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SELF-REGULATION AND LEARNING DISABILITIES

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ABSTRACT
This paper focuses on the thinking and action that effective learners apply to their own learning, that is, the cognitive actions of autonomous learners who are aware of their own thinking and can regulate it within the complicated processes of learning. In particular, it concerns self-regulation of learning, its components of metacognition, motivation, self-efficacy and attribution, and how these concepts interrelate to underpin effective academic learning and performance. The implications drawn from the literature surveyed suggest that addressing students' academic learning difficulties is best accomplished by combining explicit instruction in metacognitive self-awareness with academic skills and strategies. A case study example is used throughout this paper to illustrate methods of assessing and intervening with students who are experiencing learning disabilities.

INTRODUCTION

This paper focuses on the thinking that effective learners do about their own learning. It explores the cognitive actions of autonomous learners who are aware of their own thinking and can regulate it within the complicated processes of learning. It particularly concerns metacognition and self-regulation of learning and how these concepts interrelate to underpin effective academic performance. When learners are active, autonomous and self-regulated they have the motivation to learn and the will to focus on learning goals and to withstand distractions in order to attain their goals. Such learners show initiative and independence as they maintain motivation and effort towards attaining success in school. They use appropriate attributional self-statements to explain their successes or setbacks and thus build a sense of self-efficacy that fuels their strategic approach to learning. Throughout this paper, the argument is made that an effective way of addressing students' academic learning difficulties is through combining explicit instruction in metacognitive self-awareness, which underpins self-regulation, with strategies in reading, writing, mathematics, and spelling.

CHARACTERISTICS OF THE WHOLE LEARNER

All educators aim to facilitate the development of learners who have clear understandings of the processes of learning and who can manage these complex processes independently. Self-regulation and metacognition are not

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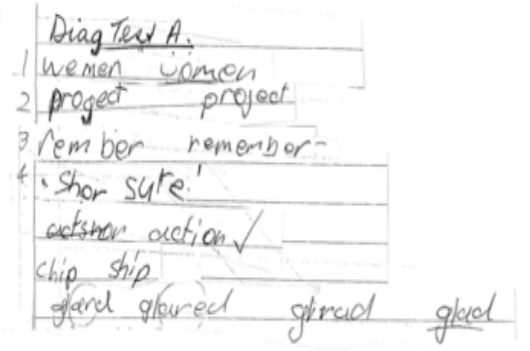
isolated cognitive processes; they interact dynamically with other factors related to individuals' functioning (Sternberg, 1998). Because learners are not just cognitive beings, it is important to consider how their social and emotional dimensions affect their cognitive functioning and their learning. For example, discussion of the case of a fifteen year-old student (who we will refer to as 'Alex') throughout this paper is a way of focusing on methods of assessing and intervening for students experiencing learning difficulties. Alex recently stated to one of the authors that he didn't see the point in trying to learn spelling as he had been failing at it for many years. He did not want to try any more. Alex no longer believed that he could learn to spell and said, "I can't spell and I can't do languages at school." Alex has developed these beliefs about himself based on his school experiences and early high school exposure to French and Indonesian language lessons, both of which he found difficult to engage with and master. His belief has been compounded by the difficulties he encountered learning to spell in English. Alex has made sense of his spelling difficulties by attributing them to his inability to learn languages. He has come to believe this is an innate, immutable factor in his makeup.

The assessment of Alex's skills and exploration of his learning through dynamic assessment (DA) procedures (Haywood & Lidz, 2007) that teach as well as test, however, demonstrated that he had the ability to develop the skills for spelling and writing that are currently causing him difficulties at school (see Figure 1 which shows part of the dynamic assessment of Alex's spelling). The DA session provided a learning environment within which Alex's self-regulation could be studied while it was being generated (Boekaerts & Corno, 2005). This investigation of Alex's performance

A dynamic assessment session was carried out using the Westwood Diagnostic Spelling Tests A and B. In this session, ways that Alex can successfully spell the types of words in the Westwood (2005) lists were explored.



Alex demonstrated that he uses both sound and visual information in his spelling. The use of visual checking is a skill that can be further developed to ensure all syllables are present when he has written a word. Strategies that assisted Alex in reviewing his attempts and correcting his words included hearing the word again once it was written to match the sounds to the written word and considering whether there is another way to write a particular sound. With regard to less regular words, Alex was able to demonstrate his knowledge of some words that cannot be learnt using sound and letter associations, e.g. 'action'. Knowing these 'sight words' is necessary to spell many common words. During the dynamic assessment session, a sound chart presenting the more complex letter groupings was available for Alex to consult if necessary.

Figure 1 Notes on the dynamic assessment of Alex's spelling skills

followed on from an assessment of his cognitive processing skills that determined there was no obvious cognitive reason for his learning difficulties. Alex was achieving better than age appropriate results in reading, yet his spelling score on the Wide Range Achievement test placed him at a Year 3 level.

Many students, like Alex, who experience learning difficulties have specific cognitive weaknesses that hinder their learning. The challenge for these students is to become aware of the way they think and learn and to gradually develop ways to manage their cognitive processes. That is, to be increasingly metacognitive and self-regulating. However, it is common for these students to lack such metacognitive self-awareness (Klassen & Lynch, 2007). Instead, such students tend to be confused as to how they can learn some parts of the school curriculum easily, but have significant difficulty with other areas. A developmental task for such students is to better understand their own learning profiles, so that they can apply self-regulation strategies effectively across domains.

The task of an educator in providing learning assistance for a student like Alex is to target his cognitive skills as well as work on his motivation and instil some sense of self-belief through authentic success. All three of these areas, cognitive skills, motivation and self-efficacy, need to be addressed for Alex to begin to learn effectively and set attainable educational goals for himself. This brief case study example emphasises the need to look at the whole student when considering what is involved in fostering self-regulation of learning. Simply put, facilitating self-regulation does not consist of simply teaching the student a series of cognitive strategies. Affective and metacognitive dimensions of learning must also be considered. The following section provides brief descriptions of the main dimensions of functioning which combine to result in self-regulated learning.

COMPONENTS OF SELF-REGULATED LEARNING

The development of self-regulated learners is a major goal of schooling. In general, students are motivated to develop self-regulation and independence as learners so that they can become managers of their own learning. Self-regulated learners are those who are engaged in an active, constructive process in which they set goals for their learning and then attempt to monitor, regulate and control their cognition, motivation and behaviour, guided by their goals and the contextual features in the environment (Pintrich, 2000). Autonomous learners who are sensitive to their own thinking, the learning environment, and who are able to regulate their own behaviour in relation to appropriate goals, make very effective learners. In fact, it was the recognition that although all learners may have particular self-management skills, their use of them is inconsistent and inefficient at times that led to the formulation of the concept of metacognition (Brown, 1980; Flavell, 1976). Flavell's influential initial conception of metacognition consisted of two interrelated factors, self-awareness and self-regulation, which can support an individual's effective learning. Importantly, Brown's (1980) work elaborated on the nature of metacognition. She researched a model of learning with four main factors: characteristics of the learner, nature of the materials to be learned, the criterial task, and learning activities. In an influential way, Brown underscored how metacognition serves to orchestrate self-knowledge, task demands, and appropriate learning activities to result in successful learning. The work of Brown and her colleagues (e.g., Baker & Brown, 1984; Brown 1980) has served as a foundation for later models of metacognition and self-regulation. The emphasis in recent models of effective learning has shifted to self-regulation as the overarching concept within which metacognition operates alongside motivational dimensions such

as attributions and a sense of self-efficacy.

Over the last two decades, increasingly complex models of self-regulation have been developed. For example, Boekaerts' (1997) model proposed two dimensions of self-regulation by delineating cognitive from motivational self-regulation. Later, Pintrich (2000) put forward a model with four dimensions within which regulation operates and Zimmerman (2002) presented a three-phase model that sought to reflect the cognitive and affective dimensions of the learner. In turn, a range of theoretical perspectives developed around the notion of self-regulated learning, have generated significant research into proactive processes used by successful learners (Zimmerman, 2008; Zimmerman & Schunk, 2001). All such research acknowledges the importance of the integration between cognition and behaviour, and has increasingly recognised the complexity of self-regulation, as a process that involves "cognition, problem solving, decision making, metacognition, conceptual change, motivation and volition" (Boekaerts & Corno, 2005, p.200).

Pintrich's model (see Table 1) is used in this paper to describe the actions of an active learner engaged in complex cognition. According to Pintrich, learners are influenced by both affect and motivation as they demonstrate behaviours and strategic functioning within a particular learning context. Pintrich's model of self-regulation integrates the concepts of metacognition, motivation, attribution, self-efficacy, planning, effort and help-seeking behaviours under the organising notion of self-regulation. It serves as a useful organising frame for the further discussion of key components of self-regulation.

Table 1 Adapted version of Pintrich's Model of Self-Regulated Learning (2000)

	Possible Areas for Regulation			
Phases	**Cognition**	**Motivation/Affect**	**Behaviour**	**Context**
1. Forethought, planning and activation	Target goal setting Prior content and knowledge activation Metacognitive knowledge activation	Adoption of goal orientation Efficacy judgments Ease of learning judgments Perceptions of task difficulty Task value activation Interest activation	Time and effort planning Planning for self-observations of behaviour	Perceptions of task Perceptions of context
2. Monitoring	Metacognitive awareness and monitoring of cognition	Awareness and monitoring of motivation and affect	Awareness and monitoring of effort, time use, and need for help Self-observation of behaviour	Monitoring and changing task and context conditions
3. Control	Selection and adaptation of cognitive strategies for learning and thinking	Selection and adaptation of strategies for managing motivation and affect	Increase/decrease effort Persist, give up Help-seeking behaviour	Change or renegotiate task Change or leave context
4. Reaction and reflection	Cognitive judgments Attributions	Affective reactions Attributions	Choice behaviour	Evaluation of task Evaluation of context

Metacognition. A self-regulated learner sets goals and activates prior knowledge, both about the content area and about thinking. Throughout learning the learner functions cognitively as well as metacognitively, selects cognitive strategies, and makes judgements about cognition and about attribution for learning. Metacognition is the ability to 'step back' from thinking and to become aware of one's own processes of thinking. As already described, Flavell's (1976) initial definition of the construct included both self-awareness and self-regulation. Later, Brown and her colleagues (Baker & Brown, 1984; Brown, 1980) as already described, defined metacognition as comprising of a knowledge component as well as a management or control component.

Importantly, Wong and her associates (Wong & Wong, 1986; Wong, Butler, Ficzere & Kuperis, 1996) investigated how metacognitive knowledge is related to academic performance for students who have learning disabilities during the 1980s and 90s. Generally, students with learning disabilities have little awareness of their cognitive processes as learners. For these students metacognition is slow to develop, tends to be less sophisticated and needs to be fostered through explicit instruction (Wong & Wong, 1986; Wong et al, 1996).

Overall, it is important to acknowledge the research-based finding that students with learning disabilities have significant difficulties with "strategic processing and metacognition" (Gersten, Fuchs, Williams & Baker, 2001, p. 280). This perspective supports the usefulness of instruction that focuses on teaching cognitive and metacognitive strategies. Like cognition, metacognition is developmental: Both thinking itself, and thinking about thinking, improve with maturity and experience and can be facilitated by the explicit teaching of appropriate strategies (Veenman, Van Hout-Wolters & Afferbach, 2006).

Motivation. Self-regulated learners are self-motivated. They are activated by interest, set realistic goals, make supportive judgements about ease of learning, task difficulty and self-efficacy, and attribute learning outcomes appropriately (Pintrich, 2000). Motivation is basically the desire to learn and to achieve. It is a vitally important consideration for learning because students are most effective when they are active and engaged with purpose and persistence in the process of learning. Human beings need to be motivated to spend cognitive and emotional energy on any activity and to persist during times of challenge. Self-regulated learners have levels of intrinsic motivation that support their need to learn and keep them engaged with a task (Ryan & Deci, 2000). Intrinsic motivation, a key concept in educational psychology, refers to one's internally directed motivation for learning. It is not dependent on rewards but comes from enjoyment, interest and is related to self-satisfaction.

Although a self-motivated learner is seen to use intrinsic motivation, it is also accepted that extrinsic motivation has an ongoing role for self-regulated learners. Many effective learners manage the use of extrinsic rewards (like grades, tokens, stickers and access to preferred activities) to support their effort in learning. For Pintrich this is management of motivation and affect, in which learners select and adapt strategies to support their learning, including activating intrinsic motivation and selecting extrinsic motivators. Motivation can vary greatly depending on the task, the learner's goals, the rewards available and expectations of performance that teachers and students hold for themselves and each other. Although extrinsic motivators are seen as tools to develop intrinsic motivation they can also undermine existing intrinsic motivation and can encourage surface learning (Vialle, Lysaght & Verenikina, 2005).

Motivation can be a problematic aspect of functioning in school for students who have learning disabilities and are likely to have experienced consistently low levels of achievement over time. Motivation

decreases in the face of failure and poor achievement, irrespective of the amount of effort a student might expend or the amount of task persistence displayed. In such situations, learners can develop reluctance to take risks in learning (Covington & Teel, 1996; Quirk, 2004) and other behavioural patterns that lead them to avoid academic tasks.

Self-Efficacy. What students believe about their capacity to learn is another important factor underlying self-regulation. Belief in the self as a learner impacts on the choices students make regarding how much effort to expend in trying to meet their learning goals and on how much motivation there is for learning. Accordingly, the power of learners' self-beliefs can be a complicating factor in the development of self-regulation. Young children's beliefs about themselves as learners clearly affect the decisions they make about how to regulate their learning behaviours (Perry & Drummond, 2002). This process becomes very complex for students who have learning disabilities as their self-belief and sense of self-efficacy can be fragile. There is also research evidence that connects learning disabilities to negative mental health states based on some students' beliefs about themselves as learners, and in particular, their negative attributions for failure to uncontrollable factors like luck (Heath & Weiner, 1996; Nelson & Harwood, 2011; Rodis, 2001). Further, research by Dunning, Heath & Suls (2004) and Job and Klassen (2012) suggest that the sense of self-efficacy of students who have learning disabilities is not only lower than that of other students, it also tends to be inaccurate, which contributes to a sense of lack of control over learning that can continue into adulthood (Desoete, 2009).

The well-being of students with learning disabilities is influenced by a number of variables including the specific nature and severity of the learning disability, the level of support from family members, economic status, social support networks, the students' match with their educational program, the existence of individual competencies, and the way that students make sense of their experiences (Margalit & Levin-Alyagon, 1994). It is clear that the whole person behind the label of learning disabilities is vitally important because individual affective characteristics have significant impact on students' development as autonomous learners. Students who have a history of low achievement or failure on a daily basis can develop learned helplessness, or even 'hopelessness', when they lose the sense of connection between their effort and any possibility of success (Au, Watkins & Hattie, 20010; Au, Watkins, Hattie & Alexander, 2009; Seligman, 1975).

Students in this situation can learn behaviours that help them cope in school and become somewhat "class wise" (Pegg & Graham, 2007) but these strategies may not be beneficial to them in the long term. Students may copy others' work, for example, or engage in low-level disruptive behaviour that distracts teachers from paying attention to their academic performance. Learned helplessness affects motivation and effort. It is described as "the situation in which an individual never expects to succeed with any task he or she is given, and feels totally powerless to change this outcome" (Westwood, 2007, p. 12). Students who develop learned helplessness have great difficulty engaging and persisting with the hard work of learning.

Attributions. Self-regulated learners attribute their learning success and failure in such a way that it supports future learning. Attributions affect both cognition and motivation. Attribution theory (Weiner, 1972) is a useful framework for considering what actions can be taken to influence motivation in the classroom. Specifically, learners can attribute or explain their success or otherwise to ability, effort, task difficulty, or luck (Weiner, 1972).

Attribution theory presents a way of understanding how people make decisions about the causes of events. These decisions,

or attributions, are classified according to three causal dimensions (Weiner, 1986). The first is whether the locus of control that affects the decision is internal or external. The second is whether the cause is stable or unstable and the third is whether the cause is controllable or uncontrollable. Students may adopt attributions for success based upon their own effort (e.g., they studied hard for the test), or they may attribute failure to their own lack of effort (e.g., they didn't bother to study for the test at all). Effort as an attribution is internal, unstable and controllable. Alternatively, students may attribute success or failure to a cause such as luck, which is external, unstable and uncontrollable (Dweck, 1999). Attributions affect motivation, performance and emotions, which in turn contribute to students' expectations for future success or failure (Schunk, 1991; Whitley & Frieze, 1985).

Attributions that explain success or failure are connected to motivation and to an individual's ability to cope at work or school. For example, Dweck (1999) also concluded that attribution theory connects with theories of intelligence. Likewise, Pintrich (2000) associated attribution theory with achievement goal theories, while Graham (1991) showed that attribution theories interact with theories of self-efficacy, as proposed by Bandura (1997), and self-worth, as described by Covington (1984).

Overall, attribution theory suggests that teaching students to attribute their successes and failures to internal, controllable events such as effort and strategic behaviour leads to students perceiving that they have more control over situations and life choices. Research also indicates that attribution retraining can be effective. For example, Dweck (1999) provided students with specific feedback that their poor performance was due to their lack of effort and appropriate strategy use. Subsequently, these learners responded more effectively to future learning opportunities by persisting longer and adapting strategies more effectively to meet their learning goals. It is vitally important to consider the types of attributions, that is, explanations for success and failure, which are modelled to students by teachers through the feedback given about classroom performance.

SELF-REGULATION AND LEARNING DISABILITIES

Students with learning disabilities and other low-achievers tend to lack many of the characteristics attributed to self-regulated learners. For example, students with learning disabilities have been described as passive learners who may have developed "learned helplessness" (Torgesen, 1977) because a history of school failure has eroded away their motivation and sense of self-efficacy as learners. Alternately, students with learning disabilities may have experienced too much structure and too many experiences with learning scaffolds during attempts to address their learning problems. Continuously scaffolding learning without gradually withdrawing the supports and encouraging students' ownership and independence can further disable individuals with learning disabilities. All students need to learn to value a planful, strategic approach to learning that requires effort to be successful (Borkowski, Estrada, Milstead & Hale, 1989; Harris, Reid & Graham, 2004; Hen & Goroshit, 2012).

TEACHING FOR SELF-REGULATION IN LEARNING

The development of self-regulated learners is an increasingly important goal of contemporary schooling. As we live in a world where knowledge is expanding at a great rate, members of our society need to be able to apply learning skills to new situations and contexts throughout their lives. Already adults are being asked to manage increasing amounts of new learning, often through technology, at many points in their working lives. Such "electronic enquiry" and "internet-based" learning is managed most effectively by those learners

who can self-regulate (Bandura, 2006).

In general, it is now more important than ever for students to be motivated to develop self-regulation and independence as learners so that they can become managers of their own learning. Because teachers want all their students, including those with LD and low achievers to become self-regulated learners, they must focus on helping them to develop autonomy and self-direction in learning, as well as fostering a sense of self-efficacy and the motivation to learn. All these characteristics are evident in successful learners (Butler, 2004; Wigfield, 1994; Zimmerman, 1989). Such effective learners have developed a repertoire of cognitive and metacognitive strategies for learning and for demonstrating their learning. However, while students with learning disabilities possess certain cognitive and metacognitive strategies, these strategies tend to be inefficient (such as, word by word reading (e.g., Graham, Pegg & Alder, 2007) or faulty (such as, erroneous strategies or finger counting in arithmetic (e.g., Graham, Bellert & Pegg, 2007)).

Ley and Young (2001) have proposed that instruction for self-regulation can be embedded effectively within all classroom instruction. To this end, they have provided a set of four principles to guide the embedding of support for self-regulation within regular instruction. The four common instructional principles they suggest have been substantiated as significant for the development of self-regulation in "less expert learners" (Ley and Young, 2001, p.94). The principles Ley and Young propose are: (i) to guide learners to prepare and structure an effective learning environment; (ii) to organise instructional activities to facilitate cognitive and metacognitive processes; (iii) to use goal-setting and feedback to present the learner with monitoring opportunities; and (iv) to provide learners with continuous evaluation information and occasions to self-evaluate.

In this context, metacognition, defined as the awareness of and ability to regulate thinking, is important because of how it guides students' effective reading and studying. Within the broader construction of self-regulation, metacognition is combined with other dimensions of skill and will such as motivation, attributions and self-efficacy. Because many students who have learning disabilities have little awareness of their own thinking and do not use self-talk to regulate their learning, the consideration of metacognition and self-regulation is particularly important for this population of students.

A simple way to support reflection on learning strategies is by using scripted self-talk such as that recommended by Naglieri and Pickering (2010). Under this approach, students would be encouraged to ask themselves:

"Have I done something like this before?"

"What are the different ways I can do this?"

"What is the best way to do this?"

Such scripts can be used by teachers when modelling tasks, and then practised by students when they are carrying out classroom tasks. The aim is for the students to internalise the questions and use them to self-regulate their behaviour (Naglieri & Das, 2003).

Specific analysis of research targeted at identifying effective interventions for adolescents with learning disabilities has emphasised the importance of strategy instruction (Baird, Scott, Dearing & Hamill, 2009; Swanson, 2001; Swanson & Deshler, 2003). However, in order for a student to be able to generalise and automatically apply such strategies, an intensity of instruction, that includes explicit practice and formative feedback on use of the strategies is essential. Swanson & Deshler (2003) recommend such a teaching sequence. Firstly, the teacher should provide verbal practice, in which each step of a strategy is used slowly and carefully demonstrated and explained. Secondly, students engage in controlled practice with feedback, where the student can apply the strategy to simple tasks, thereby continuing

the focus on strategy development rather than on new content. Thirdly, advanced practice and feedback is undertaken when the strategy is applied to instructional level tasks, again with specific feedback provided related to the student's performance. Lastly, opportunities to generalise or apply the strategy to other tasks and circumstances are provided.

Feedback from teachers to students is fundamental to this suggested teaching sequence. Positive performance feedback from teachers can boost self-efficacy of students with learning disabilities (Klassen & Lynch, 2007). There are four levels of feedback that Hattie and Timperley (2007) have identified, related to task, process, self-regulation and the self. As the most powerful feedback appears to be related to cognitive processes and self-regulation, not only do teachers need to provide intervention that focuses on these components of learning, but they also need to provide meaningful feedback that directs students to use particular processes or strategies, and to self-evaluate their performance.

Because of the pervasive nature of learning disabilities it is also necessary to work towards establishing a community of learners that both encourages and facilitates the teaching and learning of self-regulation strategies across the whole school curriculum. As Perry and Drummond (2002) have identified, a community of learners exists where students and teachers are engaged in complex and cognitively demanding activities; students move constantly towards taking increased control of their own learning; evaluation is non-threatening; and teachers provide instrumental and responsive support for student learning. Teaching children and adolescents with learning disabilities to self-regulate as they engage with learning across the whole school curriculum is a challenge. A common language around metacognition and use of strategies that is used by all members of a community of learning can become an essential tool both for learning and for self-regulation of learning.

The research reviewed in this paper indicates that addressing students' academic learning difficulties is best attempted by combining explicit instruction in metacognitive self-awareness with strategies in reading, writing, mathematics, and spelling. In light of the research on metacognition in reading, mathematics and writing, an exclusive focus on skill building is simply not enough. Teachers should include a self-regulation component in any strategy instruction. This can be as simple as including a form of self-monitoring to check accurate strategy use, or providing an explicit procedure for self-checking one's work. For example, students with learning disabilities can check their own arithmetic calculations and answers prior to handing in assignments. Systematic and consistent inclusion of self-regulating components as part of strategy instruction would assist students with learning disabilities to behave like autonomous learners, which is one of the ultimate instructional goals for these, and for all, students.

CONCLUDING COMMENTS

This paper has presented research information on self-regulation and its cardinal role in effective learning and performance. First, there was an exploration of the instructive exposition on the complex meaning of self-regulation. Second, the components of self-regulated learning were examined with reference to Pintrich's (2000) model that highlights cognition, motivation and affect, strategic behaviours and the context of learning. Last, but not least, this paper has pointed to the need for teachers to teach for self-regulation, particularly for children and adolescents with learning disabilities, who tend to have less well developed thinking skills, self-awareness and other behaviours that support self-regulated learning. Interventions related to self regulation include classroom programs that aim to increase student well-being as a way to facilitate better engagement and effectiveness of learning, as well as direct instruction in learning and

metacognitive skills and strategies aimed at students who are experiencing learning difficulties (Boerkaerts & Corno, 2005). Understanding of the dynamic feedback loop (Hattie & Timperley, 2007) and the self-enhancing or self-defeating cycles of learning that support or hinder student achievement (Zimmerman, 2008) are essential for making sense of the whole learner.

Returning to the case study, the task of an educator in providing learning assistance for a student like Alex is to target his cognitive skills as well as work on his motivation and instil some sense of self-belief through authentic success. All three of these areas, cognitive skills, motivation and self-efficacy, need to be addressed for Alex to become a self-regulated learner who can set his own attainable educational goals. Importantly, Alex needs to maintain the beliefs that he can "do" English language work and that his spelling skills can improve, and he needs strategies, success and clever informed teaching to support his future learning.

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