater impact on attainment than other forms of thinking skills programmes. However, further research is needed to identify the causes of the benefits of thinking skills programmes, to determine whether they are due to specific aspects of the programmes or to wider changes in teaching and learning processes (Higgins *et al*., 2005). It is therefore difficult to draw out precise recommendations for teachers or policymakers.

There is significant overlap between thinking skills, as defined by Higgins *et al*., and theories of self-regulated learning. In particular, the idea that thinking skills programmes require learners to 'plan, describe and evaluate' their learning and thinking resonates with the idea of self-regulated learners as students who are active participants in their own learning processes. The theory of self-regulated learning emphasises metacognitive strategies, not just the application of particular learning techniques or study skills. Thus the finding of Higgins *et al*. that thinking skills programmes have a greater impact on attainment when they include an explicit focus on metacognitive skills is encouraging for research into self-regulated learning.

Although thinking skills programmes have clear affinities with the theory of self-regulation, there are aspects of self-regulation that are not as well recognised in the field of thinking skills. In particular, theories of self-regulated learning emphasise the significance of students' self-concepts and self-efficacy for learning, in this way making important connections between how students manage their learning and their self-understandings. The links between self-concepts and self-regulation are less prominent within the literature on thinking skills.

Higgins *et al*. (2005) report positive findings from their meta-analysis of the impact of thinking skills programmes. However, there is other evidence suggesting that the benefits of 'thinking skills' programmes often fade over time and do not generalise to other subjects or situations (Claxton, 2007b). For example, a Teaching and Learning Research Programme (Economic and Social Research Council) project on 'Activating Children's Thinking Skills' showed only modest gains in thinking for high-ability children who had been exposed to the programme for three years and no gains for lower-ability children or high-ability children with less than three years' exposure to the programme.

Research into self-regulated learning may help us to understand why thinking skills programmes are not always effective and, in particular, why the outcomes often fail to generalise to other topics or situations. As Schunk and Ertmer (2000) argue, 'teaching a strategy does not guarantee that students will continue to use it, especially if they believe that the strategy is not as important for success as other factors'. One barrier to the uptake of taught learning strategies may be a lack of self-efficacy: if students do not believe they are capable of learning, they will not feel that applying particular

strategies will help them. As discussed earlier in this chapter, research into self-regulation has identified a positive relationship between self-efficacy for learning and effective strategy use, and thus suggests that interventions should not seek to address these issues in isolation (Schunk and Ertmer, 2000). Research also shows that feedback about the value of the strategy, and how well students are applying it increases achievement and the use of self-regulatory strategies more than instruction in strategy use alone (Schunk and Ertmer, 2000). These insights from the self-regulation research can be applied to thinking skills interventions, to try to broaden and strengthen their impact.

### 2.5.3 Self-efficacy and self-esteem

Self-efficacy beliefs (our beliefs in our ability to perform in specific situations or to reach certain goals) are a key self-regulatory motive in theories of the self-regulated learning cycle. Empirical research into self-regulation shows that students with high self-efficacy are more likely to choose to engage in activities, work harder, persist when they encounter difficulties, use effective learning strategies and show higher attainment (Schunk and Ertmer, 2000). Dweck's research into the power of a 'growth-mindset' (Dweck, 2007), discussed above, reinforces the importance of self-efficacy to motivation and achievement. Dweck's work also highlights the types of self-efficacy beliefs that schools should focus on cultivating, namely **students' beliefs about their ability to develop their intelligence through education and effort.**

What about the relationship between self-regulation and students' more general feelings of self-esteem or self-worth? Dweck's work on the positive impact of a 'growth mindset' and the risks of the 'wrong kind of praise' provides a useful perspective on initiatives to foster students' self-esteem. It suggests that, insofar as efforts to boost self-esteem involve praising students' intelligence, they may be misdirected. Both Dweck's work and the self-regulation research suggest that teachers should not be concerned primarily with whether students see themselves as intelligent or even whether students feel positive about their levels of achievement. Rather, teachers should focus on shaping **how** students view their intelligence and the types of reasons students tend to identify for their levels of performance: 'Low self-evaluations will not necessarily diminish self-efficacy or motivation if students believe they are capable of learning and can do so through adaptations of self-regulatory processes' (Schunk and Ertmer, 2000).

Crocker and Park (2004) similarly argue that there are risks associated with the pursuit of self-esteem, defined as 'the intention to validate self-worth by proving or demonstrating the qualities that the self does and does not have'. Research suggests that the increase in self-esteem when one succeeds at the pursuit of self-esteem is smaller than the drop in self-esteem when one fails. The pursuit of self-esteem may therefore lower self-esteem on average (Crocker and Park, 2004). Pursuing self-esteem can also be a barrier to learning. Having self-esteem or experiencing boosts to self-esteem decreases learning anxiety, but pursuing self-esteem generally increases

anxiety; only when pursuit is successful, and then only for a short time, is anxiety reduced by the pursuit of self-esteem (Crocker and Park, 2004).

Crocker and Park's work reinforces the argument that we have reason to be cautious about interventions directed at boosting children's self-esteem (to the extent that these interventions involve pursuing self-esteem in Crocker and Park's terms, i.e. telling children to feel good about themselves by taking positive actions). Crocker and Park argue that cultivating a 'learning orientation' is a more effective way of reducing anxiety and enhancing learning. The idea of a 'learning orientation' is closely related to theories of self-regulated learning, in which seeing success or failures as learning opportunities is part of the feedback element of the cycle: 'We propose that a double-loop learning goal in which people have the intention to use the result of their efforts to identify what worked, what did not work, and what they want to do differently next time provides an alternative, preferable means for minimizing the distress and disruption that fear produces. Therefore, rather than boosting self-esteem, we recommend adopting a learning orientation to reduce anxiety and the vulnerability of self-esteem' (Crocker and Park, 2004). This description of a 'double-loop learning goal' has clear affinities with the theory of self-regulatory learning cycles, in which learners' self-reflection on their performance feeds into their goal-setting, planning and subsequent strategy use.

We have emphasised the role of self-efficacy beliefs in self-regulated learning, while suggesting some reasons to be cautious about interventions designed to enhance self-esteem in a more general sense. The argument here is not that high self-esteem has no positive effective on learning.[1] Rather we are raising questions about the value of interventions in which teachers seek directly to **boost** students' self-esteem, either by praising students' intelligence or by encouraging students to feel good about themselves by taking positive actions. Self-regulation research, together with closely related work on a 'growth mindset' and 'learning orientation', suggests that teachers should focus instead on cultivating students' beliefs in their ability to develop their intelligence through education and effort.

### 2.5.4 Wellbeing

Wellbeing is perhaps not at first obviously related to self-regulation. However, Huppert's four-part framework for measuring wellbeing (summarised in Table 2 – below) helps to locate self-regulation in relation to the broader concept of wellbeing. She argues that sustainable wellbeing is best understood as a combination of feeling good and functioning effectively (Huppert, 2007).

[1] However, see Emler (2001) for a review of evidence suggesting that the correlation between global self-esteem and educational attainment is weak, and does not reflect the influence of self-esteem on subsequent educational attainment.

**Table 2: Huppert's framework for measuring wellbeing (Huppert, 2007)**

| | **Feeling** (having, being) | **Functioning** (doing) |
|---|---|---|
| **Personal** | Positive mood<br>Optimism<br>Confidence | Curiosity, interest<br>Engagement<br>Sense of purpose<br>Resilience |
| **Interpersonal** | Belonging<br>Social support<br>Feeling respected<br>Treated fairly | Social engagement<br>Respect for others<br>Caring and helping |

Interpersonal feelings and functionings, such as belonging, social engagement and respect for others, are not prominent within most self-regulation research.[2] However, the personal feelings and functionings that Huppert highlights overlap strongly with theories of self-regulation. The concept of personal engagement is a core idea underpinning the research on self-regulation: self-regulated learners are those who actively engage in their own learning processes. Optimism and confidence about learning are closely related to self-efficacy and a 'growth mindset', which we have described as key components of self-regulated learning. A sense of purpose is connected with goal-setting processes within the self-regulatory learning cycle. Thus theories of self-regulation span both the feeling and functioning dimensions of this conceptual framework for measuring wellbeing, but seem to be largely confined to the personal domain. This suggests that programmes designed to increase self-regulation of learning may need to be supported by interventions that focus on interpersonal skills and values.

Huppert's framework is useful, because it highlights a range of potential indicators of personal wellbeing that are also involved in the self-regulatory learning cycle. It also shows that the self-regulation research is primarily focused on personal processes and qualities, where a broader theory of wellbeing might also need to capture the social and interpersonal. However, there are some important divisions between different approaches to thinking about wellbeing that are not captured by Huppert's framework, but are reflected in different bodies of research and practice around the wider aspects of learning. In the next section, we discuss the idea of 'learning power' and link this to a conception of wellbeing as the ability to successfully negotiate worthwhile challenges. We suggest that this model of wellbeing can also help us to make connections between self-regulation and the wider wellbeing agenda in schools.

### 2.5.5 Capacity to learn/'learning power'

There is a cluster of initiatives and research concerned with the capacity to learn, for example the Campaign for Learning 'Learning to Learn' and Claxton's (2007b) work on 'learning power'. These initiatives differ in their specific content and approach. However, all emphasise the development of motivations, dispositions and transferable

[2] One exception to this is the conceptualisation of help-seeking as a social strategy of self-regulated learning (Newman, 1994). Further research is needed to investigate the connections between self-regulation and interpersonal skills and values.

skills that will help students to access and effectively engage with learning opportunities throughout their lives. The importance of developing young people's capacity to learn was also highlighted by the recent Foresight enquiry into mental capital and wellbeing (Foresight Mental Capital and Wellbeing Project, 2008): 'Starting early will be crucial: it will be important to create experiences for young learners that promote their motivation and capacity to engage in learning throughout their lives i.e. promoting their "disposition to learn"'.

It is useful to contrast these programmes that seek to develop students' capacity to learn with initiatives that focus on the promotion and teaching of happiness in schools. These two strands in the literature around the wider aspects of learning seem to be underpinned by competing ideas about wellbeing, or what it means for lives to go well: one perspective which emphasises happiness or feeling good and another that focuses on successfully negotiating worthwhile challenges. For example, Claxton (2007b) links learning power to ideas of character, courage and confidence to deal with challenges. It is useful to explore Claxton's idea of learning power in more depth, because it highlights some of the key contrasts within the broader wellbeing agenda in schools, and helps us to situate self-regulation in relation to these debates.

Claxton argues that educational policy and interventions should shift their focus away from happiness as 'feeling good'. Research suggests that people are not generally very good at predicting the sources of their own happiness in this sense and that there are risks in trying to boost happiness by intensifying good feelings. In particular, it can make us more intolerant of negative emotions. Instead, Claxton argues, we should focus on happiness 'which flows from making progress in challenging and worthwhile projects' (Claxton, 2007a). Within this theory, wellbeing is more closely associated with effective striving and challenging learning than with arriving at particular goals. Schools should therefore focus on building students' 'learning power', understood as 'the appetite, confidence and capacity to set and pursue meaningful challenges'. We should move away from the idea that we can have lessons in happiness, to a focus on 'the educational processes that can build up young people's ability to generate their own well-being' (Claxton, 2007a).

The concept of wellbeing underpinning Claxton's idea of 'learning power' is similar to the 'challenge model' of wellbeing developed by philosopher Ronald Dworkin (2000). This challenge model also resonates with the self-regulation research. Although the self-regulation research recognises the important role of emotions in learning, self-regulation interventions do not directly seek to promote happiness in schools. Rather they aim to help students to become more active participants in their own learning processes, with the motivation and skills to engage with challenging learning tasks.

This section has highlighted two alternative ways of thinking about the role of schools in developing students' wellbeing. We have suggested that self-regulation is connected to the wider wellbeing agenda in schools, when this agenda is understood

in terms of developing students' ability to engage with worthwhile challenges, rather than promoting their happiness.

### 2.5.6 A dispositional view of intelligence

Research into learning dispositions can help to address the question of how and why students transfer learning strategies between contexts. Claxton (2007b) distinguishes between learning a skill and developing a disposition. Dispositions are defined as abilities that you are inclined to make use of. For example, being questioning is not just about having the ability to formulate good questions. It is also 'a matter of inclination, of self-confidence, of a sense of occasion, and of entitlement' (Claxton, 2007b). A dispositional view has been presented as a corrective to thinking skills approaches, which may focus on developing problem-solving strategies, without sufficient attention to students' readiness and willingness to use them and transfer them between contexts: 'When people think only in terms of teaching "thinking skills" or "problem-solving competencies", and neglect the need to cultivate dispositions, they often find that any apparent gains disappointingly fail to last, spread or deepen' (Claxton, 2007b).

The value of the literature on learning dispositions is to highlight the issue of transfer in relation to self-regulated learning. Schunk and Ertmer (2000) suggest that students' perceptions of the value of self-regulation strategies may be higher when the strategies are integrated within subject courses. However, it is then unclear whether students will transfer the strategies to other courses. On the other hand, teaching self-regulatory strategies within a discrete programme requires transfer 'between a "content-free" course and any number of specific content courses' (Schunk and Ertmer, 2000). A dispositional view of intelligence highlights the need for further research into learners' propensities to apply self-regulation processes across different contexts and subjects.

## 2.6 Conclusion

In this chapter we have addressed three objectives:

- to discuss some of the clearest and most useful ways of thinking about self-regulation as it relates to learning
- to suggest some reasons why it is helpful to think in terms of self-regulation and to engage with this body of research
- to show how self-regulation relates to some other key concepts in the research and policy literature, such as self-esteem and thinking skills.

The introduction to this report highlighted the huge range of concepts and programmes collected under the broad field of the wider aspects of learning. Given this broad and diverse agenda, there is a risk that the selection of any single concept or framework will appear arbitrary or unhelpfully narrow. Furthermore, the idea of self-regulated learning seems a long way from where this investigation started: with a focus on 'non-cognitive skills', often understood as social and emotional skills. However, we have argued that taking self-regulation as a focal point can help us to navigate our way through the academic and policy literature around the wider aspects of learning. Although self-regulation research emphasises learning strategies and thinking skills, we have suggested that it also connects with the wider wellbeing agenda in schools. We have discussed how a self-regulation framework can encompass legitimate concerns about students' self-concepts and motivation, while avoiding some of the problems associated with focusing directly on boosting self-esteem. We have also described the close relationships between self-regulation and ideas about 'learning power', dispositions to learn and a 'growth mindset'.

There are several areas in which further empirical research is needed to explore the theories and models of self-regulation discussed in this chapter. For example, although empirical research supports the idea that self-regulation is not a fixed characteristic or trait and that self-regulatory processes can be taught (Schunk, 2005), further work is needed to explore how background characteristics influence students' propensity to self-regulate their learning. For example, there is evidence to suggest that self-regulated learning strategies co-vary to some extent with personality traits (Bidjerano and Yun Dai, 2007). Chapter 3 builds on the conceptual and theoretical discussion in this chapter, and provides a more detailed review of the strengths and weaknesses of empirical evidence about the role of self-regulation in learning.

# 3. Empirical review of the literature

## 3.1 Introduction

We have seen that there is no simple and straightforward definition of self-regulated learning. Yet neither is it a new construct; as early as 1978, Vygotsky argued that young children are capable of regulating their own learning and can give evidence of being involved and committed to steering and directing their own actions (see also Bloom and Tinker, 2001). As we suggested in Chapter 2, self-regulation can be conceived as 'the degree to which individuals are … active participants in their own learning process' (Zimmerman, 1994, p.3). The assumption, to be explored in this chapter, is that achievement effects are mediated by the self-regulatory activities that students engage in to reach their learning goals.

A growing body of research suggests that the capacity to self-regulate is central to our ability to understand and support learning, attentional flexibility, decision-making, problem-solving and task persistence. There are numerous empirical studies which highlight the complex relationship between self-regulation and academic achievement. These studies show that children and young people with greater and more adaptive personal skills and learning resources are more likely to succeed academically (e.g. Duncan *et al*., 2007; McClelland *et al*., 2000). Researchers have explored how children become accurate and proficient readers (Pressley, 1995) and mathematical problem-solvers (De Corte *et al*., 2000), how students choose the tasks and activities they engage in (Fredricks *et al*., 2004) and what explains the motivation to acquire new skills and persistence in the face of adversity or other setbacks (Eccles *et al*., 1997).

Furthermore, the evidence suggests that measures of individual aspects of self-regulation, such as attention, also relate to measures of academic achievement, independent of prior levels of cognitive ability. A study by Yen *et al*. (2004) explored the longitudinal relationships between individual learning-related behaviours – such as attitudes towards learning, attention and task persistence and flexibility – and subsequent academic achievement in literacy and numeracy. Using a sample of students ranging in age between 6 and 17 years, the authors showed evidence of an independent contribution from these self-regulatory capabilities, over and above that of earlier academic achievement. It has been suggested that self-regulated behaviour can help to explain achievement in spite of circumstances that often lead to failure (Woolfolk Hoy *et al*., 2001). Moreover, while the contribution of learning-related behaviours is relatively modest in comparison to cognitive ability, many authors emphasise that skills such as attention, persistence, flexibility, motivation and confidence are more easily amenable to change through teaching and intervention (see, for example, Diamond *et al.*, 2007). We return to strategies for developing self-regulatory skills in section 3.4 below. First, we turn our attention to a more detailed review of the literature on **how** self-regulation relates to academic achievement.

## 3.2 How does self-regulation relate to academic achievement?

Theory suggests that attention and related self-regulatory features of the child, such as concentration and persistence, can be expected to increase levels of engagement in the classroom and participation in academic activities. Skilled self-regulated learners in school are able to manage their own processes of knowledge and skill acquisition, analyse the demands of new learning tasks in relation to their academic strengths, and form appropriate decision-making strategies during problem-solving (Zimmerman, 1989). Through greater awareness of learning processes, these learners are able to attribute outcomes to factors they can control – for example, their own efforts and the effective use of learning strategies. Furthermore, self-regulating individuals are well equipped to monitor their learning, by providing their own feedback and performance evaluations, maintaining levels of concentration and motivation throughout, and viewing errors and criticism as opportunities to learn rather than as reasons to give up (Perry and Vandekamp, 2000).

Studies of associations between children's self-regulatory skills and school performance consistently suggest that the ability to direct, control and sustain attention serves to predict achievement during pre-school and early school years, carrying over into middle childhood, adolescence and adulthood. How far this relationship holds, independent of prior attainment, remains a question for further research. We discuss the limited evidence on this question later in this chapter.

### 3.2.1 Knowledge and metacognition

To be self-regulated, students should have knowledge about themselves, the subject, the task, the learning strategies, and the contexts in which they will apply their learning. Expert self-regulators also possess a detailed understanding of the obstacles they might encounter when learning something new, and of how to deal with those obstacles (Kuhl and Kraska, 1989). This knowledge is frequently referred to as 'metacognition' or 'cognition about cognition' (Flavell, 1979; Winne, 1996). Metacognition includes a conscious understanding and self-awareness of one's own cognitive processes. This enables skilled self-regulators to combine and make best use of the cognitive strategies and resources available to them; and this in turn allows them to orient themselves toward the task at hand, plan and implement actions, define the levels of effort required, and monitor their progress through an immediate evaluation of the strategies used (De Corte *et al*., 2000; Pressley, 1995). Metacognition also involves having access to strategies that direct learning, such as monitoring its level of difficulty and adapting skills previously used to successfully complete tasks.

Experiencing difficulties when acquiring a new skill may imply several things. It may simply mean that students have met with obstacles of a sort not anticipated, and that they need to find their way around them. Students who can act on feelings of difficulty when they arise regulate their actions more effectively and are consequently more likely to succeed in the task at hand (Boekaerts, 2006). However, a sense of

difficulty may also imply that students are aware that they do not have ready access to strategies to go around the obstacle, and this may lead to higher levels of anxiety, lower expectations and self-doubt (Covington, 2004).

Not all students are able to regulate their learning. Students lacking in metacognitive knowledge – those, for example, who struggle to know whether or not a given strategy will be successful – are likely to have difficulties in assessing whether a further investment of effort is worth their while (Efklides *et al.*, 1999). Others adopt approaches to learning that have been characterised as 'defensive' (Paris and Newman, 1990) and 'self-handicapping' (Covington, 1992). Typically, these students avoid failure by procrastinating, choosing easy tasks or avoiding work altogether.

In order for metacognitive strategies to prove effective, students should not only be aware of which strategies achieve which particular goals, and have access to these, but they should also show a willingness to learn and to practise, and to be able to adapt their strategies as obstacles arise or the task itself evolves. Setting realistic goals and monitoring progress towards these goals also involves self-efficacy – that is 'beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments' (Bandura, 1997, p.3). We discuss strategies for using and developing the capacity for the self-regulation of learning in more detail below.

### 3.2.2 Self-regulation over the life course

Learning to regulate one's behaviours, emotions and motivations is a lifelong task beginning in infancy (Woolfolk Hoy *et al*., 2001). There is little evidence exploring how self-regulation develops over time, and there are few conceptual models for understanding change and stability in the self-regulation of learning. However, there is considerable evidence highlighting the importance of self-regulation at different points over the life course.

***Early years***

There is growing evidence that a broad set of skills in the early years contributes to adjustment in school and subsequent academic performance. Among these, self-regulation encompasses a key set of capabilities, which is recognised in policy design. Programmes such as Sure Start in the UK and Head Start in the USA reference self-regulation in that they include strategies for learners who have difficulties following instructions, paying attention and controlling impulses. Such difficulties as these will impede early academic adjustment and subsequent success, since children will be expected to follow classroom rules and teacher directions, share toys and wait their turn (McClelland *et al*., 2000; Mischel *et al*., 1989; Olson and Hoza, 1993).

The early childhood years have been identified as highly significant for the development of important executive functions such as attention, inhibition and working memory (Anderson, 2002; Blair, 2002), all of which play a significant role in self-regulation. Recent investigations provide evidence that young children can and do

regulate their own engagement in learning activities (Neuman, 1996; Perry, 1998). These early skills set the stage for later academic performance and educational success by providing the foundation for positive classroom behaviour. Although most of the evidence is cross-sectional, longitudinal studies show that early problems with attention and classroom engagement have long-lasting effects. In a study examining the relationship between early classroom adjustment and school performance, Alexander *et al*. (1993) found that the child's interest and active participation in classroom activities, as well as good attention spans, are positively associated with subsequent attainment in reading and mathematics tests (see also Brown and Saks, 1986; Raver *et al.*, 2005). Moreover, these authors suggest that children who are engaged, who are interested and who pay attention not only spend more time on task, but that this time is also of a higher quality.

Findings from a recent study by Liew *et al.* (2008) are also consistent with the view that early self-regulatory abilities and skills will foster academic competence as well as school-related confidence in the early school years. Their results support the belief that early efforts to promote children's self-regulatory capabilities would enhance future academic self-beliefs and achievement (Fantuzzo *et al*., 2007). Similarly, recent work from the Centre for Research on the Wider Benefits of Learning (Feinstein and Duckworth, 2006) has highlighted the importance of early attention-related skills for performance in reading and mathematics five years later.

However, and by contrast, measures of socio-emotional behaviours, including internalising and externalising problems, were generally insignificant predictors of later academic performance, even among children with relatively high levels of problem behaviour. These results have been replicated in five other internationally renowned, longitudinal studies (Duncan *et al*., 2007).

***Middle childhood and adolescence***

The task of developing self-regulation for learning becomes even more important during the later school years, particularly during adolescence, when academic learning becomes more difficult and schooling becomes increasingly complex with multiple teachers, homework and deadlines. Accordingly, in middle childhood and adolescence more attention tends to be given by schools to enhancing self-regulatory skills. We can distinguish between deep and surface-level learning strategies. Students who use deep strategies are more cognitively engaged; they exert more mental effort, create more and stronger connections between their ideas and achieve greater understanding of the issues at hand (Weinstein and Mayer, 1986).

In the case of deep understanding, as early abilities mature and become increasingly automatic, attentional resources can be devoted to more complex problem-solving. Hiebert and Wearne (1996) investigated the dynamic relationships between instruction, understanding and skill in mathematics. Following 70 children over three years, the authors found that pupils applied their understanding of existing mental structures to invent new procedures and adapt old ones. They report evidence of a

persistent relationship between understanding and skill, and argue that consolidated conceptual understanding is highly significant for stimulating and guiding the development of new procedural skills. Furthermore, they find that instruction that encourages pupils to develop, modify and reflect on their own methods, as well as to make sense of the strategies employed by their peers, helps promote higher levels of understanding and stronger connections between levels of understanding and attainment. Discipline problems and inattentive behaviour have also been associated with lower school performance across middle childhood and adolescence (Finn *et al*., 1995; Finn and Rock, 1997).

As children mature cognitively, they become better at regulating their behavioural investments according to their interests (e.g. Eccles *et al*., 1993; Eccles *et al*., 1997; Wigfield and Eccles, 1992). Consequently, the relationship between elements of self-regulation – such as interest, motivation, effort, self-competency beliefs – and task-choice becomes increasingly complex (Denissen *et al*., 2007).

However, and as noted above, much of the evidence in this area is drawn from cross-sectional studies. Further longitudinal evidence is needed to determine how self-regulation develops, whether any self-regulatory skills and behaviours are synergistic, and how these skills develop alongside related behavioural, emotional and social capabilities. In addition, there are very few conceptual models for understanding change and stability in the self-regulation of learning. This research is needed to identify how the relationship between self-regulation and academic achievement changes over the life course and to ascertain whether the strategies for supporting it may need to be different for different age groups.

Such research also needs to take account of the interdependency between different aspects of self-regulation. Researchers have explored the role of self-efficacy beliefs in self-regulated learning in later school years (Pajares, 1996; Wigfield *et al.*, 2006). As with earlier years, these studies show that self-regulated learners make greater use of learning strategies and achieve better than do learners who make little use of self-directed learning strategies (Zimmerman *et al*., 1992). Skilled self-regulated learners exhibit a high sense of efficacy in their capabilities; this influences the knowledge and skill goals they set for themselves, along with their commitment to fulfil these challenges (Zimmerman, 1989, 1990). Research here similarly demonstrates that students with a high sense of academic efficacy display greater persistence, effort and intrinsic interest in their academic learning and performance (Schunk, 1984, 1989). Schunk and Ertmer (2000) argue that programmes should seek to enhance both self-regulatory competence in the performance phase and self-efficacy, rather than addressing these issues in isolation: ‘Students who possess self-regulatory skills are not apt to use them proficiently if they have doubts about their learning capabilities. Furthermore, high self-efficacy will not produce skilful self-regulation among students who lack knowledge of skills or believe that self-regulation is not beneficial.’

*Adult outcomes*

There is a growing literature which highlights the importance of aspects of self-regulation for labour-market outcomes (see Carneiro and Heckman for a review, 2003). This evidence suggests, for example, that measures of individuals' motivation (Goldsmith *et al*., 1997), sense of their own competence and locus of control – i.e. whether individuals have a sense of control over their own lives and circumstances (Goldsmith *et al*., 1997; Osborne, 1999; Coleman and DeLeire, 2000) – and difficulties regulating emotional behaviour in adolescence (Cawley *et al*., 2001), each have predictive power with respect to wages in adulthood. Follow-up studies of children identified as having attention-related problems also found that as adults they have lower levels of educational attainment, occupational rank, job performance and self-esteem (Mannuzza and Klein, 1999).

### 3.2.3 Subject-specific differences

Evidence suggests that there may be differences in how self-regulation and the skills related to attention are associated with different domains of later ability. Reading and mathematics involve comparable yet disparate abilities that may be differentially affected by attention problems (Pungello *et al.*, 1996). It is argued, for example, that in mathematics there are **qualitative** distinctions between the topics taught over time, each building on the next but frequently requiring new types of skills to be learnt – for example, restructuring a problem from a new perspective (Nelissen, 1987). Reading, however, often involves **quantitative** differences in learning over time. After the initial skills of reading have been acquired, reading material can be said to become more complicated and advanced, but not to the point that this represents a qualitative difference. At this stage, children graduate from 'learning to read' to 'reading to learn' (National Institute of Child Health and Human Development Early Child Care Research Network, 2005). It is argued that, other things being equal, learning material that is qualitatively different requires higher levels of attention than material that is quantitatively different.

### 3.2.4 Multitasking

Multitasking – trying to learn a number of skills simultaneously – can also have the effect of significantly increasing the level of cognitive demand. To the extent that concurrent activities call upon the same set of self-regulatory resources, they can compete for processing capacity and may have the effect of subtracting from it (Bloom and Tinker, 2001). This helps to explain why students with lower levels of ability, or less knowledge in a given area, often experience difficulties and report having to invest high levels of effort into learning new and more complicated tasks. The related feelings of frustration are likely, in turn, to lead students to give up more quickly. We return to these issues and the strategies for overcoming them in section 3.4.

### 3.2.5 The significance of self-regulation

Interpretation of research exploring the development of children's socio-emotional adjustment and behavioural problems is often difficult because of the high level of co-occurrence among problem behaviours (Jensen *et al*., 1997; McConaughy and Achenbach, 1994). However, while attention-related problems are frequently found in conjunction with other behavioural difficulties, a growing body of research suggests that not only are attention and related features of self-regulation conceptually distinct from other problem behaviours, but, and as reviewed above, they also relate to achievement outcomes in unique ways (Barriga *et al.*, 2002).

Studies exploring relationships across different elements of academic behaviour and adjustment in school highlight the importance of distinguishing between attentional difficulties and other forms of behavioural difficulties. Frick *et al*. (1991), for example, found that aggressive behaviours in childhood are related to low academic achievement primarily because of their associations with attention-related problems. Research also indicates that, when considered separately, attention and related skills are more predictive of later achievement than more general problem behaviours (Barriga *et al*., 2002; Hinshaw, 1992; Konold and Pianta, 2005; Ladd *et al*., 1999; Normandeau, 1998; Trzesniewski *et al*., 2006). Self-regulation thus becomes a potential key, not only to academic attainment, but also to issues around behaviour and discipline.

## 3.3 What predicts students' self-regulation?

Despite the large amount of information that is currently available on how students regulate their learning in the classroom, the literature is by no means comprehensive. We have already identified the paucity of evidence on how the capacity for self-regulation changes over time. There are also very few studies that systematically examine how far elements of self-regulation differ by gender, or by characteristics of the family such as socio-economic background.

In the study cited in 3.2.2 above by Duncan *et al.* (2007), the patterns of association between early attention-related skills and later reading and mathematics performance were similar for boys and girls, and also for children from high and low socio-economic backgrounds. Yen *et al*. (2004) carried out multi-group structural equation modelling analysis on their data, exploring learning behaviours in 6–17 year olds, and revealed that their findings were invariant across groups differing by gender and ethnicity. Liew *et al*. (2008) report that girls were rated by teachers as higher than boys on levels of persistence and resourcefulness, but that there were no significant differences with respect to academic self-efficacy or inhibitory self-control. The final models were not run separately by gender.

Eccles *et al.* (1989, 1993, 1997) have extensively explored the associations between gender and motivation, self-concept, and expectancy values – that is students'

expectancies for success on particular tasks and the subjective value they attach to success on those tasks. Their evidence consistently shows that, from a subjective point of view, girls and their parents think that they are working harder in mathematics than they are in English, and harder than boys are in mathematics. However, time diaries and teachers' data suggest that these beliefs are not accurate: there were no gender differences in how much time children themselves said they put into mathematics and reading or in terms of teacher ratings on how hard each student worked in class. Eccles *et al.* argue that these gender differences arise primarily from the causal attributions that parents make for their children's school performance, i.e. that girls do well because they work hard and boys because they are naturally able.

Several authors have also indicated that gender differences in aspects of self-regulation may explain the gap in achievement between boys and girls. Salisbury *et al.* (1999), for example, suggest that girls and boys prefer different learning styles and that boys get bored more readily, as their levels of concentration are lower and their organisational skills are poorer than girls'. Jacob (2002) further argues that boys are less cooperative than girls, and so they are less inclined to enjoy or benefit from collaborative learning (see 3.4.2 below for further detail on the particular importance of collaborative learning). He also suggests that boys are less able to organise and keep track of homework or class materials and are less inclined to ask for help.

The limited studies that do examine other moderating influences on self-regulation and related capabilities suggest that, on average, children from more socially disadvantaged groups are also more likely to have higher rates of problems with attention and externalising behaviour (Entwisle *et al*., 2005; Miech *et al*., 2001; Raver, 2004). Evidence on socio-economic contexts and emotional self-regulation, including such indicators as problem behaviours, temperament, anxiety, and delay of gratification, suggests that infants and children from socially disadvantaged backgrounds are more likely to be exposed to multiple stressors in their environments, such as residential instability, greater psychological distress among adult caregivers, lower-quality childcare settings and a range of other factors that appear to place children's emotional adjustment in jeopardy (Brooks-Gunn *et al*., 1997; Gershoff *et al*., 2003; McLoyd, 1998). However, research in low-income samples suggests that these children's use of self-regulatory strategies – such as protecting themselves from distractions – is equivalent to those from middle- and high-income groups, suggesting that they have the same potential as those from high- and middle-income groups to self-regulate learning (Gilliom *et al*., 2002; Raver *et al*., 1999).

Other work highlights the role of the family in developing self-regulatory skills and behaviours. Zimmerman *et al.* (1992), for example, have described in detail how parents can function as explicit and implicit role models when they want their children to acquire a new competency. Similarly, Xu (2004) emphasised the importance of parents as well as that of teachers in supporting and actively coaching children to develop skills such as persistence.

## 3.4 What strategies can be used to improve self-regulation?

In the introduction to this chapter, we cited research suggesting that while the contribution of various measures of self-regulation is relatively modest in comparison to those of prior cognitive ability, skills such as attention, persistence, flexibility, motivation and confidence are more easily amenable to change through intervention (Yen *et al*., 2004). Much of the literature shows that the self-regulation of learning can be enhanced through appropriate guidance, modelling of effective strategies and creating supportive yet challenging contexts (Boekaerts and Corno, 2005; Perry and Vandekamp, 2000; Schunk, 1989; Zimmerman, 2000). Indeed, many of these strategies develop from early childhood well into adolescence (Boekaerts, 2006).

Evidence from neuroscientific research (Blakemore and Frith, 2005) further supports this position, noting that adolescence is also a time of major neurological change, during which the aims of education may be just as well placed to focus on self-regulatory skills, personal development and locus of control as in earlier periods. In this section, we review the evidence on how these skills can be taught, exploring some of the strategies and interventions aimed at teaching and developing self-regulatory skills.

### 3.4.1 Individual volition strategies

Volition is a capacity of the will and displays itself in acts of willing. It is one of the most significant elements of self-regulation. Volitional competence is marked by the tendency for an individual to increase effort when it is needed and the ability to maintain it despite obstacles or environmental interruptions (Boekaerts, 2006). Volitional strategies include aspects of self-management such as persistence, perseverance and what many teachers and parents frequently term 'buckling down to work'. Corno (1994) defined these strategies as students' tendency to maintain focus and effort despite potential distractions. These might include simple strategies such as making the environment more conducive for learning to take place, for example by turning off the television before starting homework or studying at a tidy desk (Xu, 2004). Students may also attempt to make a task more enjoyable or more situationally interesting to complete by, for example, varying where homework is done or using resources and environmental cues, such as maps and charts (Sansone and Harackiewicz, 1996). As noted in section 3.2.1 above, volitional strategies such as time management and resource management, prioritising goals and marking completed tasks are equally important in life beyond the school gates (see also Corno, 2001).

Students who do not have easy access to volitional strategies when they encounter obstacles en route to their goal will require additional scaffolding in order to complete the task. Instruction in the use of good work habits and identifying effective learning styles has been shown to benefit weaker students in particular (see Boekaerts and Corno, 2005, for a review). Cognitive behavioural approaches focus on ways to direct and maintain attention, modulate emotional arousal or evaluation anxiety, and cope

with difficulty. Maladaptive thoughts such as 'I can't do this problem' are replaced with productive self-questioning, such as 'In what different ways can I do this?' (see, for example, Meichenbaum, 1977). Such approaches, however, can be costly and in general classroom settings are time consuming and cumbersome (Boekaerts and Corno, 2005).

Ames (1990, 1992) adapted this modifying-belief-structures approach to the whole classroom setting. The TARGET programme[3] refers to six aspects of classroom structure that teachers can modify to promote motivation to learn, rather than motivation to hide weaknesses or outperform others. Although there have been difficulties in evaluating the full programme systematically, reports suggest that classrooms adopting TARGET learning styles have increasing numbers of students who show evidence of the motivation to learn.

Most research in this area, however, suggests that optimal conditions for the development of self-regulation occur when children and young people are given the chance to pursue goals that they themselves find personally relevant, and are invited to develop their own skills by selecting their own tasks and activities, taking initiative, engaging in challenging and collaborative learning experiences and making their own decisions (Boekaerts and Corno, 2005; Fredricks *et al*., 2004).

Ryan and Deci (2002) highlight the need for autonomy as a central element of self-regulatory processes. They argue that students who feel ownership of their own goals – either because they inherently enjoy the activity or because it fits with their values and goals more generally – spend more time on task, show greater concentration and process information more deeply (Grolnick and Ryan, 1987; Connell and Wellborn, 1991) and show greater levels of persistence (Ryan and Connell, 1989). On the other hand, when individuals feel coerced to achieve a goal or are encouraged to comply with the goals of others, they do less well, scoring lower on a number of academic outcome measures (Lemos, 2002; Nolen, 2003). These authors suggest that the need for autonomy is most likely to be met in contexts where students have choice, shared decision-making, and relative freedom from external controls. While these features of the learning environment may be less prevalent in a relatively prescribed National Curriculum that relies heavily on assessments, there are features of the classroom that can promote self-regulated approaches and go some way towards fulfilling this description.

### 3.4.2 The classroom

The volatile world of classroom learning creates situations in which different goals compete for students' attention, and there are therefore a number of reasons why learning activities that foster self-regulation may be difficult to realise. Classroom learning is not linear; students pursue multiple goals, not only intending to learn but

[3] **T**ypes of tasks, lines of **A**uthority, means of **R**ecognition, **G**rouping methods, **E**valuation practices and use of **T**ime.

also seeking out positive social and educational experiences. However, evidence from empirical investigation and in-class observation indicates that there are various aspects of the classroom environment that seem to contribute to the emergence of self-regulatory skills, including the nature of teaching practices, the level of choice that students are able to exercise over their own work, the types of assessment and evaluation procedures used, and the variety of learning experiences offered.

***Teaching practices and classroom management***

Extensive work by Perry and colleagues characterises classrooms high in self-regulated learning practices as those in which teachers engage students in complex, open-ended activities, offer them choices and opportunities to control challenge, and involve them in evaluating their own and others' work (Perry, 1998; Perry and Vandekamp, 2000; Winne and Perry, 2000; see also Pressley *et al*., 1990). Teachers in these classrooms also provide instrumental support, ensuring through instruction that students acquire both the domain and strategy knowledge needed to complete tasks independently, helping them to make appropriate choices and encouraging them to improve their developing abilities by attempting more challenging tasks.[4] Teaching methods in these classes involve complex, cognitively demanding activities that focus on a variety of processes and purposes. Moreover, they extend over multiple periods, are embedded in all areas of the learning experience and are integrated in other subject areas. Teachers in these classes also attend to students' developing perceptions of task difficulty, encouraging the pursuit of more challenging goals and presenting errors as important opportunities for learning. Perry's findings also emphasise the value of creating continuity between children's home and school learning environments. Examples include encouraging parental involvement in school and explaining and modelling a range of strategies used in class to parents during workshops.

Students in high self-regulating learning classrooms demonstrated high levels of on-task behaviour and metacognitive awareness, and communicated attitudes and approaches to learning that focused on educational and personal progress. Even the low-achieving students exhibited high efficacy for learning, believing that they could learn and improve, and did not shy away from the more challenging tasks. On the other hand, in classrooms where teachers' practices involved simple, closed activities and focused on more narrowly defined skill sets and the more procedural aspects of task completion, students were more focused on their teachers' evaluations of their work and on how many answers they had got right. Low-achieving students in these

[4] In Vygotskian terminology, this is known as 'scaffolding' of the learning process (Vygotsky, 1962, 1978; see also Wood, 1998). In the classroom, successful scaffolding involves teachers ensuring that children are engaged and interested in the task set, maintaining an orientation toward task-relevant goals, highlighting critical features that might be overlooked and enabling the child to do as much as they can themselves without being left to struggle when the demands of the task become too difficult or frustrating for their current abilities. Implicit within this process is the notion of 'fading', wherein support is reduced for the aspects of the task that the child is ready to perform alone, and responsibility for achieving the goals of the task is handed over to the learner.

classrooms were observed actively avoiding challenging tasks and communicating perceptions of low ability and low efficacy for learning.

Researchers from the Effective Provision for Pre-school Education (EPPE) project (Sammons *et al*., 2002, 2003) highlight the importance of **cognitive construction**, during which participants are actively contributing to the learning process. Children are motivated and involved in a process of reflexive co-construction, and adults are involved with children's activities in planned and focused ways to encourage shared thinking. The EPPE researchers argue that sustained shared thinking is the basis for successful pedagogic practice, and in conjunction with practitioners, who model appropriate language, behaviour, skills and attitudes, it provides for the most effective settings and promotes intellectual gains in children. Siraj-Blatchford and Sylva (2004) demonstrate the value of responsive teaching; that is, teaching appropriate to the ability level, as well as the cultural and social perspective of the child, and which matches the current knowledge of an individual to their potential capabilities (see also Connor, Morrison and Katch, 2004; Connor, Morrison and Petrella, 2004).

Palinscar and Brown (1984) developed a cognitive apprenticeship procedure called 'reciprocal teaching' to improve the reading comprehension of all students. Reciprocal teaching involves students first observing the teacher, who thinks aloud while reading text, and then doing the same themselves. As the teacher reads, s/he models comprehension, monitoring and memory support strategies, such as summarising, rereading, punctuating key parts of the text and asking 'Wh–' questions. Reciprocal teaching has also been used in writing (Harris and Graham, 1996) and science and mathematics (Blumenfeld *et al*., 1991; White and Frederiksen, 1998). In each subject area, results show positive effects on strategy acquisition and improved achievement outcomes. Similar methods have been adopted by investigators who further contend that when students learn from teachers how to think about academic work, to reason through problems, to question assertions and present arguments, they begin to think more like experts than novices (e.g. Collins *et al*., 1989).

Finally, student achievement and attitudes are improved when clear, efficient structured and focused teaching practices are found alongside warm and supportive teacher–student interactions (Fraser and Fisher, 1982; Moos, 1979). High teacher expectations are a further determinant of effectiveness and pupil progress, with low teacher expectations and acceptance of failure being particularly detrimental to those already at risk of underachieving (Sammons, 1999).

### *Assessment, evaluation and the curriculum*

Evidence suggests that some educational practices can actually cause a decline in students' self-regulatory skills (Corno and Randi, 1999; McCombs and Pope, 1994). Critics of the National Curriculum assessments, particularly those administered in primary school, argue that they provide for simplistic judgements about pupils' ability and act only as 'performance indicators of teacher effectivity' (Ball, 1994, p. 41). These authors argue that over-assessment of pupils can adversely affect child

wellbeing and impact on educational engagement and intrinsic motivation, as well as encouraging 'teaching to the test' (see Tymms, 2004, for further discussion).

Too great an emphasis on assessment and evaluation can be particularly detrimental for those who are already underachieving. Similarly, the requirements of the National Curriculum may also constrain the methods and techniques afforded to teachers in classrooms and in the work they assign. Learning episodes that are overly prescriptive – wherein teachers set learning goals for their students that are narrowly specified and do not allow for flexibility – are unlikely to create an environment that is conducive to students becoming intrinsically motivated to acquire new skills. Yet when implemented well, assessment practices can be used to support learning objectives as well as to measure them. This applies not only to summative assessment but also to formative assessment, whereby assessment is designed to support the learner as an element of, and not set apart from, the process of teaching and learning (Black and Wiliam, 2003). Assessment practices can also provide valuable signals of those at risk of underachieving and falling behind, as well as identifying particularly gifted and talented young people (Feinstein and Duckworth, 2006; Duckworth, 2007). These findings support the principles behind the Government's recent focus on personalised learning and the recommendations of the *2020 Vision* report (DfES, 2006).

The importance of children's perceptions of primary school assessments, and how they contribute to their understanding and interpretation of themselves as learners, is demonstrated in a qualitative study by Reay and Wiliam (1999). Interviews with children in year 6 reveal children's anxiety about failing their SATs, and how success or failure in these assessments says something about their own intrinsic worth and is conflated with 'goodness', cleverness and future prospects, as well as serving as an informal assessment of the positive and negative attributes of their peers.

Findings from Perry's classroom observation studies cited above, indicate that when teachers' evaluations are routinely embedded within learning practices, students see making mistakes and constructive criticism as part of the general classroom discourse, and as evidence of what they need to learn next (Perry and Vandekamp, 2000). These students are more likely to take errors in their stride; for example, remarking that 'It's OK to make mistakes', 'Everyone makes mistakes', 'That happens all the time', 'She can always fix it'. The students here focus on the importance of effort and the desire to preserve self-esteem.

***Collaborative learning***

Learning is both a cumulative and socially situated process, yet researchers have focused less on the peer group than on teachers as influences in the development of self-regulatory skills and behaviours (Ryan, 2000). However, research examining collaborative learning in classrooms highlights several ways in which peers play an important role in creating a learning environment and promoting adaptive self-regulatory behaviours. Webb (1991), for example, described how students tended to help one another when they worked in small groups; intellectually able students

deepened their learning by explaining concepts to peers in need of clarification, and lower-achieving students benefited from the additional support offered by peers, as well as from students who modelled good working habits. 'In order to explain, students have to organize the information, put it into their own words, think of examples and analogies … and test understanding by answering questions. These are excellent learning strategies' (Woolfolk Hoy *et al*., 2001, p.148).

Schunk and Zimmerman (1998) also found that adolescents who observed peers persisting on a difficult task subsequently showed increased self-efficacy themselves, persisting longer on similar tasks and improving their own problem-solving skills. Others have found that cognitive engagement is enhanced when class members actively discuss ideas, debate points of view and critique each other's work (Guthrie and Wigfield, 2000). The rationale underpinning collaborative learning is that it supports **self**-regulation because peers model and discuss their own learning and motivation strategies, which are then distributed across the group for individuals to pick up and modify to suit their own needs. Group discussion also helps participants to rehearse, elaborate and expand their knowledge – key elements of the development of self-regulation. As group members question and explain, they have to organise their knowledge, make connections and review information, which are important processes in consolidated understanding and memory.[5] Collaborative learning also provides the social support and scaffolding that students need to move learning forward. Many interventions now exist for promoting learning that is collaborative (see Webb and Palinscar, 1996, for a review).

The importance of peer relations for academic engagement and educational success also extends into the more affective areas of self-regulation and non-cognitive skills. Peer acceptance is associated with academic effort, positive social behaviour and satisfaction in school (Berndt and Keefe, 1995; Ladd, 1990; Wentzel, 1994). Conversely, children who are rejected by their peers are at greater risk of lower classroom participation, lower interest in school and poor conduct (Buhs and Ladd, 2001; DeRosier *et al*., 1994). Peer rejection in both childhood and adolescence also increases the probability of dropping out of school (French and Conrad, 2001). In addition to raising self-esteem, altruism and empathy, liking fellow classmates and feeling liked, sense of responsibility and control over learning and time on task, Slavin (1995) also notes the importance of collaborative and cooperative learning in factors such as interracial friendships, prejudice reduction, and acceptance of disabled students. These extra spillover effects are attributed to the process of working towards common goals as equals. Consequently, collaborative learning has been touted as being particularly useful in combating the detrimental social effects among particular 'in-groups' or 'cliques' or alienation that frequently occur in secondary school (Aronson and Patnoe, 1997).

[5] Clearly, if only a few people in a group setting take responsibility for the work, the non-participants are less likely to learn.

Collaborative learning can also include computer-mediated learning environments. Interactive computer programs offer new opportunities for teaching practice, providing teachers with valuable additional resources and alternative grouping practices (Boekaerts and Corno, 2005). Computer-mediated learning environments offer innovative ways in which to embed assessments in instructional activities. The most sophisticated computer-mediated environments enable students to develop and refine their own self-regulation skills and routines at their own pace, and in the context of whatever knowledge environment they experience (see Winne *et al*., 2003; Sandoval, 2003). Evaluations of these programs are still in their infancy, but the use of scaffolding programs, involving tailored feedback and continued instruction, presents a promising prospect for developing the self-regulation of learning in ICT-mediated environments (see Aleven *et al*., 2003).

## 3.5 Summary

We have reviewed the literature on how self-regulation relates to academic attainment and performance in school, discussing what we know about the antecedents that predict the self-regulation of learning, and describing a number of ways in which these skills and behaviours can be enhanced. We have not attempted an exhaustive review; rather, we have sought to suggest how the empirical evidence, and our interpretation of that, can contribute to an understanding of what self-regulation is, and how it might be enhanced in practice.

One of the advantages of focusing on self-regulation is that it encourages a broad perspective on learning and its antecedents and effects. It encourages us to consider students' attempts to develop and become critically aware of not only their cognitions, but also their feelings, volitions and conduct during the learning process. The study of self-regulation as multidimensional, and as an interaction between the individual and the environment, also promises to help us better understand the complexity of children's experiences in school, and to design more personalised and nuanced interventions. The evidence demonstrates that what is needed for children to become skilled self-regulators is a growing awareness of their own capabilities, including their cognitive, motivational and affective functioning. At the same time, teachers and parents will do well to recall that self-regulation and self-efficacy are 'not so much about learning how to succeed as [they are] about learning how to persevere when one does not succeed' (Pajares, 2005, p.345).

# 4. The policy context

## 4.1 Overview

The concept of self-regulation rarely features explicitly in the policy literature. However, many aspects are commonly referred to, and initiatives that support elements of self-regulation are already in place throughout the age range.

Self-regulation skills are variously defined by different agencies, and are usually included within wider 'umbrella' terms, such as 'social and emotional' or 'personal, learning and thinking' skills. The main issue is therefore one of clarity, rather than that not enough is being done to support self-regulation. This is illustrated by *The Children's Plan* (DCSF, 2007), launched to draw together children's policy and to set out how the Government will meet its strategic objectives for children, schools and families. The plan announces a 'new focus' on 'social and emotional skills', in order to 'develop greater resilience and preparedness for change, both in learning, and socially'. And QCA has been asked to develop a framework for primary schools based on the SEAL programme, setting out the personal skills and attitudes that children can be expected to develop through their schooling and how these can be fostered across the curriculum. It is planned that this framework will be consistent with both the Early Years Foundation Stage (EYFS) and Key Stage 3, and it is intended that this will bring a measure of clarity to the field.

In what follows we look at how self-regulation features in policy initiatives related to the early years, primary schools, and young people, and we look at its relevance to personalised learning. We end by considering the implications for current policy and the challenges that need to be overcome.

## 4.2 Early years

For very young children, the EYFS, which became statutory in September 2008, sets out to support the whole range of a child's non-cognitive and cognitive development. Its Learning and Development theme includes a focus on personal, social and emotional development, within which children are expected to develop a positive sense of themselves and of others, and a positive disposition to learn and acquire knowledge of themselves and what they can do. These attributes have clear links with self-regulation, and some of the specific goals connected with them include:

- 'be confident to try new activities, initiate ideas and speak in a familiar group'
- 'maintain attention, concentrate, and sit quietly when appropriate'

- ‘have a developing awareness of their own needs, views and feelings, and be sensitive to the needs, views and feelings of others’
- ‘consider the consequences of their words and actions for themselves and others’
- ‘select and use activities and resources independently’ (DCSF, 2008a).

With these clear goals set out in policy, the emphasis is then on individual settings to support children to reach them, in the light of the evidence about successful approaches. *The Children’s Plan* (DCSF, 2007) also advocates a smoother transition from the EYFS to Key Stage 1 to ensure that that there is no ‘sudden change from a … focus on all aspects of children’s development to one primarily on the cognitive’.

## 4.3 Primary schools

We have previously described the positive impact on learning that follows a growing capacity to act as a self-regulated learner. We also saw that interpersonal skills are closely involved in this process, and we suggested that self-regulation and interpersonal skills should be responded to and taught in ways that bring out the close relationship between the two. It is therefore appropriate that schools act to help children develop all the skills that will enable them to become self-regulated learners. A vision for the role of schools was recently set out in *21st Century Schools* (DCSF, 2008b), prior to a 2009 White Paper. This document makes it clear that schools are indeed expected to help children and young people to ‘develop the wider personal skills, characteristics and attitudes needed to succeed and make a positive contribution to society … while enjoying a fulfilling and healthy childhood’. Examples of such skills given are confidence, self-respect, leadership, citizenship, teamwork, ‘responsibilities’ and relationship skills, which clearly involve elements of the capacity for self-regulation. It seems that the SEAL programme is already providing an ideal opportunity for these to be developed.

### 4.3.1 SEAL

SEAL takes a whole-school approach to promoting positive behaviour, attendance, learning, wellbeing and employability, and was being used by approximately 80 per cent of primary schools and 30 per cent of secondary schools by July 2008. The materials are organised into seven themes: New beginnings; Getting on and falling out; Say no to bullying; Going for goals!; Good to be me; Relationships; and Changes. These themes cover five principal ‘aspects of learning’, of which at least the first three have obvious connections with self-regulation: self-awareness, managing feelings and motivation (the remaining two are empathy and social skills) (see Table 3). The research evidence suggests that the fact that the programme covers all of these areas makes it more likely that it will help learners to self-regulate than a programme covering one area alone. The SEAL guidance for teachers (DfES, 2005) offers explanations of the terms and details the ‘knowledge, skills and understanding’ that the resources aim to develop, as quoted in the examples below. These examples have clear resonance with Zimmerman’s (2008) model of self-regulated learning.

**Table 3: Examples of aspects of learning covered by the SEAL programme (DfES, 2005)**

| | Explanation | Knowledge, skills and understanding |
|---|---|---|
| **Self-awareness** | 'Self-awareness enables children to have some understanding of themselves. They know how they learn, how they relate to others, what they are thinking and what they are feeling. They use this understanding to organise themselves and plan their learning.' | **Knowing myself**<br>E.g.: I know when and how I learn most effectively.<br><br>**Understanding my feelings**<br>E.g.: I can recognise when I am becoming overwhelmed by my feelings. |
| **Managing feelings** | 'In managing feelings, children use a range of strategies to recognise and accept their feelings. They can use this to regulate their learning and behaviour – for example managing anxiety or anger, or demonstrating resilience in the face of difficulty.' | **Managing how I express my feelings**<br>E.g.: I can stop and think before acting.<br><br>**Managing the way I am feeling**<br>E.g.: I can change the way I feel by reflecting on my experiences and reviewing the way I think about them. |
| **Motivation** | 'Motivation enables learners to take an active and enthusiastic part in learning. Intrinsically motivated learners recognise and derive pleasure from learning. Motivation enables learners to set themselves goals and work towards them, to focus and concentrate on learning, to persist when learning is difficult and to develop independence, resourcefulness and personal organisation.' | **Setting goals and planning to meet them**<br>E.g.: I can set a challenge or goal, thinking ahead and considering the consequences for others and myself.<br><br>**Persistence and resilience**<br>E.g.: I can choose when and where to direct my attention, concentrate and resist distractions for increasing periods of time.<br><br>**Evaluation and review**<br>E.g.: I know how to evaluate my learning and use this to improve future performance. |

The five areas identified by SEAL reflect the domains identified by Salovey and Mayer (1990) and Goleman (1995): self-awareness, managing emotions, motivating oneself, empathy and handling relationships.

While evaluation of the 'small group' element of the SEAL programme (Humphrey *et al*., 2008) has found positive associations with improved behaviour and attendance, detailed evaluation of the whole-school approach is still needed; this could usefully consider the effects of the programme in promoting self-regulated learning. In particular, more detailed guidance may be needed to support teachers; for example, current SEAL guidance[6] contains the generalised instruction, 'Make sure learners believe they can learn'. Incorporating work to promote what Dweck (2007) terms a 'growth mindset' could assist in promoting this development. Programmes such as Brainology (see Appendix 1) are designed to promote the belief among students that intelligence is not a fixed and unalterable state, and that it is possible to improve one's levels of performance and attainment as a result of effort and application. The programme also encourages praise which focuses on students' efforts rather than on their ability.

[6] http://nationalstrategies.standards.dcsf.gov.uk/node/66409 (accessed 14 July 2009).

### 4.3.2 Wellbeing and health

In the area of children's policy there is something of an overlap between 'social and emotional' or 'personal, learning and thinking' skills, wellbeing and health, particularly mental health. It should be noted that wellbeing is not consistently defined in policy documents (Ereaut and Whiting, 2008). However, the conception we have found in the literature, relating to the capacity to set and pursue meaningful challenges more than merely pursuing happiness (e.g. Claxton, 2007a), is useful in so far as it suggests a connection with self-regulation. The overlap between the wider health and wellbeing agenda and skills related to self-regulated learning can be seen, for example, in the fact that QCA has been asked to set out the 'essential knowledge, skills, understanding and attitudes for personal, social and health education' that children should develop alongside physical education, in an area of learning focused on physical health and wellbeing. Furthermore, the publication *Promoting emotional health and wellbeing through the National Healthy Schools Standard* (Department of Health, 2004) refers to taught courses of 'social, emotional and behavioural skills', 'including thinking and problem-solving skills'. All schools are being encouraged to work towards National Healthy School Status, which addresses pupils' emotional health and wellbeing, and also covers personal, social and health education. To gain this status, schools must show that they are providing opportunities for children to build their confidence and self-esteem – for example by using SEAL. Our findings suggest that using SEAL, which addresses several aspects of self-regulation, might indeed be more effective than attempting to boost self-esteem directly.

Guidance (DCSF, 2008c) for schools on their duty to promote wellbeing is under consideration, and the Ofsted inspection framework is also under review and due to ensure that schools are assessed on their contribution to all of the Every Child Matters outcomes rather than on attainment alone. (The outcomes are: staying safe; being healthy; enjoying and achieving; achieving economic wellbeing; and making a positive contribution.) While self-regulation is only a small part of the wider wellbeing agenda, our finding that it can contribute to the fulfilment of such an agenda further supports its promotion within and across the curriculum.

## 4.4 Young people

### 4.4.1 Personal, Learning and Thinking Skills

The new (post-September 2008) secondary curriculum and Diplomas for 14–19 year olds have embedded within them a framework of Personal, Learning and Thinking Skills (PLTS), developed by QCA (QCA, 2007). This framework specifies six 'groups of skills', under the headings: Independent Enquirers; Creative Thinkers; Reflective Learners; Team Workers; Self-Managers; and Effective Participators. These headings aim to cover skills valued by employers and further and higher education institutions, and are conceived as capturing the 'essential skills of: managing self; managing relationships with others; and managing own learning, performance and work' (Boston, letter 2006), which are clearly encompassed by self-regulation.

Within the framework, each group of skills is summed up by a 'focus statement', and a set of outcomes 'indicative of the skills, behaviours and personal qualities' that young people are expected to develop. 'Self-managers' and 'reflective learners' are the two groups most obviously associated with self-regulation, although the focus statement for 'self-managers' and outcomes quoted below demonstrate the degree to which self-management is thought to overlap with other types of skills, including the interpersonal:

'Focus: Young people organise themselves, showing personal responsibility, initiative, creativity and enterprise with a commitment to learning and self-improvement. They actively embrace change, responding positively to new priorities, coping with challenges and looking for opportunities.'

(QCA, 2007)

The outcomes for self-managers include:

- 'work[ing] towards goals, showing initiative, commitment and perseverance'
- 'organis[ing] time and resources, prioritising actions'
- 'manag[ing] their emotions, and build[ing] and maintain[ing] relationships'.

The outcomes for reflective learners include:

- 'set[ting] goals with success criteria for their development'
- 'review[ing] progress, acting on the outcomes' (QCA, 2007).

QCA recommends that young people be provided with explicit opportunities to 'learn, practise and apply' the skills (QCA, 2008), and awarding bodies such as ASDAN have begun to develop suggested activities and materials to enable young people to practise and record their development of PLTS as part of the Diploma. The evidence suggests that this is to be welcomed, and that all young people, including those taking more traditional academic qualifications, should benefit from opportunities to learn and apply the skills in different contexts.

### 4.4.2 The 'personal tutor'

A recommendation of *The Children's Plan* (DCSF, 2007) is that all secondary school pupils should have at least one person in school who knows them well and understands their learning needs in the round, being concerned for their personal development and helping them to tackle barriers to learning outside the classroom. The role of this 'personal tutor' was originally set out in *2020 Vision: Report of the Teaching and Learning in 2020 Review Group* (DfES, 2006), where it was suggested that the tutor would monitor a young person's development of 'non-cognitive skills'. *The Children's Plan* does not take up this part of the tutor's role explicitly.

However, it seems that some young people – if such an adult is available to get to know them well, and develop a relationship of trust and care with them – could greatly benefit from this kind of individual support in becoming engaged in their own learning and in developing the skills they need to become a self-regulated learner, alongside a sense of purpose in learning. Significantly, the plan envisages that the personal tutor will be the main point of contact in the school for the young person's parents. This implies that schools and families have a joint role in enabling children and young people to develop all the skills that they need – and highlights the fact that the role that schools play in the lives of children who are not receiving all of the support they need at home is particularly important.

### 4.4.3 The role of positive activities

Outside the school environment, *Aiming high for young people: a ten year strategy for positive activities* (HM Treasury/DCSF, 2007) sets the goal that by 2020 all young people will be participating in positive activities to develop 'social and emotional skills', to promote their wellbeing and to reduce behaviour that might put them at risk. This goal is reiterated in *The Children's Plan* (DCSF, 2007).

Both participation in the activities themselves and the support of youth workers and mentors are expected to help young people to develop these skills: the latter may play a role similar to that of the 'personal tutor' outlined above, in encouraging young people to plan and evaluate their activities, set high aspirations and learn from their mistakes. *Aiming high for young people* defines the skills as: 'a wide range of attitudes, beliefs and levels of understanding, including young people's self-awareness; their ability to manage their feelings; their motivations; their level of empathy with others; and their social skills'. It goes on: 'They help to shape young people's self-esteem, how they feel about themselves, how they feel about others from different backgrounds, and the extent to which they take control of their own lives'. Thus there is a view in policy that skills related to self-regulation, along with interpersonal skills, can and should be supported not only through formal teaching but also through other activities.

## 4.5 Personalised learning

The concept of personalised learning currently has a high profile, and we have seen that research (e.g. Siraj-Blatchford and Sylva, 2004) supports the value of teaching that is appropriate to the ability level and perspectives of the individual child. It therefore seems worth briefly examining the extent to which self-regulation skills fall within its compass.

Personalised learning was most fully set out in the *2020 Vision* report (DfES, 2006) mentioned in 4.4.2 above, where it is defined as 'focusing in a more structured way on each child's learning in order to enhance progress, achievement and participation', and tailoring support and challenge to children's needs, interests and abilities. Among

the ‘essential knowledge, skills, understanding and attitudes’ that children and young people are thought to require in order to thrive, the report gives examples of ‘non-cognitive’ skills and attitudes. The development of these is seen as ‘a matter of moral purpose and social justice’ – in order to reduce ‘persistent and unacceptable gaps in average attainment’. While the document gives examples rather than a comprehensive list, some of the skills highlighted clearly relate to self-regulation, and these include: taking responsibility for, and being able to manage, one’s own learning and developing the habits of effective learning; being confident and able to investigate problems and find solutions; and being resilient in the face of difficulties. The report also states that children’s ability to engage in learning depends on their ability to make good choices and decisions, to understand the impact of their actions and how to influence events, and to concentrate, apply themselves to a task and persevere.

Despite this high level of recognition, a more recent Government publication on the topic of personalised learning (DCSF, 2008d) does not mention these self-regulation skills at all, concentrating on academic learning and referring only in passing to the aspiration of ‘better personal development’ for all children. Nevertheless, since most of the skills and attributes mentioned in *2020 Vision* have been taken up in QCA’s PLTS framework, it is clear that they have not been neglected.

# 5. Conclusions

Self-regulation helps to connect programmes that are focused on learning strategies or 'thinking skills' with the wider wellbeing agenda in schools. This draws together a focus on metacognition, or 'making aspects of thinking explicit'(EPPI-Centre, 2004), with a focus on how pupils feel about themselves and their learning. This in turn suggests that a closer alignment is needed between programmes that are broadly concerned with thinking skills, metacognitive skills and learning strategies, and interventions that focus on learners' self-efficacy and self-concepts. In other words, while students are taught strategies for better learning, they also need support in developing the secure and confident belief that they **can** learn more effectively.

The evidence gives support to a combined approach of this sort: thinking strategies, together with strategies for promoting self-efficacy and self-esteem, are often best developed as part of a wider teaching and learning programme, as opposed to their being taught separately and pursued as ends in themselves. And self-esteem may be more effectively promoted in the context of a curriculum that makes no mention of self-esteem, but which is well fitted to supporting learners' needs and which challenges them in ways appropriate to their level and ability. The priority is then to design curricula, assessment regimes, and teaching and learning environments that lend themselves to demonstrable and secure learning progress among pupils of all abilities.

There are other ways in which support for self-regulation might be developed. There is evidence of the positive effects on children of involving parents in support for their learning. It would be beneficial to provide parents with the opportunity to learn some of the skills and strategies of self-regulation, so that they can better support their children at home. This suggests a more extensive role for extended schools and programmes such as Family SEAL.

Self-regulation has been shown to have a positive effect on academic attainment, while also being linked with wellbeing, student behaviour and discipline, and beliefs about their own capabilities. Although the effect is often small by comparison with the impact of socio-demographic characteristics, self-regulation is amenable to support and intervention. Current policy already provides a number of opportunities for such support to take place, but there remain a number of issues. Schools and other institutions need to be encouraged to take up these opportunities. And there needs to be greater clarity in the terminology and messages used by policymakers and other national stakeholders to describe the skills of self-regulation and the means by which they are developed.

The cyclical model of self-regulated learning provides a useful way of exploring issues such as how self-efficacy shapes learning strategy use, and how learners' self-evaluations influence their subsequent motivation and goal-setting. Studies of interventions designed to increase self-regulation (e.g. Zimmerman, 2008) have

shown how the theory of self-regulated learning can be operationalised in schools. Therefore, self-regulation seems to provide a useful organising framework within which to explore the relationships between a number of important skills, attitudes and processes.

## 5.1 Further research and next steps

Although self-regulation provides a useful organising framework for thinking about the wider aspects of learning, the term 'self-regulation' seems to have some weaknesses as a 'strategic location' (Weare and Gray, 2003) for policy communication and implementation. We should consider whether alternative terminology – self-management, for example – might more effectively convey messages about self-regulation to the policy and practice communities.

Critics might suggest that a focus on self-regulation is too narrow, and insufficiently connected to the broader wellbeing agenda. Some research into self-regulation does suggest a narrow instrumental perspective, in which self-regulation operates as a means to enhancing academic achievement. For example, Zimmerman (1995; 2000) emphasises the importance of regular testing in the development of self-regulated learning. Further work is needed to investigate how self-regulation research, and other research that focuses on the teaching of thinking skills and metacognitive strategies, connects with the wider agenda to promote wellbeing in schools. In particular, there is a need for studies that investigate the wider impact of enhancing self-regulated learning, beyond the immediate effect on academic attainment.

There is a need for evidence about how the nature and impact of self-regulation differs across different phases of childhood and how interventions might be tailored for different age groups. For example, the Tools of the Mind programme (see Appendix 1) demonstrates how techniques such as dramatic play can support the development of self-regulation in early childhood (Bodrova and Leong, 2001). It also seems plausible that strategy modelling by teachers will play an important role in developing self-regulation among younger learners, whereas older students may be more able to develop their own self-regulatory strategies (Schunk and Ertmer, 2000).

Finally, self-regulation theory may seem to focus too strongly on the personal, to the exclusion of social processes and interpersonal skills. Thus programmes to enhance self-regulation may need to be supported by interventions that develop interpersonal skills.

# Appendices

## Appendix 1: Summary of self-regulation programmes and approaches

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Brainology | An interactive computer-based version of a 'growth-mindset-workshop' (Dweck, 2007). Students learn about the brain and how it changes with learning. | **Growth-mindset** (belief that intellectual ability can be developed through education and effort)<br><br>**Fixed-mindset** (belief that intellectual ability is a fixed trait) | Concept of a 'growth mindset' overlaps with key ideas in the self-regulatory learning cycle – in particular, 'process goal seeking' (as opposed to outcome goal seeking) and attributing failure to strategy choice or effort, rather than to fixed ability. Research suggests that a growth mindset may enhance the self-motivation beliefs that are key to self-regulation. | Study of face-to-face workshop showed increases in attainment and motivation following 'growth mindset intervention' compared to control group receiving only a study skills intervention. In trial of online version, almost all students reported changes in study habits and motivation. | Carol Dweck and Lisa Sorich Blackwell, Harvard University<br><br>www.brainology.us |

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Learning to Learn (L2L) | Campaign for Learning describes L2L as a 'process of discovery about learning' that seeks to develop pupils' awareness in five key areas:<br>– how they prefer to learn and their learning strengths<br>– how they can motivate themselves and have the self-confidence to succeed<br>– things they should consider, such as the importance of water, nutrition, sleep and a positive environment for learning<br>– some of the specific strategies they can use, for example to improve their memory or make | **5 'Rs'** for lifelong learning (Readiness, Resourcefulness, Resilience, Remembering and Reflection).<br><br>The Campaign for Learning makes strong links between 'learning to learn' and the **personalisation** of learning.<br><br>Strong links to **lifelong learning:** emphasis on preparing children so they continue learning effectively throughout their lives. | Like self-regulation, five areas of awareness in 'learning to learn' encompass motivational, strategic and environmental influences on learning. Self-regulation research could therefore help to interpret the relationships between these different elements of the L2L programme.<br><br>Emphasis on how students prefer to learn and learning strengths less closely related to the self-regulation research and more in common with ideas of learning styles and the personalisation of learning. | Evidence based mainly on feedback from teachers and learners. Pupils involved in L2L report greater motivation to learn and awareness of the learning process. Teachers report a positive impact on pupils' learning and on their own motivation.<br><br>Case studies provide examples of effective practice in individual schools. | Campaign for Learning<br><br>www.campaign-for-learning.org.uk/cfl/learninginschools/l2l |

| | | | | | |
|---|---|---|---|---|---|
| | sense of complex information<br>– some of the habits they should develop, such as reflecting on their learning so as to improve next time.<br><br>L2L project in schools involves action research in primary and secondary schools, plus evaluations of L2L interventions by independent researchers. Phases 1 and 2 (2000–2002) involved 25 schools and Phase 3 (2003–2007) involved 32 schools.<br><br>Phase 4 of the schools project started in 2007 and the L2L in FE project was also launched. | | | | |

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Visible Thinking | Research-based US programme that emphasises the use of thinking routines and documentation to make thinking more visible in classrooms. Aims to develop students' thinking without separate 'thinking skills' lessons. Seeks to cultivate thinking skills and dispositions while also deepening content learning. | **Thinking routines –** 'mini-strategies that extend and deepen students' thinking'<br><br>**Thinking ideals –** understanding, truth, creativity, fairness<br><br>**Dispositional view of thinking –** skills and abilities are not enough. Learners must also notice opportunities for learning and have positive attitudes towards learning. | Visible thinking and self-regulation share an emphasis on the metacognitive – thinking about thinking. | Visible thinking instructional approach implemented in projects involving schools in US, Sweden and Australia. Detailed evidence about how teachers 'establish, use, and adapt thinking routines to make them a part of the culture of the classroom'. Qualitative evidence suggests that using thinking routines changes how students and teachers view and approach thinking and learning. | Project Zero, Harvard Graduate School of Education<br><br>www.pz.harvard.edu/research/VisThink.htm |

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Personal Learning and Thinking Skills (PLTS) | Framework of interconnected skills that are 'essential to success in learning, life and work' (QCA). Will form part of Diploma awards for 14–19 year olds, along with functional skills in English, maths and ICT. | QCA defines PLTS as a framework comprising six groups of skills:<br>– independent enquirers<br>– creative thinkers<br>– team workers<br>– self-managers<br>– reflective learners<br>– effective participators. | Emphasis on **managing** self and own work resonates with self-regulation.<br><br>Skills required to be 'self-managers' and 'reflective learners' overlap significantly with self-regulation. E.g. self-managers are said to 'work towards goals, showing initiative, commitment and perseverance'. Goal-striving is an important component of self-regulation. Reflective learners 'evaluate experiences and learning to inform future progress'. This kind of feedback cycle is a key component of self-regulated learning, as conceptualised by Zimmerman (1989).<br><br>PLTS framework is broader than self-regulation, as it includes a direct focus on social skills (team workers and effective participators). | Case study of PLTS-focused curriculum in secondary school reports improved pupil motivation, attendance and attainment. | Qualifications and Curriculum Authority<br><br>http://curriculum.qca.org.uk/key-stages-3-and-4/skills/plts/index.aspx |

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Social and Emotional Aspects of Learning (SEAL) | UK-based national programme promoting a whole-school approach to positive behaviour, attendance, learning, wellbeing and employability. | Five key components:<br>– self-awareness<br>– managing feelings<br>– motivation<br>– empathy<br>– social skills.<br><br>SEAL positioned as part of Behaviour and Attendance programme. | Self-awareness, managing feelings and motivation overlap with key aspects of self-regulation.<br><br>Emphasis on social skills and empathy gives SEAL a broader remit than self-regulation research.<br><br>Behaviour and attendance have not formed prominent part of self-regulation research agenda. | Case study evidence. E.g. schools using secondary SEAL resources reported positive effects, including greater staff awareness of their own emotional skills and behaviour in the classroom and reduction in use of sanctions.<br><br>No quantitative evidence of impact on behaviour and attendance identified. | DCSF<br><br>Primary: http://nationalstrategies.standards.dcsf.gov.uk/primary/behaviourattendanceandseal/primaryseal<br><br>Secondary: http://nationalstrategies.standards.dcsf.gov.uk/secondary/behaviourattendanceandseal/secondaryseal |

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Tools of the Mind | US research-based programme promoting intentional and self-regulated learning in early childhood. Emphasis on embedding self-regulation in all classroom activity. Involves development of play skills through drama and games with rules. Programme being implemented in Head Start programmes, schools and childcare centres in seven American states. | Based on Vygotskian approach – idea that children's behaviour is controlled by the environment until they learn to use mental tools. | Designed to promote self-regulated learning in early years. | Randomised control trial found children in Tools of the Mind had higher rates of self-regulation compared to children in other high-quality early years care. Teachers trained in Tools of the Mind scored higher in classroom management measures and productive use of classroom time, and had a higher rate of appropriate and cognitively challenging interactions.<br><br>Studies have also found significant gains in literacy skills among children undertaking the Tools of the Mind programme compared to a control group. | Elena Bodrova and Deborah Leong, Metropolitan State College of Denver<br><br>www.mscd.edu/extendedcampus/toolsofthemind |

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Deep Learning | Part of a model for the personalisation of learning developed by the Specialist Schools and Academies Trust, Deep Learning comprises three 'gateways to learning':<br>– assessment for learning<br>– student voice<br>– learning to learn.<br><br>Idea of 'deep learning' originated in research by Noel Entwistle in the 1980s, distinguishing between deep learning and surface learning (e.g. Entwistle, 1981). | Deep Learning is positioned as one of four areas in an approach to personalising learning. | 'Learning to learn' gateway is closely related to self-regulation.<br><br>Deep Learning more explicitly linked to personalisation agenda than most self-regulation research. | Teachers' and school leaders' accounts of how they have sought to implement the ideas of Deep Learning. | Specialist Schools and Academies Trust<br><br>David Hargreaves<br><br>www.ssat-inet.net/whatwedo/personalisinglearning/personalisinglearningdeeps.aspx |

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Values Schools | Programme started in an Oxfordshire school and has been replicated in several other primary schools. Aim is 'to help children control their emotions by familiarity with uplifting ideas and role models, and the practice of silent reflection' (Layard, 2007). Each month the school adopts a 'key value word', to which teaching and discussion are connected. Children practise silent reflection during whole-school assembly and at the beginning of most classes. | Key value words<br><br>Silent reflection | Both Values Schools and self-regulation research highlight the importance of emotional regulation.<br><br>Values Schools programme focuses more directly on the teaching and promotion of happiness.<br><br>Values Schools programme does not reflect aspect of self-regulation research that focuses on learning strategies. | Informal evaluation suggests improved mood, conduct and academic performance (Layard, 2007). | Richard Layard<br><br>http://cep.lse.ac.uk/centrepiece/v12i1/layard.pdf |

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Penn Resiliency Programme (PRP) | US-based structured educational intervention designed to promote emotional wellbeing in schools. Group sessions include learning about assertiveness, negotiation, decision-making, social problem-solving and relaxation. For example, learners are given scripts to practise responding assertively to different situations. PRP is designed to teach learners how to change their thought processes and behaviours, e.g. to challenge negative beliefs by considering alternative interpretations. | Based on ideas of positive psychology.<br><br>**Adversity-Consequences-Beliefs (ABC) model –** idea that our beliefs about events mediate their impact on our emotions and behaviour. | PRP and self-regulation both emphasise learners' control over their thought processes and behaviours.<br><br>PRP and self-regulation research have different roots – PRP is partly based on theories of depression. | Evaluated in 11 studies in three countries. In majority of schools, programme reduces depression by average of a half and bad behaviour by a third over the next three years. Key findings include the importance of systematic and in-depth training for teachers. | Positive Psychology Center, Pennsylvania University<br><br>www.ppc.sas.upenn.edu/prpsum.htm |

| Programme/ policy initiative | Summary | Key concepts | Link to self-regulation | Evidence | Key individuals/ organisations |
|---|---|---|---|---|---|
| Self-Regulation Empowerment Programme (SREP) | US-based training programme for middle school students that seeks to cultivate positive self-motivational beliefs, increase knowledge base of learning strategies, and help them to apply strategies to academic tasks (Cleary and Zimmerman, 2004). Two components to programmes: diagnostic assessment; and developing the self-regulated learner. Training is provided by a 'self-regulated learning coach.' | Self-motivational beliefs<br><br>Learning strategies<br><br>Self-regulated learning coach | Application of Zimmerman's theory of self-regulation as a cyclical feedback loop.<br><br>Programme focuses on both motivation and learning strategies – reflects emphasis within self-regulation research on relationship between motivation and learning strategy use. | Case study evidence from pilot programme illustrating different steps involved in implementing SREP. | Timothy Cleary and Barry Zimmerman, City University of New York<br><br>www3.interscience.wiley.com/journal/107641959/abstract |

## Appendix 2: Summary of non-cognitive terms and concepts

| Author | Umbrella term for 'non-cognitive skills' | Skills defined within umbrella term |
|---|---|---|
| Blair (2002) | Executive function/executive cognition<br><br>[Note: in psychology, executive function is a cognitive construct] | Working memory<br>Attention<br>Inhibitory control |
| Blanden *et al.* (2006) | Non-cognitive skills/traits/characteristics<br>Soft skills<br>Non-cognitive personality traits | |
| Bowles and Gintis (2002) | Non-cognitive skills | Attitude<br>Communication skills<br>Motivation<br>Personality |
| Bowles, Gintis and Osborne (2001) | Behavioural traits | Aspects of behaviour that produce non-productive skills |
| Carneiro *et al.* (2007) | Social/non-cognitive skills | |
| Côté (2005) | Psychosocial skills<br>Social skills and psychological attributes | Locus of control<br>Self-esteem<br>Sense of purpose |
| Cunha *et al.* (2005) | Non-cognitive traits, abilities and skills | Motivation<br>Patience<br>Temperament<br>Time preference<br>Perseverance<br>Judgement<br>Self-control |
| DfES (2005) | Social and emotional aspects of learning | Self-awareness<br>Managing feelings<br>Motivation<br>Empathy<br>Social skills |
| Duckworth and Seligman (2005) | Intellectual and non-intellectual strengths | Self-discipline |
| Duncan *et al.* (2007) | Attention and attention-related skills<br>Socio-emotional skills/behaviours | Task persistence<br>Self-regulation<br>Internalising and externalising problems (e.g. aggression and cheerful temperament)<br>Social skills |
| Farkas (2003) | Non-cognitive behaviours and traits | [Undefined] |
| Feinstein (2000) | Psychological attributes<br>Behavioural attributes | Self-esteem<br>Locus of control<br>Conduct disorder<br>Anti-social behaviour<br>Peer relations<br>Attentiveness<br>Extraversion |
| Gardner (cited in Goleman, 1995) | Interpersonal intelligence<br><br><br>Intrapersonal intelligence | Teamwork<br>Understanding other people<br><br>Understanding of self and using that knowledge to be effective in life |

| Author | Umbrella term for 'non-cognitive skills' | Skills defined within umbrella tern |
|---|---|---|
| Goleman (1995) | Emotional intelligence<br><br><br><br>Essential human competencies | Zeal<br>Self-control<br>Persistence<br><br>Self-awareness<br>Self-control<br>Empathy |
| Green (2002) | Non-cognitive skills | Persistence<br>Ability to communicate effectively |
| Heckman and Rubinstein (2001) | Non-cognitive skills | Motivation<br>Perseverance<br>Trustworthiness<br>Adaptability<br>Task persistence<br>Thinking ahead<br>Self-discipline |
| Holzer *et al.* (2001) | Soft skills | Absenteeism<br>Attitude toward work<br>Relations with others |
| Hughes (2002) | Executive function | Planning<br>Inhibitory control<br>Attentional flexibility<br>Working memory |
| Mulgan (2005) | Interpersonal, intrapersonal, social skills, emotional intelligence | |
| Postlewaite and Silverman (2006) | Non-cognitive/social skills | The skills valued by employers or clients that do not involve technical or professional knowledge |
| Rauber (2007) | Non-cognitive skills | Motivation<br>Self-regulation<br>Social skills |
| Rimm-Kaufman and Pianta (2000) | Social competency<br>Academic, social and emotional skills | Interaction with peers<br>Undefined, but researched children's ability to:<br>– follow directions<br>– work as a group<br>– get on with other children<br>– work independently<br>– communicate |
| Sedlacek (2004) | Non-cognitive measures | Positive self-concept<br>Realistic self-appraisal<br>Understands and deals with racism<br>Prefers long-range goals<br>Successful leadership experience<br>Community involvement<br>Non-traditional knowledge acquired |
| Tavares (2007) | Non-cognitive skills | 'All the skills that are not measured by IQ or test scores'<br>Attitude towards learning |
| Temple *et al.* (2006) | Non-cognitive skills: social and emotional and attitudinal aspects of learning and development | School commitment<br>Achievement motivation<br>Expectations for educational attainment<br>Classroom social adjustment<br>Problem behaviours in schools and official juvenile arrest |

| Author | Umbrella term for 'non-cognitive skills' | Skills defined within umbrella tern |
|---|---|---|
| Weare and Gray (2003) | Emotional and social wellbeing and competence | |
| Wilson (2006) | Non-cognitive skills | 'Anything that is not measured IQ'<br>Personal<br>Interpersonal<br>Attitudes/personal psychology |

## Appendix 3: Non-cognitive skills: a critical review

### Introduction

We had originally intended to develop a typology of 'non-cognitive' skills, with a view to illuminating how these skills support learning and attainment. However, our review of literature suggested that a category of non-cognitive skills, however typologised, was unlikely to prove useful for informing education policy. In this appendix we illustrate the diversity of conceptions of the 'non-cognitive' across the social sciences, and provide a number of reasons why this category is not helpful as the name of a discrete class of skills. (In Appendix 2 we provide a brief summary of commonly used non-cognitive terms and concepts).

### Disciplinary interpretations

The social scientific literature reveals a plurality of conceptions of non-cognitive skills. We cannot attempt a comprehensive review, but even a cursory inspection shows up a concept whose interpretations are sufficiently broad and various as to render it unserviceable for informing policy.

#### *Economics*

The growing interest in 'non-cognitive' skills is partly accounted for by the work of a number of prominent economists, who have examined the impact on labour market outcomes of individual traits such as perseverance, trustworthiness, tenacity and motivation. Prior to Heckman and Rubinstein (2001), these traits were largely neglected in the economic literature, but there is now widespread recognition of their influence on labour market outcomes and life chances more generally. Green (2001) observes: 'a growing group of economists is beginning to pay attention to the work of sociologists and psychologists on the importance of non-cognitive skills such as persistence, ability to communicate effectively, etc'.

At the same time, economists typically leave the concept 'non-cognitive' undefined and its boundaries unclear. As a notable example, Heckman and Rubinstein (2001) do not offer a definition in their paper on the importance of non-cognitive skills in the context of the US General Education Diploma (GED) testing programme. It has therefore to be inferred from the preface and a discussion of what is not assessed by the GED test – a test designed exclusively for cognitive skills. Their discussion mentions attributes such as motivation, perseverance, trustworthiness, adaptability, task persistence, thinking ahead and self-discipline. In a later, related paper Heckman draws attention to motivation, perseverance and tenacity, suggesting that this is what he has in mind as examples of non-cognitive skills (Heckman, 2006).

In their account of the impact of early cognitive and non-cognitive skills on later outcomes, Carneiro *et al.* (2007) treat the notions of 'social' and 'non-cognitive' skills as interchangeable, but they nowhere offer a definition of either. Similarly, Blanden *et al.* (2006) refer without distinction to non-cognitive 'skills', 'traits' and 'characteristics', 'soft skills' and 'non-cognitive personality traits'.

Where 'non-cognitive skills' **are** defined, economists differ between themselves. Postlewaite and Silverman (2006) suggest that in the main, economic literature identifies 'non-cognitive skills with productive factors not captured by standardized tests or observable measures of human capital'. Green (2002), on the other hand, names three 'skill inputs' for the workforce: literacy, non-cognitive and technical skills, while Holzer *et al.* (2001) use the term 'hard skills' to encompass two of these categories – cognitive and job-related skills – contrasting these with the 'soft' skills of absenteeism, attitude to work and relations with others. Bowles *et al*. (2001) refer to 'behavioural traits' as 'those aspects of the individual that are not productive skills', providing an example of what Cunha *et al.* (2005) object to in their critique of economists' treatment of non-cognitive skills – particularly those who simply label them as 'soft skills' and who fail to see their relevance to labour or education outcomes.

In addition to the number of competing definitions, Heckman (2006) has suggested that there is no reliable **measure** of non-cognitive skill. Economists have tended to make do with rough approximations. Carneiro *et al*. (2007), for example, use the Bristol Social Adjustment Guide as a measurement instrument, using 'teacher reports from when the child is age 10, of application, extroversion, clumsiness, hyper-activity and anxiety, and mother reports, at age 5, to form the anti-social and neurotic scales. Questions addressed to the children give locus of control and self-esteem measures at age 10 and an anxiety measure at age 16.' Application[7] and locus of control[8] were found to have the strongest association with parental income, but both these attributes include a combination of cognitive and non-cognitive components.

***Other social sciences***

A general tendency among economists is to define non-cognitive skills by what they are not. This approach resembles the equally unsatisfactory attempts sometimes found in educational and psychological literature, in which these skills are often defined as those that are not measured by IQ, or that cannot be measured by some other test (Wilson, 2006; Tavares, 2007). Noting that the term 'non-cognitive skill' was coined by economists, Rauber (2007) suggests that there is no general definition in psychology, although he points out that there is a considerable overlap with the psychological concepts of motivation and self-regulation.

[7] The ability to apply oneself to a task.
[8] A measure of how far we believe what happens in our lives is down to us.

There is a second notable tendency among economists: to use 'non-cognitive skills' as the name for a category of outcomes not captured by standard human capital models. This usage does not travel well from economics to psychology in particular, and the concept of executive function provides a clear illustration of this. Executive function is a construct 'that unites working memory, attention, and inhibitory control for the purposes of planning and executing goal-directed activity … the construct combines basic cognitive processes within a goal-directed executive that marshals resources towards a desired state' (Blair, 2002). Executive function is clearly understood by psychologists to involve cognitive processes, but it draws together a number of traits that economists and others would place in the 'non-cognitive' category; inhibitory control, for example, which like many of the other attributes mentioned above, combines both cognitive and non-cognitive components. The general point is that the economists' account of the non-cognitive is not well fitted to handle concepts central to the psychological literature on educational development, for these cannot be adequately accounted for without recognising both cognitive and non-cognitive elements, and the interactions between them. Any suggestion, for example, that inhibitory control is an exclusively non-cognitive capacity would amount to a basic misrepresentation of the psychological and physiological facts.

Psychologists identify disparate individual features with significant roles in learning, none of which belong exclusively to the cognitive or non-cognitive categories. These include attention and self-regulation (Howse *et al*., 2003; Posner and Rothbart, 2000; Raver *et al*., 2005), self-discipline, perseverance and motivation (Duckworth *et al*., 2007; Duckworth and Seligman, 2005), internalising and externalising problem behaviours (Duncan *et al*., 2007), and personality traits (Tavares, 2007). And as we have seen, a considerable body of psychological research points to the importance of executive function as the set of processes that underlie flexible goal-directed behaviour, such as planning, inhibitory control, attentional flexibility and working memory (Blair, 2002; Blair and Razza, 2007; Hughes, 2002). Analysis of executive function illustrates the difficulty inherent in any straightforward distinction between the cognitive and non-cognitive, since many of the capacities referred to involve both.

Sociologists draw attention to the role of attitudes, communication, motivation and personality in accounting for educational progress and employability. Schools are described as contributing to young people's future success in the workplace not only through encouraging intellectual development, but also by acting as a forum for socialisation and the development of non-cognitive skills (Bowles and Gintis, 2002).

In their 1976 text *Schooling in Capitalist America*, and subsequently in 2002, Bowles and Gintis present their hypothesis that the contribution of schools to future success in the workplace is not only through the learning of cognitive skills, but also by providing an environment in which young people become socialised and develop a wide range of non-cognitive traits. They observed that attitudes, communication skills, motivation and personality were all rated as highly important when hiring employees – well above ratings for technical skills, test scores or years of schooling. Schools are not said to teach these other skills, but to foster a hierarchical

environment akin to the workplace in which non-cognitive skills are developed. Farkas has also explored the role of wider skills in the development of social stratification, emphasising 'patterns of habitual behaviour, particularly the extent of conscientiousness or good work habits' (Farkas, 2003).

In both sociology and economics there are writers who see a relationship between the non-cognitive and social and other forms of capital. As we have seen, Postlewaite and Silverman (2006) identify non-cognitive skills with productive factors not captured by observable measures of human capital. Becker and Tomes (1986) on the other hand regard human capital as a combination of the cognitive and non-cognitive. Côté (2005) uses the concept of identity capital to 'represent attributes associated with sets of psychosocial skills, largely cognitive in nature, that appear to be necessary for people to intelligently strategise and make decisions affecting their life courses (i.e. to individualise)'. Although he describes these attributes as 'largely cognitive', Côté mentions self-esteem and a sense of purpose in life – attributes which include such non-cognitive elements as feelings of self-worth and a desire for a fulfilling life.

The literature on health tends not to make use of the 'non-cognitive' category, opting instead for such terms as 'mental health' or '(mental) health and wellbeing' to refer to emotional aspects of non-cognitive skills. For example, the World Health Organization (WHO) describes mental health as: '... a state of wellbeing in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community' (WHO, 2001). Likewise in the field of education Weare and Gray (2003), in their literature review for the DfES on the terminology used to capture these concepts, conclude that 'emotional and social competence' and 'emotional and social wellbeing' were most appropriate, being 'straightforward' and 'non-specialist'. The DCSF's SEAL programme uses the same terminology to encompass a broad range of social and emotional attributes.

A primary interest of educationists is the development of children's and young people's social, emotional and behavioural skills. Considerable attention has been paid to 'problem behaviours', their association with poor attainment and educational outcomes, and the difficulties they create for learning and teaching (MacBeath *et al*., 2004). Aggression and other forms of externalising and antisocial behaviours show consistent negative associations with academic achievement (Williams and McGee, 1994), with peer rejection a notable risk factor for underachievement (Ollendick *et al*., 1992). Relationships have also been identified between academic difficulties and features of internalising problem behaviours, such as high levels of anxiety, depression and negativism (Puig-Antich *et al*., 1993). Conversely, a strong sense of belonging and positive network support is associated with greater achievement, higher motivation and educational aspirations (Cotterell, 1992; Goodenow, 1993).

Initiatives designed to enhance children's social, emotional and behavioural skills have shown some success (Hallam *et al*., 2006). The focus of these programmes varies, and includes: mental health promotion (Wells *et al*., 2003); improving

affective and behavioural aspects of development; concern for and understanding of others through the establishment of a caring classroom environment (Battistich *et al*., 1989); and promoting community participation (Haynes and Comer, 1990). Specific curricula have been designed to teach children about managing their emotions, self-awareness, taking responsibility, the development of empathy and co-operation, conflict resolution and negotiating compromise[9] (Greenberg *et al*., 1995; Kelly *et al*., 2004; Weare, 2004). Each of these social, emotional and behavioural attributes has been regarded by one writer or another as belonging to the non-cognitive category.

[9] Research reviews, however, highlight the challenges involved in robustly evaluating these programmes and the scarcity of rigorous impact assessments.

## ‘Non-cognitive skill’: a resource for policy?

### *An overloaded category*

There is no doubt that many of the skills, attitudes and behaviours identified as falling under the ‘non-cognitive’ category are highly significant for the achievement and wellbeing of individuals and communities, and, as such, they deserve the attention of academics and policymakers. In almost all cases, however, it is questionable whether these features are best thought of as exclusively non-cognitive. That is not a question we seek to settle here. But there is a separate question: whether the term ‘non-cognitive skill’ should serve as an **organising principle**, or as the name for a **discrete category of skills**? In what follows we give our reasons for rejecting this suggestion.

### *Inconsistent definitions*

It is evident that the term ‘non-cognitive skill’ is subject to endless interpretation and there is currently no clear, shared understanding among social scientists of either its meaning or the terrain it is used to demarcate. Usage varies between and within disciplines, and varies also according to the context – early years, compulsory schooling, labour market and so on.

Postlewaite and Silverman (2006) are interested in non-cognitive skills as a by-product of social participation, describing these as ‘individual characteristics like persistence, leadership, and sociability’. But in the context of the value of non-cognitive measures in the university admissions process, Sedlacek (2004) includes as variables: positive self-concept, realistic self-appraisal, understanding and dealing with racism, preferring long-range goals, availability of strong support person, successful leadership experience, community involvement and non-traditional knowledge acquired. Temple *et al.* (2006) discuss the contribution of cognitive and non-cognitive skills to pre-school education, educational attainment and crime prevention. Non-cognitive skills are represented by measures of social adjustment, motivation, educational expectations, problem behaviour, and juvenile arrest; non-cognitive skills are defined as ‘social and emotional and attitudinal aspects of learning and development’, including school commitment, achievement motivation, expectations for educational attainment, classroom social adjustment, problem behaviours in schools and official juvenile arrest.

It is rightly said that ‘many different personality and motivational traits are lumped into the category of non-cognitive skills’ (Heckman and Rubenstein, 2001) – too many, we suggest, for the category as currently understood to be regarded as a worthwhile resource for policy.

### *Cognitive and non-cognitive: not mutually exclusive categories*

Many of the areas taken to fall within the category of the non-cognitive – for example, relationships, managing emotions, and showing respect for others – are clearly cases

in which learners and teachers are working with a complex combination of cognitive and non-cognitive attributes. Emotions will serve as an example. Emotions are often taken as an example of an **affective** state, involving an experience of joy, sorrow, anger and so on, and this is distinguished from **cognitive** and **volitional** states. But emotions are not only affective or non-cognitive states: they always – or very often – involve a cognitive component. Emotions are not simply feelings, but feelings we have **towards** an object, whether a thing or a person, a state of affairs, or an action or event. When you fear your classmate, the object of your fear is a person who has certain properties (a tendency to bully, perhaps); that will explain why you fear him. When you are angry about how your school is treating you, the object is a state of affairs. Your feelings are then bound up with your perceptions and judgements about classmates and schools, and perceptions and judgements involve cognition.

The idea of a 'non-cognitive skill' has been used to describe such characteristics as attention and motivation, but each of these involves cognitive processes (Winne and Marx, 1989). Borkowski and Thorpe (1994) give evidence in a teaching and learning context of the interrelationship between cognitive and non-cognitive domains. They identify the importance of a belief in both an incremental view of ability and the need for applied effort, intrinsic motivation, low anxiety, and positive academic-focused self-concept, for preventing underachievement. In their work with learning disabled and low-achieving children, these authors showed that the teaching of learning strategies, alongside an understanding that effort and a sense of personal control can produce successful performance, is more effective than strategy instruction alone (Carr and Borkowski, 1989; Carr, Borkowski and Maxwell, 1991).

Emotions and cognitive processes are closely related, and it is frequently in combination that they influence achievement, engagement and attainment. For example, perceived self-efficacy feeds into cognitive processing, motivation, and how we manage our emotions (Kickbush, 1990; Whitty *et al*., 1998). And all else being equal, individuals who attribute success to ability and effort can expect to improve on past performance, while individuals who attribute poor performance to lack of ability are more likely to lower expectations and come to expect that they are unable to exert much influence on how their life develops.

Some writers acknowledge that the category 'non-cognitive' essentially mis-describes the terrain they are interested in, while also maintaining that it remains useful as a 'catch-all' category. Farkas (2003) writes that examples of non-cognitive traits include 'agreeableness, extroversion, work orientations, emotionality, and helpfulness'. But at least some of these traits incorporate cognitive elements. 'Agreeableness' and 'helpfulness' are both dispositions which require knowledge of how to behave in appropriate ways, and of the circumstances in which such behaviour is called for.

We have seen that non-cognitive skills are often treated, either implicitly or explicitly, as those traits or capabilities that are not widely regarded as cognitive; or, alternatively, as those abilities that are not measured by standardised tests for

cognitive skills. Tavares (2007), for example, refers to non-cognitive skills as those skills not measured by IQ or test scores. We have indicated why this is not satisfactory from a theoretical point of view. But it also leads to questionable research strategy, as Farkas points out in his comment on attempts to estimate the extent to which the impact of years of schooling on earnings is due to non-cognitive skills: 'estimating the effect of non-cognitive behaviours by subtracting the effect of test-score-measured cognitive skill from the total effect of education attributes the effects of all unmeasured educational factors to non-cognitive behaviours, which likely overestimates their effect' (Farkas, 2003). One reason for the likely overestimation is already familiar: many attributes that fall outside the ambit of cognitive tests also involve elements that are (partly) cognitive. Maintaining working memory, paying attention and thinking ahead, organising thought and action, inhibiting inappropriate behaviour – these are not separate from, or peripheral to, cognitive performance in the classroom but are, on the contrary, an indispensible part of it.

A view of cognitive and non-cognitive skills as mutually exclusive is not only unhelpful at the conceptual and theoretical level, but will also generate difficulties at the level of policy and practice. Weare and Gray (2003), reporting on research with local education authorities, found that many 'perceived a tension between the priority given to the agenda to raise standards and work to develop emotion and social competence, as the latter is not seen as having a direct contribution to standards'. It should be clear by now that any strategy aimed at raising standards that also neglects emotional and social attributes is likely to fare poorly. And not only because neglect of emotional and social wellbeing is likely to have a negative effect on educational attainment, but also because attainment is itself a product of cognitive and non-cognitive elements that are functioning in combination.

***Are there non-cognitive skills?***

The category 'non-cognitive skill' suggests that what we are categorising is a set of skills. But many supposed examples of non-cognitive skills said to support learning are either not skills or are not only skills. Tavares (2007) describes an attitude towards learning as a 'non-cognitive skill'. But an attitude is not a skill. And, to take another example, whatever else it is, concentration is also a **capacity** – of which we have more or less – and it is something we have the **ability** to exercise with varying degrees of success. Concentration also involves volition – a willingness to pay close attention.

Self-esteem is frequently mentioned as a non-cognitive skill, but self-esteem, which is an 'evaluative attitude towards the self' (Rosenberg, 1965) is not itself a skill, even if it requires a skilled teacher to create the right environment for self-esteem to grow. It is also an important question how far 'self-esteem is primarily an affective concept, and as such a matter of feeling and emotion, and how far a cognitive concept, and as such a matter of thought and judgement' (Emler, 2001). Plausibly it comprises both elements, and the important questions are exactly what each of the cognitive and non-cognitive elements comprise, and how we should represent the balance between the

two. Nothing is gained by a conceptual device that suggests that a characteristic such as self-esteem is either one or the other, let alone that it is best described as a skill.

The term ‘skill’ implies an aptitude that can be cultivated and practised, whereas traits and intelligences tend to suggest capacities that are, at least partially, ‘innate and fixed, not teachable’ (Weare and Gray, 2003). This is controversial territory. It is open to debate how far these skills lend themselves to learning and teaching; certainly, we cannot assume that everything that falls within the category of the ‘non-cognitive’ will serve as the subject of a teaching intervention.

## Concluding remarks

The concept of non-cognitive skills may have served a purpose in economics, encouraging academics to broaden their investigation into the individual traits and abilities that affect educational attainment and life chances. However, it frequently goes without a definition of any kind, or it remains subject to loose and disparate accounts, encompassing interpersonal and personal skills, behaviours, feelings and thoughts. There is in any case a widely held view that the very idea of a 'non-cognitive skill' is itself misconceived, owing to the intimate relationship between cognitive and non-cognitive functioning, an idea which has received some support in these pages. In seeking to apply the category of non-cognitive skill more broadly within the social sciences, and to use it as a basis for informing policy, we only inherit and magnify its weaknesses as a conceptual category and organising principle.

Recent policy literature cites research suggesting that 'emotional and social processes are fundamentally inseparable from cognitive processes' (DfES, 2005). Whether or not they are fundamentally inseparable, the relations are sufficiently close and complex to block any suggestion that we should treat them as mutually exclusive, certainly in the context of explaining and supporting learning. Rather than continuing to work on understanding a category of skill that we could not see sufficient merit in, we chose instead to devote our attention to exploring a set of attributes that have been central in discussions about non-cognitive skills, and which are focused on the capacity for self-regulation.

## Appendix 4: Expert advisory panel

We would like to thank the following for agreeing to be part of our expert panel, and for their useful comments and helpful advice:

Jenny Ballantyne (DCSF)
Chris Bonnell (London School of Hygiene and Tropical Medicine)
Pedro Carneiro (Department of Economics, University College London)
Ruth Cigman (Institute of Education)
John Doherty (DIUS)
Moira Faul (Oxfam)
Leon Feinstein (HM Treasury)
John Field (University of Stirling)
Usha Goswami (Faculty of Education, University of Cambridge)
Paul Gregg (Department of Economics, University of Bristol)
Sue Hallam (Institute of Education)
Felicia Huppert (Department of Psychiatry, University of Cambridge)
Tricia Jessiman (National Youth Agency)
Ella Joseph (DCSF)
Liz Lawson (DIUS)
Julia Margo (Institute for Public Policy Research)
Barbara Maughan (Institute of Psychiatry, King's College London)
Mary McLeod (Family and Parenting Institute)
Sophia Parker (Demos)
Carlo Raffo (School of Education, University of Manchester)
Andrew Ray (DCSF)
Jodie Reed (DCSF)
Marcus Richards (Medical Research Council Unit for Lifelong Health and Ageing, University College London)
Ingrid Schoon (Institute of Education)
Colin Seal (DCSF)
Jonathan Sharples (Institute for the Future of the Mind, University of Oxford)
Anna Vignoles (Institute of Education)
Lorraine Watson (DCSF)
John White (Institute of Education)
Richard White (DCSF)
Sophie Wood (National Children's Bureau)

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Centre for Research on the Wider Benefits of Learning
Research Report No.33

# Self-regulated learning: a literature review

**Kathryn Duckworth, Rodie Akerman, Alice MacGregor, Emma Salter and John Vorhaus**

This review explores the concept of self-regulation – which includes the ability to concentrate, become involved in group activities, restrain disruptive and impulsive behaviour, and work autonomously – and its impact on learning and attainment. It also considers the recent high levels of interest in self-regulation, and provides a policy and educational context. The focus is on children aged 5-16.

There is a growing level of policy interest in self-regulation and its impact on learning and attainment. From the early years, throughout the school system and in out-of-school activities, those who work with children and young people are expected to help them develop self-regulation skills, with the aim of enabling them to enjoy their childhood, fulfil their potential, achieve well and become employable adults. The 'social and emotional' or 'personal, learning and thinking' skills, cited increasingly in policy literature, include a clear focus on self-regulation.

The literature shows that self-regulation skills have important benefits for the learning and attainment of children and young people: there is a positive overall relationship between self-regulation and academic achievement, and self-regulation has also been shown to explain achievement in spite of circumstances that often lead to failure. Although the size of the effect of self-regulation is small compared with that associated with prior attainment, it exists independently of prior attainment. The literature also shows that these skills can be developed with appropriate teaching and support: aspects of self-regulation such as attention, persistence, flexibility, motivation and confidence can all be improved as a result of effective teaching and learning practices.

Substantial evidence gaps mean we know little about how the benefits of self-regulation develop over time or about how they vary according to an individual's background characteristics. Those few studies which do consider this indicate that the potential benefits of, and innate capacity for, self-regulation do not vary systematically with socio-economic background, ethnicity or gender. However, additional stresses associated with low income such as residential instability, psychological distress among adults and low quality childcare settings may hamper the development of self-regulation skills.

One of the major benefits of self-regulation as a framework for learning is that it connects programmes that are focused on learning strategies and thinking skills with the wider well-being agenda in schools. The evidence favours a combined approach to curriculum planning: thinking strategies, together with strategies for promoting self-efficacy and self-esteem, are often best developed as part of a wider teaching and learning programme, as opposed to being taught separately and pursued as ends in themselves. While students are taught strategies for better learning, they also need support in developing the belief that they can learn more effectively.

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ISBN 978-0-9559488-4-8

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