Metacognition and Dyslexia: Towards an increased understanding of the cognitive knowledge and self-regulation practices of students with dyslexia in higher education.

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Declaration

This thesis results entirely from my own work and has not been offered previously for any other degree or diploma.

Signature .....

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Abstract

This thesis examines the metacognitive and self-regulatory practices of students with dyslexia in higher education. It focusses on the understanding that these students have of their learning, the strategies they use and factors that determine how and why strategies are used. The study further examines the planning, organisation, management and evaluation of their learning.

From an insider-researcher perspective, the data collection is derived from 16 semi-structured interviews and a self-administered inventory, situated within an independent UK university. The participants were enrolled on the full time or part time route of the same training programme at the host university. A mixed methods approach was considered to lend itself to providing qualitative in-depth lived experience data and perceptions based on a 52 statement inventory of knowledge and regulation of cognition.

The study findings suggest metacognition and self-regulation practices of these dyslexic students in higher education to be inefficient rather than deficient. Importantly, it notes the timeliness and impact of training input and learning support intervention on such findings.

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Contents

Abbreviations

ADD	Attention Deficit Disorder
ADHD	Attention Deficit Hyperactivity Disorder
BDA	British Dyslexia Association
BIS	Business, Innovation and Skills
BPS	British Psychological Society
CAQDAS	Computer Assisted Qualitative Data Analysis Software
DDA	Disability Discrimination Act
HESA	Higher Education Statistics Agency
IDA	International Dyslexia Association
IPA	Interpretative Phenomenological Analysis
IQ	Intelligence Quotient
SENDA	Special Educational Needs and Disability Act
SpLD	Specific Learning Difficulty/Disability
SRL	Self-regulated Learning
UK	United Kingdom

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Chapter 1: Introduction

This chapter introduces the research topic and main focus of the study. A brief summary of the statutory framework contextualises societal and educational perspectives against which the research topic is set. Further review of literature to examine the learning experiences of students with learning disability in higher education contextualises the topic.

Contrary to the rules of academic writing, this thesis is written in the first person. My justification for doing so is to demonstrate the subjective nature of my views, opinions and interpretation. The use of 'I, me or my' in this context, signifies my ownership and responsibility of such positions as a sole researcher. Similarly, my use of 'we' within the text infers the research or education community as a collective, of which I am a part. 'We' is used in the context of explanatory or insight into practice or purpose.

1.1 Aims of the study

The research aims to examine the perceptions of students with dyslexia in higher education, regarding their learning strategies and management of their learning. The research would highlight some of the implications for the learning practice of these students and the teaching practices of educators at the host university.

My interest in this area of work is long standing, arising many years ago from my role as Personal Tutor and Programme Leader. This experience has provided me with a number of professional and personal lenses in the approach to this research. What I bring to this research is an awareness of the high levels of students entering higher education with undiagnosed learning difficulty; an appreciation for the difficulties these students experience in managing seemingly simple academic tasks on the one hand while for example, paradoxically may display strong verbal reasoning skills; and also

being cognisant of the range of learning difficulties dyslexic students present with. This latter point is of particular significance, since my increasing involvement with dyslexic students over the years and increasing knowledge and skills have brought me to recognise and diagnose my own learning deficiencies as dyslexia. My own experience has led me to appreciate why so many of these undiagnosed students do not similarly suspect their learning battles as being due to dyslexia.

What interested me to research this area is to have a greater understanding why despite hard work and motivation, students with dyslexia continue to flounder, which led me to consider the first research question:

- How well do the participants say they understand their own learning processes in academic contexts?

Dyslexia is a hidden learning difficulty that has a lifelong impact and as such, individuals have to overcome a range of barriers in order to make a full contribution to society (British Dyslexia Association [BDA] 2015). A large proportion of students entering high education with undiagnosed learning difficulties, having been declared unteachable during their early schooling years (Madriaga 2007). These early learning experiences usually impact on the attitude and skills for effective further learning. Damaged self-confidence often leave individuals doubting their learning skills or abilities, whilst similar experiences can be powerful motivators to disprove the opinions of doubters. This leads me to the second research question:

- How successful do the participants say their learning strategies are, or have been?

Early diagnosis of dyslexia, coupled with the required learning support, usually sets the individual on a more advantage learning route than those who remain

undiagnosed for longer periods of time. It may be that diagnosis of dyslexia and intervention prompts the individual to consider their learning difficulties in more reflective and self-evaluative ways (Kirwan and Leather 2011). It may also be that the lack of such self-evaluative opportunities have led to the belief that students with dyslexia lack metacognitive skills (Goldfus 2012). However, successful learning outcomes require a range of other cognitive skills, which leads me to consider my third research question:

- How do the participants say their use of learning strategies in academic contexts has been/ could be enabled or limited?

Dyslexia is a paradox; although Pollack (2005) claimed an increasing acceptance that it exists, others have contested and debated dyslexia as an entity, primarily due to the difficulty of defining dyslexia as a discrete condition (Elliott and Grigorenko 2014). Such confusion and contentious debate among professionals, compounds negative learning experiences and provision of supportive intervention. Research show positive learning outcomes that result from early intervention intended for improving learning skills (Torgesen 2004; Kirwan and Leather 2011). This raises the question, how do students acquire these skills and is it time bound? Research suggests that individuals from marginalised groups (Shevlin et al 2010; Konur 2006) such as dyslexia, are less likely to achieve goals in the absence of informed learning support.

I argue that research focussed on the perceptions of the learning processes and practices of students with dyslexia would contribute important data for the knowledge improvement and awareness of educators and learning support staff. Consideration of the learning strategies of the participants raises the question of how and when these strategies are used, leading me to pose my final research question:

- How far do the participants say they are able to regulate their learning?

Increasing number of students with learning difficulties aspire to higher education to fulfil lifelong learning ambitions. Access programmes that enable unconventional entry opportunities are designed to improve academic and learning skills, which indirectly nourishes the affective domains. Despite some of the damaging experiences many of these students endured during school years, it is the level of motivation and dedication to learn that generally incites self-regulatory practice (Borkowski 1996). However, the learning deficiencies of dyslexia challenges the learner agency role (Reid and Wearmouth 2009) expected of higher education practice.

Provision of Access to Higher Education programmes go part way to minimising participation barriers for those aspiring to higher education (Business, Innovation and Skills [BIS] 2016; Chowdry et al 2013; Farmer et al 2002), but there is a recognised need to be complemented by tailored and inclusive learning support approaches, to reduce attrition and improve attainment (BIS 2014). However, improving access to a full range of courses would be futile if teaching and support staff lack the awareness and knowledge of learning difficulties, potentially leading to insufficient or inappropriate learning support. There is some concern that enablement through non-traditional routes would cause educational standards to deteriorate (Humphrey 2012). Such concerns may be ill-founded where institutional infrastructure enable learners to build and practice a range of appropriate learning skills and promote and encourage agency.

1.2 Contextualising the research field

At least 10% of a given population are thought to be dyslexic; based on the extent of the dyslexia, the orthographic system and sampling methods employed (Sprenger-

Charolles et al 2011). Statistical data for 2014-15 shows, of 571,610 undergraduate students in UK higher education, 11% disclosed a disability, with 46.2% of all disabilities being specific learning difficulties (HESA 2016). Dyslexia makes up the largest proportion of specific difficulties, affecting approximately 5–17.5% of children and adults (Habib, 2000; Shaywitz et al 1998; Shaywitz et al 2002). These incidence rates signify learning difficulties as an important aspect of social and learning practices. Of further interest is the recognition of dyslexia as a neurological condition with prevalence rates (Molfese et al 2008) suggesting a genetic origin (Stein 2008; Cooke 2001; Ramus 2003a; Siegel 2006).

The significance of dyslexia as part of the bigger disability picture, is further reflected by the responses of countries in Europe, America, Asia and China recognising and legalising the rights and needs of disabled students within higher education (Fuller et al 2004) to improve enabled social mobility. UK disability legislation made provision for post 16 education in the Special Education Needs and Disability Act (SENDA 2001). Further extension of this legislation was undertaken in the Disability Discrimination Act [DDA] (2005), updating and amending the 1995 Act. It was considered timely that public institutions such as higher education be made duty bound to minimise barriers to participation by way of the Disability Equality Duty Act, 2006 and the Equality Act, 2010. Such initiatives made it unlawful to discriminate against the inclusion for access to lifelong learning (Riddell et al 2002). Furthermore, in keeping with the ethos of the social model of disability, the UK legislative landscape within this field continues to evolve with establishment of bodies such as the Office for Disability Issues, Disability Action Alliance and Disability Rights UK. This brief overview provides a glimpse of the shifting disability landscape and repositioning within society and educational domains. It is against this background that a culture of inclusion and equality has taken a prominent position within the UK higher education.

Since the above legislative edicts do not dictate detailed practice for the disability and equality infrastructure, education institutions apply nuanced interpretations. The literature suggests therefore, that educational institutions have not sufficiently embedded practices of widening participation opportunities within their academic infrastructure (Wardop et al 2016) that incorporate inclusive practice at institutional and individual level (May and Bridger 2010; Konur 2006). What this means for practice is that although many universities may actively promote institutional learning support services to encourage disclosure of specific learning disabilities, commitment to minimising the barriers of accessing the curriculum (Vickerman and Blundell 2010) is often overlooked.

Although some institutions provide staff training to improve awareness and knowledge of learning disability, optional attendance at such training often results in low take up (Rodger et al 2015). Incentivised and proactive staff development could build an enabling culture in which students work in a safe learning environment to enhance their autonomous practice. This is especially pertinent, since the cognitive domains of dyslexic students have a significant impact on higher education learning (Farmer et al 2002; Hatcher et al 2002; Mortimore and Crozier 2007; Pino and Mortari 2014).
Understanding the impact of the cognitive aspects of dyslexia, such as short term and working memory (Baddeley 1998; Gathercole 1999; Cowan 2005), literacy skills (Snowling 2006; Baddeley 1998; Schulz et al 2008; Swanson et al 2004) and the central executive (a set of cognitive processes), is central to the research.

1.3 Deficiencies in evidence

A number of studies examine the learning experience of students with learning difficulties (Goode 2007; Borland and James 2010; Mortimore and Crozier 2007;

Holloway 2010) or the barriers to learning (Fuller et al 2004; Denhart 2008). However, many of these studies emphasise breadth rather than depth, with large sample sizes (Farmer et al 2002; Madriaga 2007; Pollak 2005).

A few studies examined the metacognitive (Wong et al 1989; Goldfus 2012) or self-regulatory skills (Harris et al 2004) of children with learning disabilities. Others (Mortimore and Crozier 2007) used a survey to examine the study skills of dyslexic students in higher education, but in the literature reviewed, there appears to be a distinct gap in in-depth studies of the metacognitive and self-regulatory skills of dyslexic university students. Furthermore, all of the reviewed studies engaged a single research approach such as case study or survey. This study adopts a unique approach in the use mixed methods to examine the learning experiences of dyslexic students in higher education, with regard to specific metacognitive and self-regulatory skills.

1.4 Outline of the study

The research is situated within an independent UK university with a well established global presence, where participants are studying on a professional health related degree programme. Professionally diagnosed dyslexia was the only set criterion, although background experiences and personal characteristics such as age and gender have been included to contextualise experiences relative to this study. It is interesting to note that the vocation programme on which the participants are enrolled, attracts many students seeking a second career, and thus the ages of many of these students are above the norm for undergraduate study.

Equality, diversity and inclusion are important and prominent infrastructure developments as the university continues to evolve in scope and diversity of provision. To improve further the contribution I make within my secondary role as learning support officer, I have undertaken a commitment to examine specific aspects and nuances of

these difficulties students with dyslexia experience, such that an appropriately informed learning support service could be further modelled. Being the largest and most commonly occurring specific learning difficulty within the higher education student body (Whitelegg 2013), I have chosen dyslexia as the main focus of learning difficulty within this study.

A mixed methods approach was used; a phenomenological designed interview to understand the meanings of the lived learning experiences and an inventory. The quantitative element was conducted concurrently and integrated with the interview findings. These findings would be of interest to students with dyslexia and non-dyslexic students as well as teaching staff, to aid understanding of the metacognitive and self-regulatory practices of dyslexic students, such that intervention may be focussed and timely.

Chapter 2 situates the research, providing the contextual background within the literature examined. Chapter 3 sets out the methodological approach relative to personal ontological and epistemological positioning. Research findings and analysis are presented in Chapters 4, 5 and 6. Here convergent evidence of inventory and interview are interspersed with supporting literature and participant quotations. Finally, Chapter 7 draws the study to a conclusion with some theoretical and practice implications, and suggestions for further study.

Chapter 2: Literature Review

2.1 Introduction

This section will begin by examining the current understanding and theories of dyslexia within the specific learning difficulty (SpLD) spectra. The terminology used to describe and define this spectra include dyslexia, dyspraxia, dyscalculia and attention deficit. Definitions within this field continue to be explored and positioned within psychology, education, science and legislation. The Diagnostic and Statistical Manual (DSM-5) issued by the American Psychiatric Association in 2013 re-categorised and re-labelled a wide range of 'mental disorders' for refining their diagnosis (Tannock 2013). Much debate has ensued the re-categorisation of specific learning disorders as neurodevelopmental disorders (Pham and Riviere 2015). It is evident that whatever term is used to describe dyslexia; specific learning difficulty, specific learning disorder, neurodevelopmental disability, or learning disability, there is a general consensus regarding the endless debates of how this conditions should be quantified or categorised. As testament to the differences in the views and opinions regarding terms and labels used, this review reflects briefly, the diverse terminology of researches cited here. Thus, increasing research activity within these arenas recognise diverse cultural, social, political and educational influences being converged within a disability framework.

Examining the evolving understanding of the cognitive aspects of dyslexia and the related lived experiences is the epistemic lens through which theoretical constructs of dyslexia are considered. Against this backdrop, the review concludes with the examination of metacognition, self regulation and approaches to learning and teaching.

Historically, research domains were based on the medical model that typically focused on the biological dysfunction of the brain (Snowling 2006). This deficiency discourse took on a similar mantle. Deficiencies in learning became medicalised by being considered as cognitive impairments. Negative language and connotations associated with impairment, labelled individuals as being stupid and lazy, thus robbing these individuals of equal participation in education and became a barrier to development during formative years. Impairment of learning focused on neurological and sensory deficiency where politically assigned values culminate in inequitable power dynamics (Linton 1998). Power dynamics arise from societal norms that consider 'learning disability' to be related to normal/abnormal or dis/abled perceptions (Reid and Valle 2004). These norms emanate from constructed medical, socio-political and functional models, imposing potentially powerful public perceptions of disability which have the capacity to shape the self-identity of individuals with disabilities (Smart 2009). Movement away from the medical models where disability is focussed within the individual, and shifting the power toward the social model, places the onus on society to facilitate equitable access to education and public services (Thurston 2014).

Although such frameworks provide the platform for worthy research and debate, there is a danger of some researchers losing sight of the individual (Reid and Valle 2004) for whom complex influences determine unique and singular experiences (Linton 1998). However, some of the positive outcomes emerging from research suggests that appropriately aligned intervention and support can help to overcome some deficiencies experienced by individuals (Rowan 2014).

2.2 Current understanding of Dyslexia

2.2.1 Definition

Although dyslexia is the most commonly known type of learning 'disability', there continues to be much confusion and debate around the validity of dyslexia as a construct (Elliott and Grigorenko 2014) and thus how it should be defined. The need for a definition is to minimise abuse and misinterpretation by providing an informed, meaningful and contextualised working understanding for education and employment (Peer and Reid 2003).

The British Dyslexia Association (BDA) describes dyslexia as:

'a specific learning difficulty that mainly affects the development of literacy skills. It is likely to be present at birth and to be life-long in its effects. It is characterised by difficulties with phonological processing, rapid naming, working memory, processing speed and the automatic development of skills that may not match up to an individual's other cognitive abilities. It tends to be resistant to conventional teaching methods, but its effects can be mitigated by appropriately specific intervention, including the application of information technology and supportive counselling' (BDA, 2008, p. 5).

In the United States, dyslexia is explained as being a language-based learning disability such as spelling, writing and pronouncing words that has life-time effects, but the impact can change at different stages of the individuals' life (IDA 2012). The British and American definition indicates that the signs of dyslexia may become increasingly apparent as the child develops, but stops short of acknowledging its neurological basis. Whichever way the construct of dyslexia is described, what is important is the explanatory power of the terminology used. Elliott and Grigorenko (2014) argue for correct labelling of the condition in the first instance. Shifting emphasis from definition to the terminology used in the labelling associated with learning difficulties, they

suggest, would lead more naturally to an appropriate definition. For example, the DSM-V (Diagnostic and Statistical Manual of Mental Disorders -V) relabelling 'dyslexia' as 'reading disability or disorder', addresses problematic issues around definition by clarifying the condition as a disability of fluent word recognition, poor decoding and poor spelling. An additional function of such labelling may also serve to indicate interventions required, since 'dyslexia' may have different interpretations.

The fifth version of the DSM thus recommended use of the terms specific learning disorder or learning disability (SpLD), which encompassed: reading disorder, mathematics disorder, written expression disorder and learning disorders not otherwise specified (Tannock 2015). Although these changes are intended to help improve the understanding of those outside of the field (Scanlon 2013), whichever label is used, perceptions or understanding are subjective and remain contentious (Gibbs and Elliott 2015).

Negative connotations of labelling can lead to losing sight of the individual as a person with a spectrum of learning needs, rather than what is understood by the particular label (Riddick 2000). In line with this thinking, an increasing shift toward de-stigmatisation, shows a preference in the use of the terms specific learning difference or difficulty (Whitelegg 2013), 'learning difficulties' (BDA 2015) or reading disorder. These terms emphasise the differences in thinking, learning styles and cognitive processing of individuals (Rodger et al 2015). The terms specific learning difficulties or specific learning disabilities are commonly used when referring to cognitive impairments such as dyslexia, dyspraxia and attention deficit disorder. 'Learning difficulties' or 'learning disabilities' are also used interchangeably with SpLD, all representing equally inhomogeneous characteristics (Inglis 2013). SpLD acknowledges the complexities of the conditions and recognises that specific cognitive

deficiencies are specific to the individual. Additionally, individuals may have a presence of some deficiencies and absence of others. There is little doubt that such attempts at categorising conditions for improved clarity would continue to be debated (Büttner and Hasselhorn 2011; Al-Yagon et al 2013), testament to the complexity and diversity of challenges presented within this field of defining and diagnosing dyslexia.

What complicates this picture further is the differing levels of dyslexia severity that make it difficult to adequately define the condition (Elbeheri and Everett 2009; Reid 2002; Cooke 2001) and its co-morbidities (Everatt et al 2008). Furthermore, these disorders are not discrete and distinct, but overlap with each other, making functional labels more useable than traditional diagnostic labels (Kirby and Kaplan 2003). Thus far, the debate on definitions have lost the explanatory power for conceptualising the difficulties of individuals with dyslexia (Elliott and Gibbs 2008; Elliott and Grigorenko 2014). When based on clinical diagnosis, such labels have provided little insight into the strengths and weaknesses of the individual (Kirby and Kaplan 2003; Tannock 2013) indicating once more, the tensions in attempting to define dyslexia in a single definition (Miles 1995; Cooke 2001). Therefore, an element of DSM-V recommendations that may be adopted by practitioners, is being more specific about the experiences in academic difficulties and impaired skills (Elliott and Grigorenko 2014).

Dyslexia has historically been considered to be a phonological deficit (Vellutino et al 2004; Rack et al 1992: Stanovich and Siegel 1994; Ramus et al 2003a). However this in itself does not sufficiently distinguish this literacy weakness from other causal types (Snowling 2006), nor does it acknowledge the range of other difficulties associated with dyslexia.

Strengths in semantic coding may for example offset single factors such as phonological deficit or low level comprehension of reading, emphasising the

importance of a multiple deficit model when defining dyslexia (Snowling et al 2002). This debate led to the commissioning of a working party of The British Psychological Society (BPS) to clarify a definition. However, the outcomes of this working party were considered too narrow, restrictive and thus open to interpretation (Cooke 2001). The BPS (1999) defined dyslexia as being a difficulty with accurate and fluent word reading and or spelling that is severe of persistence, despite educational intervention. This suggests that dyslexia may be explained as affecting children with phonological difficulties such as decoding (Rack et al 1992) but some distinction between the written letters (grapheme) and letter sounds (phoneme) (Everatt and Reid 2009; Fawcett 2002; Snowling and Griffiths 2003; Snowling 2006) needed to be clarified, indicating the level of confusion and complexity in defining this term, and therefore a consideration to re-label this difficulty as reading disability (Elliott and Grigorenko 2014).

Although learning disability was understood as deficiencies resulting from basic psychological processes required for learning, the discrepancy criteria between general measure of IQ and learning achievement was the agreed approach to diagnosis (Torgesen 2004). Aptitude-achievement discrepancy, used to be considered an important factor within learning disability (Cooke 2001; Siegel 1992). Whilst this discrepancy was not a diagnostic criterion (Siegel 1999; Stanovich and Stanovich 1997; Miles 1996; Pavey et al 2010), it had been considered as a means of identifying dyslexia by comparing the actual reading ability with the intelligence quotient (IQ) predicted ability (Elbeheri and Everatt 2009). For many practitioners, this discrepancy criterion has been discounted, although there are some who persist in this practice despite shifting paradigms (Elliott and Resing 2015).

2.2.2 Theories of Dyslexia

Dyslexia was a specialist term confined to cognitive psychology and special education. Due to overuse of 'dyslexia' as a generic term for poor literacy skills such as reading, spelling, and writing, its use is no longer confined solely to these areas of specialist practice (Berninger et al 2008; Nicholson and Fawcett 2011). Since literacy skills are known to be influenced by environmental, biological and cognitive factors (Peer and Reid 2003), the dyslexia label may be used inappropriately.

Dyslexia constitutes the major category of all specific learning difficulties, especially as it proves difficult to distinguish it from other learning disabilities based solely on word-level literacy scores (Everatt et al 2008). The phonological theory postulates dyslexia as a reading impairment, with associated deficiency in dissection and manipulation of word sounds (Ramus et al 2003a), slow automatic naming and poor verbal short term memory (Snowling 2006). It is thought that impaired item short term memory is associated with phonological awareness and rapid automatised naming (Gupta 2003), whereas order short term memory deficiency is not a consequence of language impairment (Martinez Perez et al 2013). Further research is needed however, to either support association between item and order short memory (Gupta and Tisdale 2009; Botvinick and Plaut 2006) or disassociation (Attout et al 2012; Martinez Perez et al 2013; Staels and Van den Broeck 2014). Clarify is also needed of the causal basis of order short term memory, arising within neural network processes (Majerus et al 2010; Majerus and D'Argembeau 2011) which may be distinct from the phonological basis of item short term memory.

It is suggested that phonological deficit, or word recognition to be the basis of literacy difficulties associated with learning disability (Everatt and Reid 2009; Stanovich and Stanovich 1997; Lovett et al 1994), although has not been evident in all individuals with

learning disability (Martinez et al 2013; Ramus and Szenkovits 2008). When phonological deficit is compounded by a naming speed deficit, this double deficit of deficient rapid serial naming, erodes reading fluency and development (Wolf and Bowers 1999). In contrast to the phonological theory which focuses on speech in the pre-reading phase, the double deficit theory draws on the processing of the words which is necessary for reading automaticity (Pennington 2006).

This process of reading decoding involves item and serial order short term memory, important to the acquisition of reading skills (Martinez Perez et al 2012). It is worthy to note, that phonological deficit does not always mean reading disability, but may be represented as a speech sound disorder, a difficulty in the development of sound production and subsequent spoken language (Snowling et al 2000).

A significant proportion of learning disability research concentrates on reading disability as a discrete entity, highlighting a reading deficit being more apparent among children with dyslexia because other children with matched demographics read much better (Nicholson and Fawcett 1990). Children who experience difficulty in distinguishing and verbalising phonic sounds have difficulty with automaticity of cognitive or motor skills (Everatt and Reid 2009).

The automaticity or cerebellar theory hypothesises the cognitive difficulties experienced by dyslexic individuals result from cerebellar dysfunction, manifesting as poor motor control and therefore speech manipulation (Ramus et al 2003a), writing, reading and balance (Fawcett et al 1996). Automatisation of a motor skill such as reading, is associated with the process of rapid naming of familiar items such as letters, digits or objects for attained reading fluency (Jones et al 2016). Rapid naming of items is based on recognition and therefore spontaneous and uncontrolled. However, based on stroop interference, some workers (Goldfarb et al 2011; Lifshitz et al 2013) argue,

word reading can be controlled, thus rebutting the automaticity theory. Stroop interference, developed by John Stroop in 1935, is based on naming the colour a word is printed in, rather than reading the word e.g. saying 'blue' (print colour) rather than word 'green' (MacLoed 2015), interfering with the reading fluidity of the text. Augustinova and Ferrand (2014) replicated and extended Goldfarb et al's work. They express caution on interpretation of the current empirical evidence regarding controllability of word reading, thus upholding the automaticity theory for the present.

Weak capacity in the automisation of many such motor skill tasks are evident in dyslexia (Fawcett et al 1996; Gabay et al 2012) although the commonality of motor problems in dyslexia are uncertain (Ramus et al 2003b) due to the substantial overlap of characteristics with dyspraxia, a motor skill deficit (Kirby et al 2008). Nevertheless, automisation of motor skill are considered to be associated with impaired cerebellar function (Nicholson and Fawcett 2001).

The acquisition of reading skills and hence reading fluency is linked with harnessing attention. However, the attentional resources of dyslexic individuals are diffusely spread (Facoetti et al 2010) affecting many reading related functions (Gabay et al 2012; Franceschini et al 2012) and subsequent automaticity (Gabay et al 2012). The cognitive processes are key to understanding and defining this concept of automaticity. Rapid automised naming involves complex lexical access; recognition and processing the letters and or target words, and then shifting visual attention to the next upcoming word at speed. Impaired function of the left cerebellar hemisphere can manifest as less effective analysis and decoding of information in reading (Galaburda 1993). Many dyslexic individuals who are right hemisphere processors are reported as creative and lateral thinking (Peer and Reid 2003).

Other contributory factors to reading difficulties may be those associated with visual processing. Research emphasis is increasingly being place on the role of visual processing in reading (Stein and Kapoula 2012). The visual theory proposes disruption of the magnocellular pathway (a major visual system pathway), leading to deficiencies in visual processing of letters and words within text, due to unstable binocular vision (Stein and Fowler 1993): difficulties in focussing, separating letters, words or sentences (Moody 2003). Visual crowding (Spinelli et al 2002) is only evident in a subgroup (Ramus et al 2003a). Reading disability is thus one of a range of cognitive skill deficits (Stanovich and Stanovich 1997; Nicholson and Fawcett 1990) of temporal processing and extending to deficits in motor skills and automaticity of skills (Fawcett 2002). There is general consensus regarding the presence of phonological deficit in dyslexia, with some auditory and to a lesser extent, visual disorders that intensify the phonological deficit. Ramus et al (2003a) argue that phonological deficit exists in the absence of auditory, visual and motor impairments.

What is clear in research literature, is the confirmation of the complexity of dyslexia; in that no one single theoretical perspective can accurately account for the dyslexic deficits of different individuals. The multiple deficit model proposed by Pennington (2006) would represent more accurately, examples of comorbid existence such as reading disability with attention deficit or reading disability with speech sound disorder, recognising that although reading disability may exist as a single deficit, there are many instances of disorder overlap on the cognitive level.

The discrepancy theory focusses on the inconsistency between IQ and reading ability. Such deficiencies are considered indicative of learning disability (Siegel 1992; Ferrer et al 2010) despite intervention (Gustafson and Samuelsson (1999). Therefore, individuals who have a reading score below their chronological age and IQ, are defined

as being reading disabled, although it could be argued that persistent poor reading has an effect on cognitive development. This concept referred to as the Matthew effect, emphasises the bidirectional consequence and importance of remedial intervention (Stanovich 1986).

Historically, dyslexia had been associated with low cognitive ability and considered as an excuse middle class parents use for their underperforming children (Cooke 2001). It is nevertheless important to recognise that individuals with dyslexia have a combination of abilities and disabilities. Complementing the deficits may be outstanding levels of critical thinking and intuitive understanding (SpLD 2005) unleashed and supported through structured and timely literacy training (Lovett et al 1994; Ferrer et al 2010). This 'uncoupling' between reading difficulty and cognition over time has become key in defining dyslexia in some children (Ferrer et al 2010).

2.2.3 Discrepancy assessment

IQ represents the overall intellectual ability of an individual and an established mechanism for predicting academic success (Turner and Nicholas 2000). Dyslexia and IQ have been connected in two main ways: firstly as a method of definition using the discrepancy criterion; the basis of which is that an individual with a low IQ would have poor performance in a range of skills, including reading and may therefore be excluded as reading disabled. The discrepancy approach thus distinguishes poor readers as having reading skills below their IQ predicted level or at a level expected, based on their IQ score. Secondly, derogatory connections between dyslexia and IQ have been widely reported in social discourse (Elbeheri and Everatt 2009). Although research evidence suggests many dyslexics have average or above average intelligence (Larkin and Ellis 2004), realistically, dyslexia could span the range of intelligences.

The use of IQ in the discrepancy criterion was a tool used to define dyslexia by some practitioners (Cooke 2001; Torgesen 1989) although Siegel (1989) believed this approach to be inaccurate. Diagnosis was usually confirmed where there was a large discrepancy between academic achievement and IQ. However, in instances where this discrepancy was less significant, children were not diagnosed with a learning difficulty (Büttner and Hasselhorn 2011). Researchers have thus become increasingly concerned that the use of a single assessment of IQ and achievement was unreliable in the identification of dyslexia (Pham and Riviere 2015). The Wechsler Intelligence Scale of Children (WISC) is used to determine the predicted reading level, but some of the subtests may either be irrelevant or assesses impaired abilities that are due to learning disabilities (Siegel 1989). These subtests present a challenge to individuals with dyslexia due to the nature of their learning disability, providing an inaccurate measurement of their abilities (Reid and Kirk 2005).

Skills deficit assessment of reading, writing and spelling is an indication of learning disability when compare to others of similar age, and not indicative of IQ (Siegel and Lipka 2008; Siegel 1992). Thus, Siegel (1989) argued that the relationship between reading and IQ is unidirectional in that IQ has an impact on reading ability. This theory was rebuffed by Aaron (1994) who suggested that poor reading ability may be improved by increasing the level of reading activity, which in turn impacts on verbal IQ. The theory behind this being that intelligent people are well read, and the less intelligent tend to be poor readers (Torgesen 1989). Such conclusions are rebuked by studies that measure the impact of social and learning environments (Peer and Reid 2003) on the learning development of children, and recognition of the complexities involved in the cognitive processes in those with reading disability (Stanovich and Stanovich 1997). Reading disability should be assessed by a reading score in tasks such as word

recognition, speech rate and visual search (Siegel 1992). The varying discrepancies and theories may well result from differences in assessment measures and where the purpose is to argue for or against a definition of dyslexia, reference to the impact of co-existing learning conditions have not been made.

The aptitude–achievement discrepancy was an important means of suspecting learning disability where there is an imbalance between high IQ and average or below average achievement (Merrell 1990; Cooke 2001; Elbeheri and Everatt 2009), although word recognition sub-skills remain important for diagnosis (Stanovich and Stanovich 1997). Merrell (1990) found that students with learning disabilities had a higher IQ but lower achievement than low achievers who generally had a IQ lower than the learning disabled students. Determining cognitive abilities was thus be a means of distinguishing between underachievers and dyslexia (Turner and Nicholas 2000) with the caveat that statistical practice of regression toward the mean would lead to over identification of dyslexia in those with a high IQ whilst under identification of those with a low IQ (Catts and Kamhi 1999). Evidence increasingly indicates that dyslexia exists across the IQ range (Elliott and Resing 2015). Since the IQ-achievement discrepancy is considered statistically invalid (Cahan et al 2012) little confidence is currently attached to this approach as a diagnostic tool (Al-Yagon et al 2013). Diagnostic assessment preferences are now shifting toward cognitive strengths and weaknesses (Pham and Riviere 2015), increasing predictive powers for intervention. Such dynamic assessments would provide more meaningful feedback for individualised intervention to stimulate progression (Elliott and Resing 2015), although this reliable alternative is yet to be established (Scanlon 2013).

It follows therefore that the aptitude-achievement discrepancy would provide an indication of educational ability whereas the IQ-reading discrepancy is not outcome

based (Torgeson 1989). Furthermore, it would seem that increasing resistance to the IQ–achievement discrepancy is not based on the practice of assessing the differences in cognitive ability, but in the methods of diagnosis (Turner and Nicholas 2000) and excluding IQ measurements from the assessment process may well lead to more accurate outcomes (Elbeheri and Everatt 2009). The conceptual change from pathology to performance rating (Al-Yagon et al 2013) of dyslexia therefore facilitates appropriate learning support requirements (Brook and Weeks 1998).

2.2.4 Co-morbidity

Research indicates that dyslexia usually exists in conjunction with other learning difficulties such as attention deficit disorder (ADD) and motor co-ordination difficulties (dyspraxia) (British Psychological Society 1999; Cooke 2002; McCormick 2000; Visser 2003). Attention deficit hyperactivity disorder (ADHD) and dyslexia are two of the most common developmental disorders of childhood (Purvis and Tannock 2000; Willcutt and Pennington 2000) considered to co-occur and overlap in high proportions (Pennington et al 1993; Wimmer et al 1999; Seidman 2006; Shaywitz et al 1994). An overlap of learning difficulties between dyslexia and emotional/behavioural difficulties has also been evident (Everatt and Reid 2009).

Although it is suggested that dyslexia may be distinguished from dyspraxia and ADD by phonological processing weaknesses (Purvis and Tannock 2000; Seidman 2006; Snowling 2005) and visual-spatial measures (Everatt et al 2008), research indicates an overlap between dyslexia and the less widely researched dyspraxia (McCormick 2000). Adults with dyspraxia show less of the motor co-ordination difficulties of childhood and more cognitive difficulties of sequencing, structuring information, organisation skills and sometimes social skills (Moody 2014).

Rourke's (1989) description of dyspraxia being centred on a weakness of the central processing in visual, motor or non-verbal skills has subsequently been challenged by the phonological disorder research in dyspraxia (McCormick 2000).

Pennington et al (1993) proposed that rather than ADHD and dyslexia being co-morbid, that instead, one developed as a consequence of the other. This theory was not endorsed by others who proposed the distinct phonological deficits of dyslexia and executive functions of ADHD as the differentiating characteristics (Wimmer et al 1999; Seidman 2006; Purvis and Tannock 2000). This suggests that individuals with dyslexia and ADHD have poorer executive functioning than individuals with dyslexia alone, due to the combined cognitive disorders (Seidman 2006). Other studies also proposed inhibition deficit as a defining characteristic of ADHD. Purvis and Tannock (2000) suggests this to be an unreliable indicator since this deficit has also been associated with dyslexia.

Because ADHD is a developmental disorder becoming evident by the age of seven, many studies such as the one conducted by Wimmer et al (1999), involved the study of children. They indicated that children with dyslexia achieved comparable outcomes to their peers in dual-task balancing whereas those with high ADHD ratings performed poorly. Research concluded that the presence of ADHD co-existing with dyslexia influenced effective performance and thus considered a co-morbidity (Pham and Riviere 2015; Purvis and Tannock 2000; Seidman 2006; Wimmer et al 1999). Such co-morbidity is accepted when risk factors such as processing speed (McGrath et al 2011; Pennington 2006), visual stress manifested by text shifting on the page of white paper or binocular problems associated with misreading words or missing out lines when reading (Moody 2014), are shared with another disorder.

Advancing knowledge and understanding of these complex developmental disorders, arising from co-morbidity research, are increasingly drawing on the multiple deficit

models as a more accurate representation (Pennington 2006; Snowling 2006; McGrath et al 2011) as the shortcomings of the single cognitive deficit model became increasingly evident. The complexity of dyslexia makes it important to acknowledge the influences processing speed, naming speed, verbal working memory (McGrath et al 2011; Wolf and Bowers 1999; Snowling 2006) and visual stress (Stein and Fowler 1993; Moody 2014; Spinelli et al 2002) have on reading and attention deficits.

2.3 Cognitive aspects of dyslexia

2.3.1 Executive function

The central executive is involved in the control and regulation of working memory (Swanson et al 2004). This complex mechanism of information retrieval, functions to select information in the short or long term memory, retrieving it and checking it at speed (Sikora et al 2002), placing a high load on the attentional capacity. The executive function thus supports goal directed behaviour to maximise mental activity outcomes (Baddeley 1998), as depicted in figure 2.1.

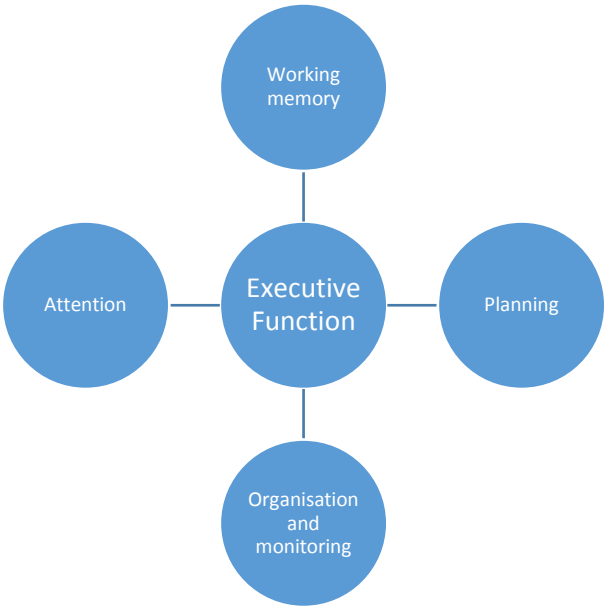

Figure 2.1. Components of the executive

2.3.2 Short term and working memory

Working memory within cognitive psychology has been referred to as the limited capacity system that consciously focuses on manipulation of newly presented information and draws on stored short and long term information (Swanson et al 2004) to be bound together as a unitary experience (Baddeley 1998). During normal everyday life, sensory information (akin to perception) from the environment is received by the sensory register and held for short periods of approximately 3 to 5 seconds. (Swanson et al 2004). This information could for example, be a person's name, telephone number or directions to a destination which is transferred to the short term memory for temporary storage (Gathercole 1999). This temporary storage decays over a variable time period controlled by the individual. Repeated sub vocal rehearsal helps to maintain the information in the short term memory until such time that it is transferred into the long term memory or it decays (Swanson et al 2004). Effective cognitive functioning depends on flexible capacity to store and manipulate information

(Gathercole 1999; Gathercole and Baddeley 2014). The central executive communicates with two subsidiary storage systems; the phonological loop and the visual-spatial sketch pad (Figure 2.2). Although working memory researchers (Baddeley 1998; Gathercole 1999; Cowan 2005) have developed different theories and perspectives, there appears to be general consensus around the basic conceptual frameworks.

2.3.3 The phonological loop

The auditory and speech based phonological loop plays an important role in phonological learning and thus development of vocabulary. It temporarily stores verbal information (verbal storage) for a limited period and maintains this information by inner vocalisation (verbal rehearsal) (Baddeley 1998, 2000; Swanson et al 2004). When related to the task of reading, the short term memory is associated with recognition of words and the working memory with reading comprehension.

Working memory tasks require active monitoring of events, selecting information from the short term and the long term memory and then actively manipulating the information until the required action has been completed (Baddeley 1998). Children with learning difficulty are inefficient in phonological coding (short term memory) and thus perform poorly when required to accurately and with speed, recall words presented to them. Such deficient short term memory may also be associated with a poor working memory when poorly executed tasks require attentional capacity for information manipulation (Swanson et al 2004). When more challenging or complex tasks are presented, the central executive comes into play. The central executive, which Baddeley (2000) called the supervisory attentional system, is suggested to focus and switch attention, funnelling information through the short term memory toward long term memory.

The quality of information that is banked in the long term memory depends on the conversion process; deeper and more elaborate encoding would lead to more consolidation of long term learning (Craik and Lockhart 1972). Baddeley (2000) theorised that if information was being received simultaneously from two systems (visuospatial sketchpad and phonological loop) at different rates, a buffer would be necessary to facilitate storage and integration with each other as well as linking with long tem memory and perspectives. This so called episodic buffer (depicted in Figure 2.2), encodes information at different levels, presenting the output as episodes that are pulled together into a temporary system of limited capacity and accessible to the conscious awareness.

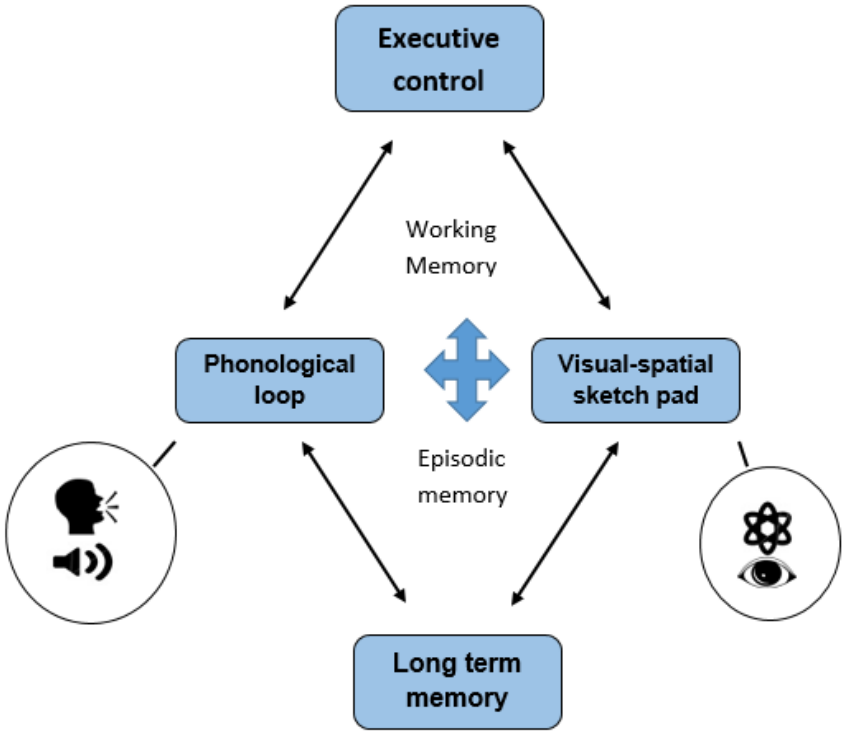

Figure 2.2. The interconnections between working memory and long term memory.

Baddeley (1998) demonstrated that the capacity of the short-term memory span and the quality of recall diminished with longer words because the speed of rehearsal increased thus making recall more difficult than monosyllable words. This suggests that the rehearsal rate depends on the length of the material since memory of new information begins to decay if the memory is not refreshed within a few seconds. This is particularly significant for individuals with dyslexia who are deficient in phonological representation. Experiencing difficulty in repeating multisyllable words is a consequence in the organisation of phonemes in their correct sequence (Snowling 2006; Gupta 2003).

Baddeley further demonstrated that if rehearsal of visually presented items was prevented, performance declined irrespective of word length, due to lack of inner vocalisation rehearsal loop. Although rehearsal is an important component of working memory because it helps to form a stable mental representation for later recall (Cowan 2005; Baddeley 1998), improving working memory through intensive strategy training would also help to extend memory span (Gathercole 1999; Gathercole and Baddeley 2014). This aspect of short term and working memory has been shown as being a particular weakness for students with learning disability, since the phonological presentation of verbal information is deficient (Snowling 2005, 2006).

Memory performance has been hypothesised as depending on the quality and quantity of knowledge; general and domain specific (Swanson et al 2004). Information in the short term memory is in phonological units but may also be represented semantically. Although researchers differ in their views of whether phonological and semantic memory is the domain of short or long term memory, what is agreed is that learning occurs with repeated association and therefore increasing activation strength (Swanson et al 2004). Individuals with learning disability are more likely to rely on the

attachment of meaning to information for retention to a greater degree than those without a learning disability. Retrieval of long term information thus becomes troublesome when information is displaced or suffers interference (Swanson et al 2004). Schulz et al (2008) showed that following a reading task, children with dyslexia responded slower and less accurately to semantic questions; indicating that the act of reading does not equate to understanding what is read. These difficulties experienced in decoding written words may often be addressed using strategies associated with meaning and context (Snowling 2006).

2.3.4 The visuospatial sketchpad

The visuospatial sketchpad is associated with processing and storing of visual and spatial information (Swanson et al 2004) that is associated with perception and motor tracking, visual imagery (Baddeley 1998, 2002) and movement sequences (Smyth and Pendleton 1990). The visuospatial sketchpad has been considered as consisting of two components; firstly the temporary storage or the visual 'cache' where information is held for future use and secondly the rehearsal process or the inner scribe (Logie 1995).

Baddeley (2002) argues that the rehearsal process in this two component model could not be substantiated in the same way as suggested in the phonological loop. Verbal rehearsal, he argues, can be maintained by regeneration of the stimulus through repeating the known word or digit. Visual stimulus on the other hand cannot be regenerated in the same manner, but there may be other mechanisms for rehearsal such as repeatedly challenging the visual representation within the long term memory. However, the visual or spatial representative can be blocked by interference. Using visual patterns or a task of tapping a sequence of keys would interfere with visual or spatial coding (Duffie and Logie 1999, 2014; Deyzac et al 2006; Baddeley 2002).

Baddeley and Logie (1999) propose a tripartite model of working memory operation depicted in Figure 2.3 to illustrate the inter-relationship of working memory, short term memory and long term memory. This diagram illustrates the inter-dependence of the three memory systems on and with each other, and the subsequent influence on recall.

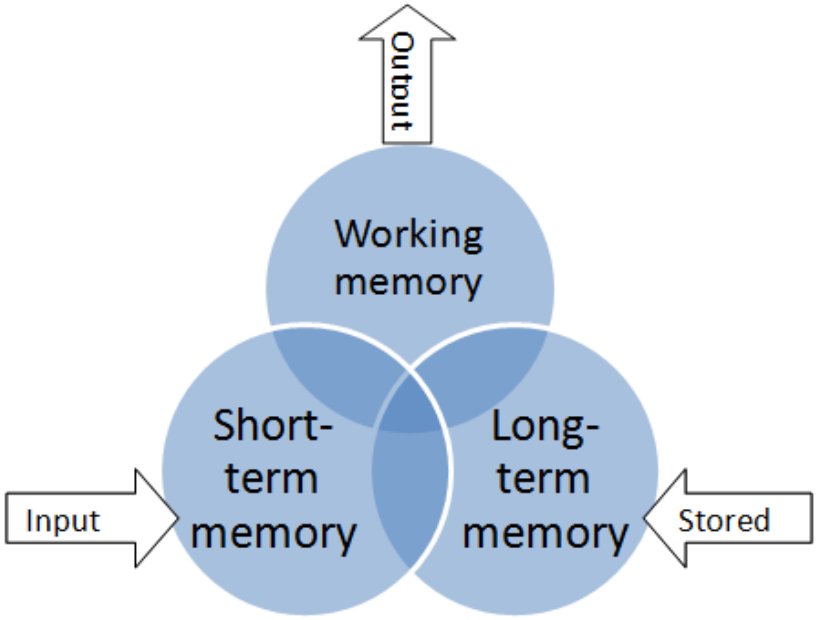

Figure 2.3: Tripartite model of working memory

2.4 Metacognition

Research in areas of metacognition, self-regulation and executive function have led to an overlap within these constructs (Harris et al 2004). It has been described by some as being the cognition of cognition, as well as the regulatory skills of cognition (Martin 2004). However, since metacognition is considered to be student's knowledge of their learning and understanding and how they manage their learning, self as agency becomes central to the process.

'Thus, metacognitive understanding is not a process of intellectually constructing a schema that includes the role of self, but is an ongoing process of progressively deeper insights or realizations that, in turn, lead to an awareness, or conscious understanding of self.' (McCombs and Marzano 1990, pp 54). Reviewed literature suggests a multi-

faceted metacognition of states and processes requiring multiple definitions (Borkowski 1996; Dunlosky and Metcalfe 2009).

Flavell (1979) was credited for the theoretical construct of metacognition that evolved from his early research in the working memory of young children. In this research with pre-school and elementary school children, Flavell set children some memory tasks. Children in each category were to indicate when they had memorised the task they needed to perform and were able to carry out this task with the information provided. He found that the younger children were not only less able to assess and reflect on the quality of their recall knowledge but also unable to judge the information requirements to perform the task. He concluded that these children were neither able to reflect on their knowledge nor monitor their thinking and understanding of what they needed to know. Learners who are more metacognitively aware, are therefore said to be more effective in their learning performance (Flavell 1979; Pressley and Ghatala 1990; Swanson 1990; Schraw 1998; Gul and Shehzad 2012).

The learning method or strategies students use in learning situations may differ from their peers. During a period of assessment preparation, students may assess which type of information requires more time and effort to learn (Pressley and Ghatala 1990). Some would metacognitively apply more time and effort with the expectation of improved learning recall (Winne 1996; Dunlosky and Metcalfe 2009). However, this additional time and effort would not necessarily equate to improved outcomes (Winne 1996), since achievement is also strongly linked to effective working memory (Swanson et al 2004); what is remembered and understood now may not necessarily be remembered and understood at a future time (Flavell 1979). Judgments of learning, i.e. predictions of future memory quality of material studied, tend to be more accurate when there is a time delay between the learning and active recall (Dunlosky and Nelson

1992; Ariel and Dunlosky 2011). Such judgements are driven by heuristics and subject to bias such as overconfidence (Son and Kornell 2010), but also influenced by previous assessment performances (Ariel and Dunlosky 2011). The cues incorporated or highlighted within new learning material are important triggers in judgements of learning (Ariel and Dunlosky 2011) and linked to epistemic beliefs of understanding and knowledge (Liang and Tsai 2010; Tsai et al 2011). Learning patterns and approaches to learning have an intricate and intrinsic relationship with self-efficacy and conceptions of learning; interpreting and reflecting on learning (Lin et al 2012).

Where conceptions of learning are low, Sadi (2015) found students believe it appropriate to learn through memorisation to achieve pass grades with less consideration given to the quality of knowledge. Similarly, Winne (1996) found that although some students might adapt their study methods to cope with more complex learning, their metacognitive control in choosing appropriate learning methods did not prove to be more effective. When knowledge is not understood, it could be due to incoherence of the concepts or misinterpretation of information received (Flavell 1979). Such review or feedback of learning and learning methods could improve with practice over time, eventually leading to instinctive choices of learning approaches (Winne 1996; McKoon and Ratcliff 1992), while for others metacognitive monitoring in adaptation of learning approaches burdens the cognitive load (Winne 1996) to such an extent as to hinder effective learning.

To become self-regulated learners, students with learning difficulties must acquire good metacognitive skills of knowledge, monitoring and controlling learning – all of which many students with dyslexia lack (Goldfus 2012). Acquisition of such skills enable the learner to monitor their learning performance and make judgements on when, where and why to deploy certain learning strategies (Borkowski et al 1989).

However, the processing capacity required to effectively apply different types of knowledge or strategies to various tasks, are normally deficient in individuals with learning difficulties (Swanson et al 2004) and would therefore benefit from focussed metacognitive skill instruction (Wong 1987). Teaching metacognitive skills helps to improve students' awareness of themselves as a learner (Kolencik and Hillwig 2011). The interest of educators in metacognitive research has far reaching consequences on the learning success of all students whether they have a learning difficulty or not. Incorporating metacognitive skills into teaching, can dramatically improve the quality of learning and enable students to deploy the learned skills in other situations (Wong 1987) although no amount of tutoring could substitute for the presence of motivation and will. Ultimately, non-cognitive factors such as affective and attributional domains are pivotal to personal motivation factors that galvanise self-regulation processes (Borkowski 1996). Confidence, self esteem and attributions are integral to metacognition since metacognition is under the control of the self (McCombs and Marzano 1990).

2.5 Self-regulation

Self-regulation is considered to include metacognitive skills with the addition of motivational, affective and cognitive states and behavioural monitoring (Harris et al 2004). Strategies for self-regulation are usually multi-layered structured approaches that are adapted as well as tried and tested for the intended tasks and goals. Perceived values and success determines the chosen approach or method (Winne 1996). However, failure in academic self-regulation occurs when students lack the skills to assess the nature and demand of tasks that consequently lead to inappropriate goal setting and planning (Zusho and Edwards 2011; Winne 1996; Bjork et al 2013).

Self-regulation deficits reported in students with learning disabilities (Harris et al 2004) may be improved through teaching of processes and strategies such as self-

monitoring, self-evaluation, self-instruction, goal setting and self-reinforcement (Zusho and Edwards 2011). In situations where subject knowledge is sound, individuals use forward searching techniques for locating information relevant to the task, minimising the requirement for metacognitive monitoring and task engagement efforts. More challenging knowledge or novel tasks requires deeper engagement of metacognitive monitoring in terms of the perceived task and strategies (Alexander and Schwanenflugel 1994). Outcomes of this first phase in self-regulation would determine the success of the ensuing task (Winne 1996).

Self-regulation practice can alter the feeling of academic self-worth (Borkowski 1996) and therefore academic support provided by friends and family are important to the continuing success of some students. Students who lack confidence in their academic ability may rely too heavily on such support, robbing themselves of the opportunity to become independent and autonomous learners. When embarking on university programmes many miles from home, the 'electronic tether' keeps students connected with their home support network through social media, emails, text messaging and phone calls. These multimedia channels continue the academic support mechanism of proof reading or editing coursework and organisation and planning workload (Hofer et al 2009), such that agency and self-regulation skills are not fully developed. However, when design is optimised and exploited within the educational environment, this technology could provide opportunities for learners to exercise agency; controlling their own behaviour and cognition (Sha et al 2012).

Although central to success, self-regulation skills are impotent in the absence of will; the desire to actively engage (McCombs and Marzano 1990). Importantly, it is the learner who has the control, enabled by the tools of technology (Liaw et al 2010). Therefore, if the learner has the knowledge and motivation to engage in learning, they

are the agents of pro-active self-regulation; improving and selecting required strategies (Bandura 2001; Bjork et al 2013) they have been taught or have acquired, to achieve goals. 'Agency is both determined by and determines the environment, essentially eliciting two key components of SRL: *motivation* and *metacognition'* (italics in original) (Sha et al 2011, pp 368).

The motivation to learn with a desire to do well and driven by an intrinsic love of learning is what generally promotes self-regulated learning (Thomas and Gadbois 2007; Kirby et al 2008; Sha et al 2011; McCombs and Marzano 1990; Bjork et al 2013). When left to their own devices, externally motivated learners tend to procrastinate and adopt task-avoidance behaviour (Wolter 2003; Kirby et al 2008) and largely respond to reward or avoidance of punishment (Ryan and Deci 2000).

Achievement goal theory categorises student achievement behaviour as either mastery or performance-orientated students. Mastery-oriented students are driven by their need to learn and understand material in order to maximise achievement (Zusho and Edwards 2011). Students adopting such deep approaches to learning employ higher order cognitive strategies (Kirby et al 2008), as external control transforms into internal self control (Ryan and Deci 2000). Performance-orientated goals on the other hand are said to be targeted at normative outcomes where students would compare their own performance with that of others to ensure they are either on a par or exceeding peer performances.

Performance-orientated students primarily focus on doing what is necessary to achieve results; which may not be consistent with strategies for comprehension (Zusho and Edwards 2011). This approach is often consistent with surface processing where students motivated by extrinsic factors often resort to less effective rote learning (Kirby

et al 2008), and therefore may forego the deep level processing (Covington 2000). This contrasts with the enjoyment of learning and motivation to seek new knowledge experienced by the self-regulated mastery-orientated students (Pintrich and De Groot 1990; Thomas and Gadbois 2007; Kirby et al 2008; Zusho and Edwards 2011), although many students may move between the two approaches, actively seeking solutions to attain goals (Zimmerman 1990).

Affective experiences of learning establish intrinsic or extrinsically motivated behavioural responses that contribute to the functioning of self as agency (McCombs and Marzano 1990). This is certainly reflective of the dyslexic student approach to learning, who although seeks to understand and make sense of a topic that forges the link with existing knowledge, is often forced to engage in iterative practice to memorise information, establish, build and consolidate these links over time.

The process of self-monitoring involves self-assessment of a particular behaviour or event, to consider the conditions, frequency and self-responses (Nelson & Hayes 1981). This procedure does not increase the range of behaviour, but serves only to examine current behaviours. Maintaining a record of such data provides an oversight of behaviour over time, without the involvement of external reinforcement (Harris et al 2004). Self-evaluation on the other hand incorporates values or standards as the external reinforcement, against which to benchmark specific behaviour.

Overt verbalisation during such activity or information processing aids attention focussing or processing of information. Self-instruction or self-talk is one such process involving overt verbalisation, supporting the self-regulation and guidance of behaviour in learners (Graham et al 1992). The impact on new learning may however be negatively affected where the self-regulation strategy does not adequately attend to the demands of a specific task (Reid and Harris 1993).

Goal setting is therefore an important self-regulation strategy for effective learning. Such dynamic activities fully engages the self and serves to inform on progress that is driven by targeted effort and performance (McCombs and Marzano 1990). Although self-judgment compares progress with set goals, performance is often determined by external reinforcement (Schunk 1990). An example of this is normative goals that are often peer markers used by students with learning disability to compare their performance as a means of enhancing self-efficacy and motivation. Self-efficacy and self-belief are powerful motivators that influence thought and action (Bandura 2001). It enables learning from experiences reflected upon with possible subsequent modification and regulation of behaviour (Caprara et al 2013). Afflerback et al (2013) suggests that high self-efficacy drives individuals to challenge problems, but I would suggest that determination and dogma would be necessary to maintain persistence when repeated attempts are required to achieve desirable outcomes. Those who have a level of confidence in their ability to complete or succeed in the task are more likely to persist in difficult and challenging tasks. However, whilst attainable goals may be easily sustained, motivation can be adversely affected when goals prove to be too challenging (Harris et al 2004; Schunk and Zimmerman 1997). Rewarding achievement of predetermined criteria sets in motion a self-reflective cycle of further self-regulation strategies (Graham et al 1992).

Self-regulation procedures and practices have benefited from the work of Meichenbaum (1980) in cognitive behaviour modification. He noted that strategy training incorporated a number of self-regulation procedures, which culminated in the conception of self-regulated strategy development. Central to this framework was strategy instruction (Harris and Graham 1999) to support critical skills within self-regulation development. The cognitive difficulties that students with learning disability

struggle with, which include attention, memory or information processing are compounded by low self-efficacy which results from previous learning experiences. Environments lacking emotional security where struggling students feel embarrassed and unsupported (Margolis and McCabe 2004) engenders engagement resistance and thus missed opportunities to develop important self-regulation skills. A structured and staged approach to develop life skills and strategies such as the quality of writing composition thus have meaningful improvements for students with learning disabilities (Harris et al 2004). Importantly, at the core of this planning for learning and self-regulation is structure and order. Chaotic environments pose huge challenges for students with learning disabilities because they lack calmness that structure and order provide, but instead prove to be distracting and stressful, adversely impacting on cognition (Mendl 1999).

2.6 Diversity in learning and teaching

Approaches to learning are embedded within many theories of student learning (Biggs 1987; Meyer and Land 2006; Schwartz et al 2011; Case and Gunstone 2006; Firth et al 2010) and social learning (Bandura 1977; 2001). Epistemologically, the role of socio-cultural structure and agency (Ashwin 2008; Archer 2003) and 'situatedness' of such learning within the social practice context (Haggis 2003) are important harmonious factors (Eraut 2007). At the root of social practice and student learning is the concept of student engagement; a wider more intricate web of relations between the student and learning institution (Trowler 2010). Alienation threatens such engagement when limited by a capacity to participate in unfolding discourses (Mann 2001), demonstrating a need to widen consideration beyond agency (Kahn 2014).

Widening participation policies in the UK enables students from a wide range of backgrounds to enter higher education through a variety of routes (BIS 2014). Such variation creates vibrant and challenging learning environments for learners and

educators (Zusho and Edwards 2011). The resulting gap between policy and practice often leads to teaching staff not being sufficiently supported and thus often lacking the knowledge or insight regarding specific learning difficulties. Consequently, such learners have restricted access to learning; being tailored more toward non-disabled students (Madriaga 2007).

Supporting such learners are often complex since there is no such thing as a typical learning disability student. The heterogeneous nature of learning disability rejects the single approach to learning and teaching. As in all learning environments, approaches to teaching and learning are more effective when awareness of individual learning styles are central to teaching and learning methods (Larking and Ellis 2004). Brooks and Weeks (1998) found that using visual, semantic teaching approaches were effective for high IQ, poor spellers. However, low IQ children seem to fare better using phonic approaches in a structured manner, although have similar underlying literacy issues (Everatt et al 2008). Such generalisation might be too simplistic. Consideration to the modes or methods by which new information might be absorbed, understood and remembered, and expressed or communicated, are more effective approaches to learning (Eide and Eide 2011). Learning the basics of effective approaches to learning are the necessary and essential skills children need to fulfil aspirations and potential, without which they are not able to keep pace with their peers (Rose 2014).

Making covert processes more explicit during the teaching process, helps students to witness how effective problem solvers think (Larkin and Ellis 2004) and when given the opportunity of practising such skills independently (Foster 2008), over time, students should be able to apply the skills in different situations (Margolis and McCabe 2004). Vygotsky considered working in the ‘zone of proximal development’ as an important aspect of independent learning, where the adult models and supports the learning of

the learner, then gradually removes assistance to transfer responsibility to the learner (Harris 2009).

Scaffolding learning in this way as first described by Bruner (1975), becomes successful if the acquisition of knowledge or skill is conducted in a hierarchical and staged process. Embedding the processes within multisensory and multimedia teaching and learning approaches, exploits and stimulates sensory responses. Based upon the evidence of sensory based information processing (Barsalou 2008), it follows that whilst some senses such as visual or auditory may predominate in some learning situations, they are not exclusively involved in information processing. While this is the ideal, far too often teachers are forced to maintain a certain level of curricula pace and to concentrate on those learners more likely to meet the learning targets (Pritchett and Beatty 2015). The quality of general education may therefore be achieved at the expense of less able learners, and therefore leads to learning inequality and learning casualties.

Since teaching instruction primarily focusses on factual knowledge without the teaching of techniques aimed at recalling memorised information, many learners lack the skills needed to build links or associations between new and current knowledge, with subsequent rehearsal as the first stage to committing this extended knowledge to memory (McGaugh 2000). Provided this piece of information is not overwritten at this stage, it becomes increasingly consolidated as it moves from the short term to long term memory. A consolidation method such as active engagement with the learning material has proved to be beneficial when the students learn the material well enough to teach it to peers.

Self-explanation and questioning encourage thinking more deeply about meaning (Chi et al 1994). Thus rote memorisation is not only inefficient but also negates the need

to contemplate meaning, whereas linking associations, cues visual imagery and mnemonics or rhymes, also use visuals such as pictures to aid understanding and support recall of the information (Scruggs and Mastropieri 1990).

Alignment of structural and agentic factors where learning support provision is tailored to the learning needs of the learner (Puntambekar and Hubscher 2005), enables the learner to take increasing ownership of their learning. However, not all learners are able to identify when they need help or the type of help needed. Since the learning difficulties experienced by individuals with dyslexic are not generic but specific to that individual, some sought more learning support than others (Wright 2005).

Learners may resist learning situations where responsibility of learning is placed with them, in a shifting of balance of power. Learning environments are more likely to enable agency where shared power and collaborative enquiry exists (Wilbur and Scott 2013). Although it often proves difficult to harness the diversity of learning styles, it is essential to ensure learning engagement at some level. Therefore to maintain interest in the subject and motivate further learning, teaching methods that are creative, participatory and facilitate self determination of learning pace can effectively utilise prior knowledge to enhance learning performance (Chen and Huang 2013).

Education systems are effective when they are enabling; where literacy and numeracy levels enable individuals to function effectively in society (Rose 2014; Pavey et al 2010). Struggling learners have a tendency to avoid tasks where they have previously failed and thus the notion of scaffolding provides the required learning support during the early stages of new learning and gradually tails off as the learner increases in confidence and competence, such that these skills are successfully employed in new situations (Puntambekar and Hubscher 2005). The primary mode of intervention of learning disability is direct instructions for developing academic skills. When asked, students considered individual tutoring support that enhanced learning strategies and

developed new study skills in higher education, a necessary and valuable intervention (Kendall 2016). Such intervention that improves general study skills are effective in raising academic outcomes (Torgesen 2004; Peer and Reid 2003) in higher education (Tops et al 2013; Pavey et al 2010; Mortimore and Crozier 2007), although it is generally accepted that this type of intervention is not uniquely applied to children with learning disabilities alone. Thus, teaching staff play a key role in engaging with learners to improve self-efficacy and self-belief in academic work (Margolis and McCabe 2004) through the promotion of informed and active participation in the learning process (Puntambekar and Hubscher 2005). Efficiency and effectiveness of players and relationships within such complex teaching-learning contexts are essentially dynamic and flexible, where both players take ownership of their responsibilities within such relationships (Ashwin 2009).

Anderson (1982) promoted a theoretical account of the process of skill acquisition, which he categorised as 'declarative', 'knowledge compilation' and 'proceduralization'. During the first declarative stage, working memory is loaded with facts for performance of a skill. A process of error and rehearsal of correction occurs during this stage with progressive development toward the second stage. Knowledge compilation was explained as being the transformation of declarative knowledge through a range of processes of how to achieve the skill. During this stage a series of considered steps in the production become speeded up and blended into one smooth action.

Gradual automatisation of the skill over time leads to decreasing demands on working memory during the proceduralization stage. As the automatisation becomes embedded, new or easier means of executing the skill may be sought during what is referred to as the tuning phase. It is upon this premise of automatisation that Nicholson and Fawcett (1990) proposed the 'dyslexic automatisation deficit' hypothesis. Automaticity in reading is a complex and skilled process requiring phonological

encoding in single word identification, cognitive loading and processing, and vocalisation; thus playing a key role in reading skills. The better the automatisation of the sub-skills in fluent reading, the lower the cognitive load and the higher the processing speed (Nicholson and Fawcett 1990).

Dyslexic readers often struggle with vocalisation of phonologically challenging words and the slow speed to decode, taxes the short term memory which in turn causes comprehension difficulties. Comprehension difficulties are also evident in the writing skills of students with dyslexia, which requires a series of challenging executive processes such as planning, organisation, attentiveness and working memory (Seidman 2006; Logue and Gould 2014). Wong et al's (1989) study of the writing skills of learning disabled adolescents, reported students to be more concentrated on lower cognitive skills such as spelling, punctuation, correct wording in sentences and neatness than high order skills such as presentation and generation of ideas. These poor academic skills suggests the importance that teaching should not be confined to cognitive strategies, but includes skills and strategies that enhance reading (Afflerbach et al 2013) and knowledge of writing processes (Wong et al 1989).

Without harnessing such skills at an earlier stage, children with learning difficulties would continue to accumulate cognitive problems as they progress through school, with fewer opportunities of catching up (Wong et al 1989). However, with practice and learning support, the written work of dyslexic students with regard to ideas and structure could improve and be not too much different to that of peers in higher education (Connelly et al 2006).

Recognising that phonological processing, working memory and executive function are deficient in some dyslexic students (Vellutino et al 2004; Everatt and Reid 2009;

Stanovich and Stanovich 1997), are just some of the processes involved in the translation of ideas (Tops et al 2012) into linguistic orthographic forms; correctly aligning spelling, grammar, meaning and structure (Van der Sluis et al 2007; Hatcher et al 2002; Wong 1987; Graham and Bellert 2004), which helps teachers to understand how to structure learning support. Excluding the language challenges, most adult students with learning disability are able to demonstrate cognitive strengths of innovative and novel solutions to verbal or visual problems. These acquired skills are thought to develop through compensatory strategies to circumvent learning difficulties experienced (Everatt et al 1999) although the heterogeneous nature of learning disability cautions against generalisability of characteristics (Graham and Sheinker 1980).

Although some may consider that teaching children with dyslexia should be no different to teach other children (Norwich and Lewis 2005), evidence suggests dyslexic children benefit from a multisensory teaching approach, due to the multifactorial nature of dyslexia (Connor 1994). It could be argued that irrespective of learning difficulties, a single teaching method approach would not be an ideal and that all children are likely to benefit from a teaching approach that taps into all senses and learning styles. Basing teaching approaches on traditional learning styles categories and theories reduces the opportunities for learning engagement. Surface learners are more likely to alter their approach to learning in a sensory based teaching approach (Barsalou 2008; Ojose 2008). For example, the teaching of a new concept could be introduced by providing a verbal overview of the theory (auditory), with further explanation using images (visual), models (kinaesthetic) and note taking (reading and writing). Such multisensory approaches do not favour the traditional theories of singular, one or the other learning styles, but activate multiple representation simultaneously, and enhanced further through multimedia instruction (Mayer 2014). Learning styles are

therefore considered as ‘an individual’s natural, habitual, and preferred way of absorbing, processing, and retaining new information and skills’ (Kinsella 1995, pp171) which is often influenced by context and time.

There is now broader acceptance that the earlier literacy difficulties are detected the more likely it is that remediation would set the individual on a more successful learning path (Reid and Kirk 2005). Literacy based remediation should be undertaken at the earliest opportunity (Everatt and Reid 2009) to improve poor comprehension that is associated with a range of language weaknesses related to morphology and syntax (Tong et al 2013; Nation and Snowling 2000). The benefits gained from such intervention is irrespective of being considered poor readers or reading disabled (Stanovich and Stanovich 1997; Stanovich 1991; Lovett et al 1994) although in some instances the changes in reading ability were not notable (Torgesen et al 1992).

Although confidence levels in the outcomes of small scale studies within this field are much reduced when intervention details are ill reported, literacy remediation and metacognitive strategies (Lovett et al 1994) are nevertheless key to academic success (Elbeheri and Everatt 2009; Kirby et al 2008) and would benefit and be supported by the teaching of learning strategies (Moody 2014). Dyslexic students in higher education develop forms of coping strategies to manage longstanding reading (Kirby et al 2008) and study difficulties when their dyslexia remained undiagnosed during earlier schooling years (Madriaga 2007). Children would have to be in formal education for a number of years before failure of ‘fluent reading or spelling’ (BPS 1999) is acknowledged. It is sometimes due to continual effort of persistent parents that attention is drawn to genuine learning difficulties despite concerted efforts of the child. Failure during these earlier years leads to despondency, loss of self-esteem and interest in learning (Cooke 2001).

For many parents, educationalists and practitioners, this scenario is untenable. In the absence of mechanisms that recognise and remedying early signs of phonological deficiencies, children have often been described as lazy, stupid or should be trying harder (Cooke 2001). The constructs of dyslexia have ranged from 'mental retardation' Benton and Pearl 1978), to 'gifted' (van Viersen et al 2015; Weinfield et al 2006; Lafrance 1997). Such disparities challenges societal judgement when such extreme concepts are offered. It is clear that what is understood by the dyslexia label varies with context and interpreter. Some dyslexic students in higher education consequently tussle with what benefits the label attributes, other than access to learning support (Cameron and Billington 2015). It could be argued, that being labelled as dyslexic which is recognised as a neurological disorder, be preferred to being labelled as a 'garden variety poor reader' and of lower intellectual ability (Gibbs and Elliott 2010, pp 298). Those labelled with dyslexia often have to negotiate a considered path of judgment for disclosure or non-disclosure. Individuals have been socially stigmatised due to slower learning behaviour or being labelled with a specific learning difficulty (Riddick 2000). Responses to being labelled in this manner has shown to have longstanding impressions on the future of the individual. Individuals with learning disability have shown to associate more with others in the average or below prosocial behaviour or misconduct networks (Pearl and Donahue 2004). Many adult learners with learning difficulties are plagued by years of academic failure, although considered by peers to be successful and talented individuals outside of academia (Larkin and Ellis 2004).

There is general consensus regarding the importance of addressing phonological weakness within literacy deficit as the foundation upon which further learning attainment would be based (Sawyer and Bernstein 2008; Torgesen 2002; Torgesen et

al 1992). Of equal importance is the less widely documented remediation required to lessen the impact on learning of slow processing speeds and automatisation (Connor 1994; Everatt and Reid 2009). More research to support practice strategies and intervention in an effort to reduce the trial-and-error approach of many practitioners is needed, in their effort to identify the best support mechanisms for individual students (Everatt and Reid 2009). Crucial to such a support system is the social model of learning; inclusive approaches to learning and teaching recognises and takes account of a range of learning styles and abilities, standardising teaching and learning practices to benefit the whole student body (Rodgers et al 2015).

More recently, recognition for a broader scope in remediation has led to the visual deficit hypothesis. Oversensitivity to light, known as Scotopic Sensitivity Syndrome, renders some individuals with dyslexia to experience reading disturbances that may be remedied through the use of coloured overlays or lenses to alleviate certain light wavelength sensitivities (Everatt 2002). Although there have been pockets of evidence to support this theory (Wilkins 2004), the low levels of research publications in this area have not provided sufficiently convincing evidence of the mechanisms involved in this sensitivity (Everatt and Reid 2009).

Empowering learners in a variety of contexts to monitor and evaluate their learning is key to successful instruction (Reid and Valle 2004) although successful use of in class strategies may not necessarily be transferred to other life situations (Wong 1987). Instructors should thus remain alert to appropriate contextual learning strategies and purposeful transference.

Increased knowledge and awareness of the learning challenges faced by students with dyslexia, is the metaphorical key that enables (Foster 2008) many students with dyslexia to realise their academic ability (Pollack 2005; Moody 2014).

2.7 Conclusion

The profile of dyslexia as a specific learning difficulty is paradoxical; contentious yet improved greatly over the past couple of decades, largely reflective of research activity within the educational, psychological, neurological and social domains. What is evident within all research is the complexity and uncertainty that continue to dominate all spheres, while at the same time enriching the understanding and appreciation of issues relating to learning difficulty.

What is also evident within literature is the increasing interest and importance to be placed on metacognitive and self-regulatory practices of students with few related to dyslexia. Importantly, what we draw from the diverse metacognitive research is the impact focussed remediation can have on the learning of students with dyslexia when emphasis is shifted from a deficiency model to one of instructional, with equal importance placed on cognitive and metacognitive skills (Wong 1987).

Although additional learning support that is focussed to improve learning attainment and experiences may prove to be effective in some situations, students with learning difficulties are likely to experience lifelong academic difficulties (Shaywitz et al 2008) due more to their coping strategies rather than learning deficiencies (Margalit 2003).
The study of metacognition suggest that it is not a unified theory, albeit offering a wide range of theories for examining learning practice. Of relevance is the importance of self-systems such as motivational antecedents, the development of knowledge about task and strategies, development of metacognitive judgement and monitoring skills together with the emergence of self-regulatory skills (Borkowski 1996).

Chapter 3: Methodology and Methods

3.1 Introduction

This chapter describes the approach taken in my research design and methodology. It will also discuss some of the challenges faced by an insider researcher and outline the processes of data analysis.

To aid my understanding and interpretation of the phenomenon, I would be using constructivist theories as my conceptual framework within the theories of social learning, and the disability interpretive lens to focus on learning disability as a difference and not as a defect (Mertens 2003; Creswell 2013). The transformative intent of this study provides the participants with the opportunity of inviting the researcher and interested parties into their experiences of 'being-in-the-world' of dyslexia and will challenge the ontological assumptions of the stereotypical dyslexic in 'that which seems "real" may instead be reified structures that are taken to be real because of historical situations.' (Mertens et al 2010). The transformative intent here is not for bringing about political and policy change but bringing about changes in perception, primarily in the host institution but also in the wider educational community through explicit value laden knowledge of the learning practice of students with dyslexia in higher education, as a stigmatised group.

Ontological and epistemological positioning, together with the research questions, provides the research methodology and method framework (Grix 2010; Creswell 2013). Methodological considerations to address research questions are not prescribed, but rather serve as tools to aid our understanding of the world, which in turn is informed by how we view the world (Cohen et al 2000).

3.2 Research Paradigm

Research literature is rich in paradigm conflicts between positivists, post-positivists, constructivists and critical theorists. To position myself within these philosophical paradigms, seemingly endless self-reflection, questioning and debating arose, stimulated by purposeful and reflexive literature. Framing of the research paradigm was guided by the constructs of Guba and Lincoln's (2005) belief systems; ontological, epistemological, methodological and axiological assumptions.

My ontological assumptions are grounded in the belief that reality is borne out of our existence within the world; interacting, reacting and creating meaning. What is real to us and the sense we make of it is relative to our perspective and knowledge and constructed by social forces which are contextual and time bound. The explanatory power of social constructivism is thus borne by simplification of the complex dynamics of social interaction (Burr 2003) by socially constructed and constructing individuals (Sayer 1997). Socially constructed reality is shaped by a range of factors and thus within the context of this study my questions would be "What is the perceived reality of the learning of students with dyslexia?" and "What are these students' perceptions and understanding of their learning?" The reality embedded within the learning experiences of students with dyslexia would be a snap-shot in time. Ontology should essentially encompass change, but at the same time recognise enduring structures within (Bhaskar 2002). Bhaskar proposes stratified layers of reality; real, actual and empirical. The 'real' accounts for the unseen structures that we cannot observe, but speculate on, such as gravity which we cannot see, touch, hear or smell. The 'actual' dimension of reality is suggested as being the mechanistic enactment of the real, such as the apple falling from the tree due to gravitational force. So we cannot observe gravity but we can observe an event that occurs as a result of gravity. The last layer of reality is empirical; the observed experiences of the actual. Based on the

observations of the events, the observer is able to make speculations of the real through interpretation and theorising the actual events.

This model of stratification, may be utilised to conceptualise the notion of the effectiveness of student learning. Although the mental processes involved in acquiring and processing knowledge are not visible, what has been understood and learnt may be observed through verbal, written or physical demonstration of such knowledge. I draw on the philosophical basis of critical realism, postulating created concepts and theories of the world we live in that is contextual and partial, primarily limited by our perception and conceptual schema, because existence is independent of our being (Altheide and Johnson 2011; Scott 2005).

My epistemological assumptions are thus based upon the knowledge creation and understanding gained through personal interaction with the participants. The experiences of the participants thinking about their learning; their perceptions and reflections on learning strategies and regulation of learning would provide an informed knowledge of their metacognitive practices. Although situated outside of the teaching-learning interactions (Ashwin 2009), such reflexive accounts are valued contextual epistemologies of the participant which are bound to be subjectively critiqued and interpreted and contextually fallible in dimensions of time, place and situatedness.

My interpretivist position further underpins my philosophical belief that individuality is created through interplay of nurture, nature and social interaction. Interpretivist and critical realist theories are thus aligned, accepting that by their very nature, social phenomena are meaningful with multiple interpretations and as such are described and understood, rather than measured.

A constructivist interpretivist epistemology embodies the belief that to understand or create sense of the phenomenon, it has to be interpreted. Constructivist and interpretivist perspectives offer a unique conceptualisation of human inquiry. Interpretivism or 'Verstehen' (associated with the work of Weber, the German sociologist), perspectives relate to understanding the meaning of a social action by considering the context and social cues contained within, and theorising these as the intention of the actor by stepping into their shoes and entering their minds.

Heideggerian phenomenology is concerned with intersubjective meaning; focussing on the contextual existence of a person in time (Mackay 2005) and interpretation of social reality in terms of our own everyday life actions and that of others. Schwandt (2000) considers the interpretivist perspective as subjective understanding of attempting to capture the intentions and beliefs of the actor may also have a level of objectivity about it by the interpreter consciously stepping out of their 'historical frames of reference'. I would argue, that whilst some consider this process to be an important means for avoiding mis-interpretation, our historical frames of reference is the epistemic bedrock that facilitates the interpretive process; deconstruction or decontextualisation of the scenario, followed by reconstruction and recontextualisation in light of ones frames of reference. Inferring meaning is based on our own background, experiences and beliefs, at the same time accepting that ontologically, the existence in the real world is independent of our belief (Creswell 2013) that may emanate from environmental influences outside of our control.

"The perspective of the observer and the object of observation are inseparable; the nature of meaning is relative; phenomena are context-based; and the process of knowledge and understanding is social, inductive, hermeneutical, and qualitative." (Sexton 1997, p. 8). Philosophical hermeneutics advocates meaning as being

negotiated rather than constructed; suggesting that understanding is changeable and open to the perspectives and sense making of the inquirer within a social context. To be meaningful, utterances within such interpretations are bound by context and rules of human action and language. This sociocultural backdrop enables creation of new knowledge through the use of models and concepts that is repeatedly tested and modified in the light of new experiences (Schwandt 2000).

The epistemology of social constructionism imbues contextual frameworks as a means of understanding and explaining the world (Schwandt 2000).

> "... our brains interpret the input from our sensory organs by making a model of the world. When such a model is successful at explaining events, we tend to attribute to it, and to the elements and concepts that constitute it, the quality of reality ... But there may be different ways in which one could model the same physical situation, with each employing different fundamental elements and concepts. If two such … theories or models predict the same events, one cannot be said to be more real than the other..." (Hawking and Mlodinow 2010, p 8).

What this means is that as individuals, the meaning and understanding we take from a given experience can vary based on our perspective and so becomes a unique interpretation. This understanding is jointly constructed whereby the understanding of one person is developed through interactions with others, and therefore shaped to some extent by such encounters. The caveat within observation of events and the constructs generated is that we remain alert to the fact that epistemologies are limited and influenced by our own background, understanding and experiences, and as a consequence, the subject of our interpretation.

The constructivist interpretivist stance taken within this study is twofold. Firstly being emphatic about description as a means of seeking to understand and develop meaning of lived experiences that is both complex and contextualised. Secondly to accept how the study participants perceive their student roles and experiences of the phenomena (Grix 2010), facilitating and encouraging (whilst not cajoling) voicing of such experiences.

Epistemologically posed questions would be “What are the factors that shape the way students with dyslexia learn and how is this learning deployed?” Based upon this premise, “What might effective learning look like?” and “What are the determinants of an effective learner with dyslexia?”

Based upon a constructivist interpretivist epistemology, my methodological assumption guides me quite naturally to a qualitative research approach that enables understanding of experiences and perceptions, since interpretation of reality within the context should be enabled by the methodology of choice. To understand how students with dyslexia manage their learning, qualitative information of their lived learning experiences; emotions, attitudes and specific difficulties would be necessary. From the researcher perspective, the inductive approach opens up the field of research by enabling me to pursue any changing direction in the nature of the phenomenon, once the research has begun and formulate new theoretical frameworks from emerging patterns.

The reality of such experiences are therefore subjective and multiple (Charmaz 2006). Holding the key to a world rich in unique and affective information, as a qualitative researcher I would be limited by time span available and the situational context; the mood of the participant, relationship between participant and researcher, nature of

phenomenon, interview environment and therefore bound by context. These limitations may be balanced by an approach that is context free; where the participants control where and when to execute a self-administered research tool.

Traditionally, the quantitative research methodology is considered to provide a positivist approach to data collection and as a sole methodological approach, would not serve to provide insight of the human experiences underlying the phenomenon. Interpretation of qualitative research methods being based upon words and quantitative methods based on numbers implies that the two methodologies are restricted to these dimensions (Bergman 2010). Being confined to the rules or boundaries of a research methodology may not only limit the researcher in their quest, but also the accuracy of the study outcomes (Law 2004). These limitations in research approaches have been reconceptualised to exploit the scope of research methods by blurring and modifying the framework boundaries of traditional qualitative and quantitative methods (Green et al 1989; Onwuegbuzie and Coombs 2010; Teddlie and Tashakkori 2006; Tashakkori and Creswell 2007) such that the methods are not separate but an interactive continuum (Newman and Benz 1998).

Whilst the use of a quantitative element would contribute a useful dimension of data that describes the approaches to and management of learning through the use of a self-administered inventory, a qualitative approach would add the emotional and social dimension of the human learning experiences under study. Thus mixed method approaches enable the collection of different types of data for different purposes (Mertens 2007), where the intent of both methods are to explain their findings (Onwuegbuzie and Leech 2005). For complementarity and pragmatism, seeking elaboration and clarification within different perspectives of the phenomenon (Green et al 1989; Law 2004; Nastasi et al 2010; Morgan 2007), data generation would benefit from extending beyond a single methodological approach.

My axiological assumption regarding ethical research values lies within the transformative paradigm to ensure respectfulness of participants and remaining mindful of the vulnerability associated with disability. Beneficence aims are for increasing and transforming knowledge and awareness of the learning practice of students with dyslexia to reframe values and attitudes and dispelling commonly held stigmas through the voicing of learning experiences of participants who have diverse and complex specific learning difficulties (Mertens et al 2010).

This study intends that the outcomes of the research is not to the sole benefit of the researcher, but that participants gain an increased insight into their learning and provokes an interest in exploring further, areas within knowledge of cognition and regulation of cognition indicated as deficient. In an attempt to move closer to this intent, the pragmatist perspective presents an opportunity of inquiry being interpretivist (qualitative) and less subjective (quantitative) perceptions; such that the integration of different perspectives supports interpretation of the data.

Valuing the opportunity the participants have granted me in allowing me as a researcher to enter their world, shining a spotlight on sensitive and highly personal issues and then categorising and re-framing their experiences as my interpretations of their reality, is an expression of trust in our ethical values. Dillard (2006) suggests that research is a responsibility where the researcher should be answerable and obligated to the people being researched. The privilege bestowed by the researched goes beyond the formal processes of research approval panels and into the foundations of the ethical context; situated firmly within the values and attitudes of the researcher.

3.3 Methodology and Methods

Research design is driven by the research purpose, the researcher's philosophical perspective and the inference quality; that enables sense making of the phenomenon (Tashakkori and Teddlie 2010; Law 2004; Grix 2010; Creswell 2013). As such, my research approach was based on my ontological and epistemological stance as a constructivist interpretivist; believing that social reality phenomena are determined and constructed through emotional interactions of 'being' in the natural world. Furthermore, that the research purpose should not be curtailed, confined nor re-shaped by research methodology, but rather that methodology be the servant and not the master. What works and best serves the purpose of the research is the pragmatists stance adopted in this study. This does not mean abandoning rigour for a more flexible habit of mind, but rather to deliberate and question with an open mind, not bound or limited by methodological ideologies. Open mindedness encapsulates elements of intuition; an untapped cognitive potential, and intellectual knowledge that evolves as a difference to instinct (Allen 2013). However, this knowledge is limited by experiences and insight, relying on cyclical interpretative analysis of data rather than analytical methods (Servillo and Schreurs 2013).

Empirical research serves to provide the quality of data required to realise the research purpose, by answering the 'why' and 'how' questions. A qualitative approach seemed the most natural methodology for understanding a social phenomenon within the context of its setting, where interpretations of experiences are subject to the interpretations of the researcher. A quantitative inventory conversely offers a quick means of measuring participants' responses to specific aspects of that phenomenon.

The distinct features of the two methodologies; quantitative survey and qualitative interview inquiry would optimise the quality of data collected, through complementation of accessible information and the integration of the processes and data. Using quantitative and qualitative methods in this manner would not only "serve the dual purpose of confirmation and elaboration of results" (Creswell and Tashakkori 2007, p 109) but also enhance the study further than either one of the individual approaches (Bryman 2007). The two-way relationship facilitated by the qualitative approach enables the researcher to 'guide' the participant in describing their perspectives and detailed lived experiences of the phenomenon during the interview process. To adequately address the scope and extent of the subject matter within the interview, careful and considered planning of the interview is essential. The limiting factor however is the interview time the participant is willing to commit to.

The quantitative survey on the other hand, lacks the means for accessing the detail of the participant's stories relative to the phenomenon. It does however, facilitate insight into of a wider range of learning practices than offered by the qualitative approach, which is restricted by time bound interviews.

There has been increasing acceptance of this methodology as a pragmatic approach; combining methods on the basis of their practical usefulness (Maxwell and Mittpalli 2010; Onwuegbuzie and Leech 2005), although some researchers' believe that the philosophical stances of the qualitative and quantitative researcher may be in conflict, making the methodologies an unworkable combination (Johnson and Gray 2010). The subjective and seemingly objective perspectives of the two methodologies may be conceived as being agonistic to the aims of a research project but in this instance, both approaches examine similar topic areas from different perspectives.

From a pragmatist's stand-point this mixed methods approach would not compromise the study outcomes since my ontological and epistemological positioning are not conflicted (Bryman 2007). For me, pragmatism is not about internal conflict, nor 'split personality' (Diggens 1994), but an attitude to orientation, adopting an alternative to traditional ways of thinking and about being open minded and willing to consider different points of view and philosophies. I believe that the 'flexible habit of mind', as pragmatism has been described, is an ideal approach for my purpose since it is compatible with a variety of philosophical approaches (Nicolson 2012). Therefore when adopting a research approach, what came more naturally to me was the metaphorical bough bending and flexing in the prevailing wind and not just about going with the flow, in accepting a methodological and philosophical approach typical of the nature of qualitative research I was to embark upon.

In the subsequent sections, I will discuss qualitative and quantitative methodology and methods, followed by the combined, mixed method approach of this study.

3.3.1 Qualitative Approach

My qualitative methodological choice is based upon enabling me to understand and describe the phenomenon, since this approach shares its philosophical foundation with the interpretive paradigm. The constructivist interpretivist approach taken in this study views social reality as being constructed through interactions of subject and object and interpreted to create meaning, albeit multiple meanings and realities (Crotty 2004).

I will be seeking to understand and describe how students with dyslexia experience understanding and regulation of their learning; the insight they have of the types of strategies they use and knowledge of their approaches to their learning; where and when they apply them and the factors influencing the 'effectiveness' of their learning.

Effective learning may be defined by the students in the context of social, educational and affective influences, although no such suggestion or structure would be prescribed.

Phenomenology is a research tool that would facilitate this exploration and description of the lived worlds of research participants. As a research design, phenomenology has evolved and developed from its early philosophical roots to one that is now recognised as an approach for studying the nature and meaning of phenomena (Finlay 2009; Mackey 2005; van Manen 1990).

A brief overview of the prominent philosophical proponents that determined my choice of qualitative research method will be discussed here, followed by further considerations of the quantitative research approach.

Edmund Husserl (1859 – 1938) and Martin Heidegger (1889 – 1976) were the founder philosophers of phenomenology (Mackey 2005; Phillips-Pula et al 2011). Heidegger was a follower of Husserl before he branched out on his own philosophical journey. Husserl's philosophy focused on the epistemological knowledge of human experiences, knowledge that is independent of conscious experience, transcending human experiences. Heidegger's concern related to understanding the ontology of 'being' (Mackey 2005), building connections with epistemological questions to understand what can be known about the nature of reality (Crotty 1996). I have drawn on Heidegger's phenomenology, seeking to interpret and understand being-in-the-world (Mackey 2005) as a grounding for my ontological assumptions of 'what it is to be'.

Three distinct phenomenological traditions are recognised:

- Transcendental
- Hermeneutic
- Existential

Transcendental phenomenology was conceptualised by Husserl as an approach whereby reality can be discovered and described when going beyond experiences. This is built upon the premise that the researcher can remain detached or bracketed, and arrives at a single description of the phenomenon untainted by subjectivity (Lowes and Prowse 2001). Although I am aware of transcendental workers (Bhaskar 2000) and respect their beliefs, this practice does not harmonise with my own current philosophical position. I can accept theorising what is unexplained as a way of deriving some meaning, but believe that reality is multiple and limited by ones own 'being'. Interpretation of a phenomenon may be considered on a plane of acceptance or connectance where accepting theories as knowledge (as in metaphysics) is distinct from being able to connect with knowledge that is based on 'being in the world' and thus further confirms my parallel with Heidegger.

Interpretation is a conduit for making sense of the world, where Heidegger referred to such understanding of the meaning as "hermeneutic" (Mackey 2005); phenomenology uncovers the meaning and hermeneutics interprets the meaning (Bäckström and Sundin 2007).

Existential perspectives of phenomenology also situate the phenomenon as being-in-the-world and thus a non-dualist approach of humans present and interacting within the world. Together, hermeneutics and existentialism engenders reflexivity and centralizes the human dimension in the research inquiry (Todres and Wheeler 2001).

The phenomenological approach centers on the description of the real life scenario and the researchers subjective interpretation (Allison et al 1996; Mackey 2005; Pringle et al 2011). These dualist forms of existence and truth have been credited to Descartes (Sikerry 2006) and Heidegger thereafter.

As a researcher engaging in this methodology, being astute to concerns of rigour in the research process and validation of data interpretation (Creswell and Plano Clark 2011) is essential for valuable contributions to the knowledge base. The value of any knowledge contribution made to the research field would be based upon legitimacy and thus rigour (Koch 1996).

The debates surrounding issues of research vigour and validity continue to be pertinent with little evidence of agreement amongst qualitative researchers with regard to quality criteria. In some areas of research practice, rigour and thus validity may be achieved by adhering to procedural steps. However, the diversity of qualitative approaches suggests that enforcing such quality criteria may not do justice to the data. Such diversity emphasises the importance of the researcher's ethical obligation in proclamations of why their work should be trusted (Altheide and Johnson 2011). Criteria such as 'confirmability', 'meaning-in-text', 'recurrent patterning', 'plausibility', 'credibility', 'creativity' (Leninger 1994; Altheide and Johnson 2011; Sandelowski 1993), 'trustworthiness' and 'authenticity' (Creswell 1994) are argued to be alternative criterion more appropriately applicable to qualitative research.

As a novice researcher, examination of 'validity' literature to aid my decision making in appropriate quality criteria within phenomenology proved to be quite challenging. Some phenomenologists propose pre-set processes set out in a structured and staged format. This provided a good starting point and much needed confidence in beginning the internal debate and deliberations of how subjective, interpretive research provides assurances of credible knowledge generation. What is apparent within the literature is the prevailing tension of terminologies between methodologies. On one hand a requirement for an overarching and unifying criterion, but on the other hand adamant about the distinct philosophical basis of each methodology.

Cycles of confusion and clarity were guided by the caveat of validity not being an inherent element of procedure but associated with data generation within a purposive context (Maxwell 1992). Validity criteria demonstrates the authenticity of concepts and theories arising from such data as being representative of the phenomenon (Hammersley 1992) and yet providing the space to go beyond existing knowledge to creatively present new knowledge (Marshall 1990). Furthermore, there is uncertainty in all knowledge however well founded empirically or theoretically (Emden and Sandelowski 1999).

This leads me to believe that irrespective of the term used, quality research standards are what all researchers strive to demonstrate. For interpretative inquiry, this means that validity criteria would map to the research approach taken; relatively ideal for the research purpose and context (Maxwell 1992). Whittemore et al (2001) reconceptualised validity criteria into primary and secondary criteria; the former constituting credibility, authenticity, criticality, integrity and the latter being explicitness, vividness, creativity, thoroughness, congruence and sensitivity. Primary criteria are considered the essence of all qualitative research while elements of the secondary criteria may apply to only some research approaches. For example, phenomenological research *'... will need to address investigator bias (explicitness) and an emic perspective (vividness) as well as explicate a very specific phenomenon in depth (thoroughness).'* (pp 529). However, sensitivity to the nature of the phenomenon and creativity in data generation may also prove necessary.

These ideals were built into the qualitative approaches; a face to face semi-structured interview designed to collect factual lived experiences of higher education students with diagnosed dyslexia; their knowledge and perceptions of the effectiveness and

quality of their learning practice and management. Inclusion criterion was based on students with diagnosed and disclosed dyslexia within a particular department of the university. Sixteen of the twenty students registered for learning support agreed to participate in this research. Invited participants were provided with written information regarding the purpose and intent of the study and researcher contact details to request any additional information, so that they were in a position to make an informed decision regarding involvement in the study.

All participants requested the interviews to be held within their place of study. A neutral location (a meeting room) within the university was booked for the pre-arranged interview times. Prior to commencement of the interview, purpose of the study, consent to participate and audio-recording were re-confirmed. Open questions used were intended to encourage the participant to talk freely about their experiences with minimal interruptions. The questions were kept to a minimum to enable the participant to become immersed in the phenomenon and disclosing information of their choice. Questions such as “Tell me how you might go about preparing for an assessment; a written exam and assignment/essay?” were used to direct the focus of the interview. Further questions were based on interview responses to elicit more information or detail, although trigger and prompting questions were also posed to encourage discussion around the key areas of the study aims and as a means of separating my knowledge and experience from that of the participants. The questions would be designed to gain insight into feelings of self-efficacy related to learning practice and perceptions of “effectiveness” as a learner.

3.3.2 Quantitative Approach

To complement the qualitative data collected, a further study objective was to examine specific detail of how students understood and regulated their learning. Quantitative

research is helpful in bringing about more meaning of general principles of learning practice by situating the events of learning knowledge, management and regulation for quantitative measurement and interpretation. Westerman (2006) proposes that the interpretive function of qualitative and quantitative approaches only differ in that the degree of focus of the former is on characterising phenomena in meaning-laden terms, whereas the latter concretely specifies phenomena.

The quantitative approach considered the most useful was the metacognitive research conducted by Schraw and Dennison (1994). They developed an inventory which was distributed to 197 college students with no distinction made between students with or without specific learning difficulties. Use of this inventory for the purposes of this current study, was not intended for large scale data collection and analysis as is the norm for quantitative methods, but to complement my qualitative data such that the outcomes may be further enhanced through additional insightful and interpretive dimensions (Bergman 2010). The statements within this inventory were designed to provide a measure of the participating student's knowledge of specific aspects of their learning behaviour pertaining to the characteristics of metacognition. For my study, this inventory was distributed for completion the day prior to the interview and handed back in on the interview day. The data generated provided a useful development tool that students may use to improve their learning outcomes.

The inventory contained two defining factors: knowledge of cognition and regulation of cognition. The categories (variables) examined within factor one consisted of: declarative knowledge (knowing learning capabilities); procedural knowledge (knowing how to apply what they learn); conditional knowledge (knowing the circumstance under which a learning strategy is suitable). Factor two categories were: planning (managing time and setting goals); comprehension (understanding own progress); evaluation

(analysing strategies); information management (focussing learning topics); debugging (sorting out learning problems). In the original study, content validity testing of this research tool used factor analysis; a number of questions were loaded by category such that they loaded to two main factors of metacognition; knowledge of cognition and regulation of cognition, with the aim of validating data relationships and variance and reliability testing (Schraw and Dennison 1994). Those questions that did not achieve an eigenvalue of greater than one were discarded (Hill and Lewicki 2007). Factor analysis functions to reduce the volume of multivariate data to fewer dimensions that is more manageable but still captures the maximum amount of original information in a more efficient way of reporting the data. Additionally, multivariate reduction addresses the increased chance of errors in measurements with increasing numbers of variables that are correlated (Hill and Lewicki 2007).

Using an established inventory that examines and addresses the intent of my research question, offers the advantage of having been previously piloted, refined and validated elsewhere. Reliability and validity of this 52 question instrument was confirmed in other studies (Young and Fry 2008; Kleitman and Stonkov 2007), reporting similarly significant statistical data. Based upon successful use of this instrument by other workers, it seemed foolhardy to modify the tool in any way, thus jeopardising the validated status of the instrument (Creswell 1994).

3.3.3 Mixed Methods Approach

Mixed method research facilitates the use of the most appropriate qualitative and quantitative approaches to thoroughly exam the phenomenon of interest. This so called methodological eclectism, provides the researcher with a choice of tools considered to be the best methods for answering a diverse range of questions (Tashakkori and Teddlie 2010). From the pragmatist perspective, mixed methods

research aligns with the philosophical viewpoint of “what works” (Creswell and Plano-Clark 2011); where the research approach is driven by the research question and not the reverse. Such an approach seemed appropriate to examine the research questions: How well do the participants say they understand their own learning processes in academic contexts?; How successful do the participants say their learning strategies are, or have been?; How do the participants say their use of learning strategies in academic contexts has been/ could be enabled or limited?

The intentions of the research was to delve deep into the participants understanding of their learning strategies by questioning the why, when, how and what of their practices. Although qualitative methodology would be effective in gathering the minutiae of such data, I considered the length of interview time required for such detail would exceed the average 60 – 90 minute time commitment time. I considered further, any suggestion of extended interview times would discourage participation in the study.

Many studies examining the metacognitive practices of students in higher education were on a larger scale. (Borkowski 1996; Wong et al 1989; Azevedo et al 2010; Green and Azevedo 2010). The inventory approach was chosen as a quick means of capturing a wide range of evidence appropriate to the study, although it lacked the personal stories underpinning such experiences. Access to the nuances of learning experiences are important for setting and understanding the context of individual situations, especially where the learning of participants are complicated by dyslexia.

Thus, limited by the interview time, an additional research tool in the form of a survey was sought to facilitate drilling down deeper into the learning practices of participants, to enable examination of the detail and intricacies of such practice with regard to

metacognitive and self-regulatory skills. The criteria required of the additional instrument was that it examined both metacognition and self-regulation and demonstrated successful use within educational research. The chosen inventory indicated suitability based upon the set criteria and being validated through further equitable research.

The different research approaches and philosophical foundations of qualitative and quantitative research are therefore the argued basis for different and more appropriate criteria (Leninger 1994).

This paradigm shift has led to an increase in mixed method approaches that have been defined as "research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches, or methods in a single study or a program of inquiry." (Tashakkori and Creswell 2007, p4; Creswell and Tashakkori 2007). Other attempts to define mixed methods (Tashakkori and Teddlie 1998) have led to reconceptualization of approaches where data is integrated (mixed methods) or not fully integrated (quasi-mixed methods) (Teddlie and Tashakkori 2006).

During the design stage of this study, I considered the qualitative arm of the research to be the main thrust of the study and would thus be the primary approach, followed by the quantitative element. For logistic reasons, I decided that qualitative and quantitative data would be collected concurrently. Participants on different delivery modes and at different stages their of study had different teaching and assessment schedules and may not be able to commit to separate research interventions at different stages. Additionally, since the quantitative approach was a self administered inventory, the risk of non compliance would jeopardise the credibility of the project and invalidate the research aims. Following completion of the audio-recorded 60 – 90 minute interview,

the process would proceed to transcription and qualitative analysis once all the interviews had been completed.

This stage would then be followed by analysis of the quantitative inventory handed in at the interview and the subsequent integration of analysed data from both approaches. However, following completion of the first interview, the participant asked for clarification of a couple of statements within the inventory. As we talked, I realised the importance and relevance of our discussion to the data collection. Audio recording was restarted and continued for the duration of the second phase of the interview. For the purpose of capturing as much evidence on audio-recording, the participant agreed to reiterate the initial discussion for completeness. Such discussion and interaction between interviewer and participant lead to co-creation of unique and significant research data (Lowes and Prowse 2001).

During post interview writing of field notes and reflecting on the process, it became apparent to me that the quantitative element of the study would contribute far more when integrated at the data collection stage. Although this approach was not evident in research methods literature I reviewed, it was not a basis for rejecting it as an approach, but I believed instead that this approach further enhanced the quantitative contextual information. Inference quality is an important factor in research design, and as such I considered whether construct validity that had been integrated into the framework of the study design (Messick 1995) would be negated.

Emphasis on the appropriateness of methods chosen, relationship between qualitative and quantitative approaches and their sequencing, which are key to the quality of inferences drawn from combined methods (Onwuegbuzie and Johnson 2006) had been pivotal during the design stage. Reassured that construct validity remained

intact, all subsequent interview times were shortened to allow for discussion of responses to inventory statements which in turn provided more qualitative data. No changes were made to the inventory responses where discussion revealed conflicts in perceptions, understanding or knowledge, but noted in my researcher note book for future consideration. Quantitative and qualitative research methods used in this study thus proceeded as concurrent data collection and analysis, for merging as unified data generation and interpretation.

Barnes (2003) described the influence research has had in the paradigm shift regarding disability issues, from the medical to the social model. The social model of disability and social learning theories will be the conceptual framework used to facilitate insights into the different perspectives of the phenomenon (Finkelstein 2002) such as disabling barriers and impairment. Mixed methods research approach supports transformative paradigms; with qualitative data providing an in-depth subjective perspective and the quantitative providing the specific inferences used to influence change (Mertens et al 2010). Change in this instance is not for enhancement of social justice in the wider political sense, but for attitude and perception change through increasing the visibility of stigmatised communities (Mertens et al 2010; Natasi 2010).

3.4 Insider researcher perspectives

My position as the Inclusion Officer at the host institution provides me with unique privileges and challenges as an insider researcher. By virtue of this position, having direct access to students within a particular department who have been diagnosed with specific learning disabilities, and developing a relationship with many of these students is a privilege that outsiders would not achieve. Herein lies the challenge, that as an insider researcher being an authoritative figure within the organisation, may subject the participant to some level of pressure in agreeing to participate in the study. In

compliance with ethical approval, students were assured that participation or non-participation would not affect access to any learning support provision. Having met with all students who had been diagnosed with dyslexia to discuss learning support, these students were familiar with my office location, what other roles I performed within the department and therefore my position within the organisation. The researcher-student- participant relationships were thus well established.

Such relationships proved to be an advantage as an insider researcher. I believe our established relationship, enabled participants to feel at ease when discussing sensitive and personal details of their learning experiences. An example of this was when two of the participants became tearful and emotional when recalling past learning experiences and when receiving their diagnosis of dyslexia. They were able to contrast past and present experiences and use situated events within the institution that I could relate to and thus provide situated empathy and reassurance.

Mindful of the personal nature of the research and thus the vulnerability of individuals with dyslexia, I decided to invite study participation via email. I considered that face to face invitation would place students under pressure whereas the email mode of contact provided sufficient space and distance for students to decline participation. Humphrey (2012) presented aims and objectives of her research to the cohort under study, which resulted in 100% participation rate. There may be various explanations for this level of response, but since the whole of the cohort was being studied, it seemed appropriate to provide study information to the whole group. Students invited to participate in my research were spread out across the programme, making a group presentation of study information more difficult to organise.

One of the challenges I faced as an insider researcher, was separating associations of professional involvement from events within the interview or during analysis of the data. It was essential that I remained mindful of previous insider knowledge that may inadvertently influence the data collection. For example, due to my insider knowledge, I was aware that a particular participant struggled to achieve pass grades at first attempt in written examinations. Although I wanted to explore the underlying reasons for this, I was also aware that my approach to each interview should be as consistent as reasonably possible and the need to separate my learning support role from my researcher role should be paramount as a means of managing subjectivity (Finlay 2014).

In keeping with the Heideggarian philosophy, I cannot completely bracket my insider knowledge (Alvesson and Skölberg 2000; Moustakis 1994; Smythe et al 2008; Pringle et al 2011) but wanted to remain alert to enabling the participant to tell their story without prejudice, and trust that the flexibility of the semi-structured interview, with guiding and prompting questions, would reveal the necessary information. I questioned at this point whether my insider knowledge enabled or hindered the research process (Kanuha 2000). I considered that insider knowledge was helpful in framing interview questions since I had an insight regarding the learning environment, academic practice and what language or terminology would be acceptable. Being alert to such information provided an element of security for researcher and participant. It was imperative therefore from the insider researcher perspective to be risk aware (Humphrey 2012) and reflexive at all stages of the research process, to minimise risks and their effects.

3.5 Reflexivity

A common limitation of phenomenological approaches is that the researcher and the researched may have an assumed understanding of meaning that each other holds.

Seeking clarity and understanding of each others meaning as well as verifying my own reflection and interpretation with outsiders helps to address any misunderstandings (Asselin 2003). The subjective interpretations of the phenomenon are influenced by the knowledge and experience of the researcher. Thus to provide a unique interpretation of the phenomenon, the researcher should set aside or bracket previous experience and influences (Alvesson and Skölberg 2000) during consideration of the research data through a process called epoché (Moustakis 1994).

Epoché is intended to distance the influence of any preconceived ideas such that the essence of the phenomenon becomes apparent. Heidegger, on the other hand, believes that this is not possible to achieve, since we cannot be divorced from our prior experience or understanding of the phenomenon (Smythe et al 2008; Alvesson and Sköldberg 2000; Pringle et al 2011), because it serves to enrich and sensitize our interpretation and supports recognition of meaning that may otherwise go unnoticed (Todres and Wheeler 2001). This is the stance I have adopted throughout the research process. However, I am mindful that empirical research naturally connects the researcher with the research topic through their life experiences and encounters, which consequently introduces potential bias (Bergman 2010). Conscious efforts to distance ourselves from insider knowledge that may adversely influence data collection is challenging to many insider researchers. By its very nature, epoché requires continuous reflexivity. Reflective skills and practice are an important element of health professional training, and as a health professional, I considered reflexivity to be an established skill integral to my professional practice.

Thus during the interviewing of participants, I wanted to use the established relationship I had with participants to help them feel safe and at ease, while at the same time not wanting this relationship to influence their story telling. Participants were

aware that I had some level of insight into their particular learning difficulties and therefore may not provide as much detail believing that this information was already known to me. The flip-side of this relationship is that students may be guarded in their provision of highly personal information believing that such disclosure may be detrimental to their identity within the community of academics and thus influence their learning status.

As a researcher, I engaged in reflective self-awareness, declaring my experience and bias within the phenomenon as a means of managing subjectivity (Finlay 2014), but also alert to focusing on interpretation of meaning divorced of its context (Bergman 2010). I am aware that credibility is not based on research processes and rigorous data analysis alone, but also on reflexivity of the nature and characteristics of the research conducted. More important than adhering to detailed procedures is the need to recognise the ambiguity that exists in reality, which may be likened to '… a hall lined with convex and concave mirrors (researchers, language, theories, reality) ...' (Alvesson and Sköldberg 2000, p276).

3.6 Sampling Design

Integral within an inclusive mixed methods framework are the considerations within sampling choices that validate credible data (Tashakkori and Teddlie 2010). Individuals invited to participate in this study were those who had experience of being a student with diagnosed dyslexia in higher education. No other limiting criteria regarding, gender age or mode of study was imposed. As the first study within this institution to emphasis specific aspects of the learning experiences of students with dyslexia, it was important this remained the study focus, to the exclusion of gender, age or mode of study factors. A number of participants were mature returners to study and therefore considerably older than traditional entry level age. This was not by design, but reflective of the

student demographics across the full-time and part-time programmes of training in this particular department of the university. Many similar studies reviewed, describe participants as “undergraduate”, as are the participants in this study. Aware that the participant profile as discussed in Chapter 4, are atypical of undergraduate, it was imperative that such differences were made apparent. Noting such aspects was intended as a point of interest from which to draw on for further study and for comparison with other “undergraduate” studies of this nature.

Although the registered students have diverse learning needs and characteristics compared to the norm, they represent a homogenous group due to shared learning difficulty characteristics. Such purposive sampling serves to inform the understanding of the phenomenon under study (Creswell 2013; Tashakkori and Teddlie 2010; Creswell and Plano-Clark 2011), requiring the researcher to be flexible in their sampling strategy through adaptation of sampling numbers or characteristics (Creswell 2013). Purposive sampling limits the generalisability of the findings (Creswell 1994), but the purpose of phenomenological research is not for generalisability but transferability of data mediated through the subjective lived experiences of the phenomenon (Moustakas 1994; Creswell 2013; Creswell and Plano-Clark 2011).

Researchers are continuously challenged in their decision on an appropriate sample size. It is said that for qualitative research, the choice of sample size should be determined by saturation of data collected (Guest et al 2006). Saturation may be more easily achieved if the characteristics of the proposed sample is limited to as few as possible, to realise a more homogenous group. Therefore the more homogeneity within the group, the smaller the sample size required for saturation (Guest et al 2006; Sandelowski 1995). However, if the sample size is too small then the trustworthiness of transferable data may be questioned; equally, large sample sizes may not provide sufficient depth and relevance of data (Sandelowski 1995). Empirical mixed method

research is commonly of smaller scale and limited data collection (Crewell and Tashakkori 2007) and thus for the purposes of this phenomenological research the sample size of sixteen participants who agreed to participate in the study were considered an appropriate sample size; representing 80% of the group invited to participate.

3.7 Analysing the Data

Analysis of data using mixed methods, is the most complicated process of the methodological approach; integrating data from both strands to achieve a meaningful understanding (Onwuegbuzie and Combs 2010; Tashakkori and Teddlie 1998). Mixed method analysis was conducted sequentially, with quantitative following qualitative analysis, such that one informed the other (Tashakkori and Teddlie 1998; Creswell and Plano-Clark 2011). Data validity would relate to the meaningful inferences made from the quantitative data and complementarities with qualitative data (Creswell and Plano-Clark 2011).

Interpretation of meaning was thus considered in the light of current theories and research (external validity) with transferable meta-inferences drawn from the merged mixed methods findings as well as the inferences of the separate qualitative and quantitative approaches (Nastasi et al 2010; O'Cathain 2010).

3.7.1 Qualitative Analysis

There are numerous computer assisted qualitative data analysis software (CAQDAS) packages available such as NVivo which is widely used and Atlas.ti to which I had access, to sort, simplify and organize complex qualitative research data. This may be considered a welcome aid to managing large volumes of data, but requires

considerable time investment for researchers to become familiar with its use (Bergin 2011). It may be considered that mechanised research tools restrict the flexibility and creative discovery nature of qualitative research (Bergman 2010), but other users advocate such tools as a valid means of increasing rigour when the range of software capabilities are realised (Bergin 2011), taking analysis further than manually able (Leech and Onwuegbuzie 2011). The key element of phenomenological studies is that the researcher becomes immersed in the data, attempting to capture the real meaning of the phenomenon; set within the context of the researcher's knowledge and experience of the phenomenon and going beyond the words of the participant to develop meaning (Mackey 2005) by examining the what and how of experiences (Finlay 2014; Stark and Brown Trinidad 2007). Denzin and Lincoln (2005) cautions against the researcher losing sight of this central tenent; irrespective of analytical approach, the researcher remains the key analytical tool.

Key aspects of my decision making of the most appropriate qualitative analytical approach were firstly that nuanced interpretation of sensitive data is primarily achieved through the intimate connection of the researcher with the phenomenon; Heideggarian philosophy conceptualises time and space from a perspective of being (Mackay 2005). Secondly, lack of experience in the use of CAQDAS and limited time to become familiar with the systems, reduces opportunities for optimal use of software capabilities, especially where little on-site support existed. Lastly, although manual analysis of the data generated would prove to be challenging, I felt more comfortable with this approach and considered this to be most prudent for this type of small scale study.

The most common analytical approach in qualitative research is thematic analysis, due to its flexibility and compatibility with diverse paradigms (Braun and Clarke 2006). Qualitative analysis is thus naturally drawn to thematic analysis as a tool for describing patterns emerging from the data. From a constructivist perspective, this analytical

approach enables examination of the societal effects on experiences of the phenomenon.

Interpretative phenomenological analysis (IPA) on the other hand is epistemologically aligned with phenomenological research; to understand the detail of lived experiences of being-in-the-world, as a means of sense making of the study phenomenon (Braun and Clarke 2006; Cope 2011), moving from description to interpretation (Cope 2011). It is essentially idiographic; focussing on the experiences of individuals that are drawn from broad, open interview questions (Smith and Shinebourne 2012). Many parallels exist between the processes of thematic analysis and IPA (Braun and Clarke 2006; 2013), although Heideggerian interpretative phenomenology focuses on the person and the context of their existence (Mackay 2006) and therefore not entirely compatible with CAQDAS (Braun and Clarke 2013).

I transcribed all interviews myself, which meant that I was able to include notes that alerted me to intonations, elongated pauses or laughter. Analysis of the transcribed data then primarily constituted writing and re-writing of stories (van Manen 1990) within a process that resembled the following stages:

- Becoming familiar with the data
    - Repeated listening to recordings
    - Verbatim transcription of the interviews - paying attention to verbal and non-verbal elements
    - Reading and re-reading the data - the ‘dwelling phase’ (Finlay 2014)
    - Start to think about what the data means
- Generating initial codes
    - Highlighting relevant sections of the scripts and writing relative codes in the page margins

    - Codes may take the form of interpretation, conceptual or theoretical framework
- Searching for themes
    - Asking questions of the data
    - Identifying prominent features, similarities or overlapping codes
    - Collapse or cluster codes
    - Using combined codes, construct thematic maps
    - Identify prominent themes
- Defining themes and meaning
    - Proposing meaning
    - Situate the phenomenon to understand the experience of time, space and nature of being.
    - Discard miscellaneous material
- Report writing
    - Final analysis

(Mackey 2005; Harding 2013; Finlay 2014; Creswell 2013; Braun and Clarke 2006; Braun and Clark 2012)

The initial coding stages enabled a global naive perspective of the phenomenon. Descriptive words or phrases were written in the margin against each line/s of the transcript to provide a quick snap-shot of the experiences as portrayed by participant. For example, one participant commented: '*I have a credibility issue, so I do set myself really high goals.'* I coded this statement as 'feels judged by others'. The next stage in coding examined the participant's words more closely for further interpretation. The sentiments of the participant suggests the participant may have been subjected to judgemental behaviour or derogatory comments which she believes misrepresents her self-image.

To re-position the perceived impression others have of her, the participant sets her goals high in an attempt to change attitudes. This I re-coded as 'changing others opinions of self'. These second phase codings were then drawn into overarching themes, in this instance 'motivational triggers: changing opinions and attitudes' (Appendix A).

Each iterative cycle increased the depth of meaning that emanated from examining details of reality, by decontextualising and recontextualising (Starks and Brown Trinidad 2007). This hermeneutic circle, developed by Heidegger and refined by Gadamer (Todres and Wheeler 2001), begins with our own understanding. Heideggerian tradition accepts preconceptions of the researcher interpreter of 'being-in-the-world', and accepts that interpretations based on the experiences and beliefs, are a legitimate part of the research process (Lowes and Prowse 2001). Thus in the coding and analysis of data, researchers commonly use a combination of an inductive approach, drawing on what is in the data and a deductive approach, bringing to the data some interpreted concepts or ideas. However, when the intention is "giving voice" to experiences, inductive analysis usually predominates. (Braun and Clark 2012.)
With each iteration of data examination, generation of the data was extended and developed where understanding through interaction with and contextualisation of the data, I arrived at a new understanding of the phenomenon. An example of this was that students with dyslexia were not limited by their aptitude to learn new learning strategies, but by the time taken to acquire such skills.

Reducing the data by coding key points relevant to the research question in each transcription and then in subsequent cycles linking these points to the inventory themes, was a means of converging qualitative with quantitative data. The data was examined in the light of context and time (Mackey 2005: Smythe et al 2008; Alvesson

and Sköldberg 2000; Bergman 2010) since “To remove a story from its rich textual background is to remove meaning and thus the possibility of understanding the experience as it is lived ……” (Smythe et al 2008 p. 1392). Reported participant experiences were written as anecdotal accounts to underpin the trustworthiness of the data and support the interpretation and meaning of the lived experiences (Starks and Brown Trinidad 2007; Creswell and Plano-Clark 2007) which Koch (2006) refers to as the “decision trail”.

Remaining mindful and reflexive throughout the research process of the influences my own experiences and opinions may bring to bear on the data generated, my preconceptions were noted in my field notes. Reference to these field notes during analysis were intended to increase transparency of my preconceptions, positioning and interpretations at different stages of the research process (Lowes and Prowse 2001) to address what might be considered as study limitations. Furthermore, with research “credibility” at the forefront of my mind, I continually questioned the data by asking why and how of the phenomenon categorisations and interpretations, alert to focusing on interpretation of meaning divorced of its context (Bergman 2010).

3.7.2 Quantitative Analysis

I trawled through numerous statistical texts to aid my decision in the most appropriate measure of quantitative analysis, to demonstrate my quantitative data as robust and meaningful. Although the inventory used had been created and validated elsewhere, the analysis used in the original study did not meet my research aims. Statistical significance and validity of data is more robust with large numbers and appropriate study design. I considered a small scale non-experimental study such as this to be more limited in the type of statistical application.

A pragmatic approach to quantitative analysis was chosen, such that the format of analysis would be conducive and appropriate to be integrated with the qualitative findings. I considered that because the variables within the inventory were placed in mutually exclusive categories (cognitive knowledge and regulation of cognition) where the variables were marked by the participant as either true or false, the dichotomous response would not have a specific order or ranking of the data (Allison et al 1996).

Furthermore, the nature of my quantitative data analysis would fall within descriptive rather than inferential, since my study aims are not to predict outcomes but to integrate the data (Allison et al 1996) with the description and interpretation of the qualitative data. I considered that this quantitative strand of the study may be limited by the design of the inventory; although validated elsewhere, students with dyslexia were sometimes confused by the wording of some statements. They also considered that in some instances their honest response would be neither true nor false, but "some of the time". All of these 'grey' areas were discussed in the interviews, although no changes were made to their original inventory responses, but a record made in my field notes.

In keeping with the confirmatory and complementarity of the quantitative element, I considered that conventional statistical analysis would not enhance meaning, but introduce unnecessary complexity (Westerman 2006; Onwuegbuzie and Combs 2010). The chosen analytical approach was thus one of descriptive analysis of frequency scores in the data and illustrated using tables and histograms.

Analysis began with converting raw data into a more meaningful format. The scores for each of the subcategories of cognitive knowledge and regulation of cognition were entered into a spreadsheet. This format made it easier to scan across the subcategories for each participant, for a first glimpse of broad trends within each

overarching category. The summed score in each subcategory provided an indication of the level of performance in specific learning aspects, which could be linked to the qualitative narrative. The numerical data was imported into SPSS, the computer statistical software package to score or code the data. Applying such descriptive statistics analysis was the first stage of gaining an understanding of the specific focus within the study population.

3.7.3 Convergent analysis

Concurrent analysis of qualitative and quantitative data is integrated as one body during this phase. Emergent qualitative themes and sub-themes that showed patterns or differences were to be linked with the quantitative data patterns. During this convergent phase tensions between the intricacies and complexities of metacognitive practice that I had intended to study and the IPA themes became apparent. For the outcomes of this study to be informative and increase the participants understanding of metacognitive practices (stated in section 3.2), it would be necessary to drill down into specific aspects of this practice as evidenced within the inventory used. Being mindful of the needs of dyslexic participants for information to be clear, specific and detailed, the thematic approach may not prove to be explicit enough. Consideration for clarity was subsequently given to the learning behaviors within the categories for knowledge of cognition and regulation of cognition of the inventory, to serve as the discussion 'themes'.

This convergent phase of analysis thus became the third phase following separate qualitative and quantitative analysis. In this transformative phase, quantitative data was qualitised to facilitate narrative discussion (Tashakkori and Teddlie 1998). Such qualitising seeks to create meaning of the inventory responses by linking to the experiences within the qualitative data.

Morgan (2007) considers the relationship between theory and data in mixed methods research to be abductive; the outcome when combining qualitative (inductive) and quantitative (deductive) methods. From a pragmatist's perspective, abductive reasoning is about orientating the data for questioning from different stand points, so that it is neither solely inductive nor deductive but moving between the two (Bertilsson 2004: Servillo and Schreurs 2013; Morgan 2007), remaining open minded and open to uncertainty (Nicholson 2012).

Although the scoring of the inventory was purely quantitative registering either true/false response, the nature of the declarative statements provided qualitative information that was used to support or challenge narratives derived from personal interviews. For example, the response to a statement in the inventory "I think about what I really need to learn before I begin a task" was compared with individual interviews. Examination of this one statement showed that many of the participants indicated 'false' because they were unable to identify the key topics that they needed to concentrate on when preparing for an assessment. It could be argued that this in itself indicated that some thought had been given to what needed to be learnt. Another statement "I have a specific purpose for each strategy I use", to which many of the participants answered 'true'. Some students had only one strategy while others couldn't reason the choice for specific strategies. Qualitising the quantitative data in this way by converging the outcomes of each strand, provided a rounded, unified and in-depth examination of the phenomenon. The quality of inferences can therefore be enhanced when drawn from both qualitative and quantitative data as opposed to a single method approach (Tashakkori and Teddlie 1998).

3.8 Conclusion

Although the phenomenological approach to research is a philosophy and not a method of data collection and analysis (Finlay 2014), the analytical credibility of a coherent argument remains the cornerstone (Starks and Brown-Trinidad 2007). Phenomenological analysis is not intended for development of themes, codes or theories, but to evoke the rich description of the phenomenon in an influential manner, with excerpts of participants' quotations (Finlay 2014). Linking interpretation to the words of the participant is central to evidencing analytical credibility and authenticity of developed themes. Furthermore, interpretations of 'being-in-the-world' experiences are multiple; there is no single correct account. Developing theory from data was realised through continual notation of perceptions and graphic representation such as diagrams and tables of the main concepts arising from quantitative data and compared with thematic data and the relations between the key and sub-categories (Alvesson and Skölberg 2000). In the analysis of mixed method approaches, examining of qualitative data and quantitative data separately and then converging the data for further abductive analysis, extended the depth and quality of the data that may not have been achieved by one or the other alone.

Chapter 4: Participant Profiles

4.1 Introduction

This chapter discusses the contextual findings around the learning experiences of the participants that arose from the interviews. Excerpts taken from interviews are used in Chapters 4, 5 and 6 to situate and authenticate discussion and interspersed with relevant literature. Quoting the participants is also a means of reconciling in part, the trustworthiness of the data. Trustworthiness of data was an integral element of study design. Additionally, providing clarity around the stages and process of analysis, reflexive documentation of field notes at every stage of the research was helpful to demonstrate researcher thoughts and perspectives.

Recording of preconceptions of the phenomena within the field notes was not only helpful to remain mindful of positioning oneself during the interviews, but also served to chart changes in preconceptions as the study progressed (Ashworth 1987). An example of this was my preconception that students felt a sense of relief when diagnosed with dyslexia, because this diagnosis provided answers to unexplained questions around learning difficulties. However, one of the participants expressed her feeling of horror upon receiving the positive diagnosis, perceiving this diagnosis would label her as ‘stupid’.

Participants were asked at the start of the interview to discuss their early learning experiences at school and include their perceptions of the quality of those learning experiences, as a means of settling the participants into the interview and to set the context. This was considered a relevant starting point since it paved the way for the reflexive path that was to follow and also provided the space for the participant to consider how much sensitive information to disclose. The inclusion of such information

was carefully considered since it needed to be pertinent to the study; demonstrating early learning experiences and influences that set the foundations for further learning and shaping future learning pathways.

4.2 Participants' profiles

An overview of the student profiles help to set the context against which the development of metacognitive skills and self regulation of learning are positioned and examined. To secure anonymity as far as possible, identifiable aspects of the data was redacted. Many of the participants who chose not to disclose their learning disability to their peers accepted that anonymity in publication of this study may not be entirely assured since being registered for additional learning support at the university in itself, discloses their identity. The minority who chose for disclosure to be on a 'need to know' basis, had over time, come to accept the realisation, that the necessary learning support adjustments by their very nature, identifies them within the student community and possibly, study publication.

Table 4.1 lists the students under their pseudonym, tabulating gender, age at interview date and age when diagnosed as dyslexic. Although gender was not significant to the study, it was noted for personal interest, since the register recorded disclosure from more females than males. Thus it was interesting to note the gender; males accounting for 44% and females the remaining 56%.

Pseudonym	Gender	Age	Age at diagnosis
Adam	M	35	10
Adele	F	40	35*
Aiden	M	46	43*
Alex	M	22	18*
Bea	F	26	25*
Callum	M	49	48*
Carley	F	34	19
Dana	F	24	22*
Estelle	F	24	7
Faye	F	26	19
Jade	F	47	45*
Larry	M	37	36*
Paige	F	59	53
Reece	M	44	15
Sam	M	50	48*
Zoey	F	22	17

Table 4.1. Participant characteristics

* Diagnosed upon entry into higher education

All students participating in the research were enrolled on an undergraduate vocational course of study in chiropractic. Fifty six percent of the participants were diagnosed with dyslexia following entry onto the programme of study at this particular university and all except Alex and Zoey were considered mature students upon entry.

Students were recruited across the programme; the 4 year full time (FT) and 5 year part time (PT) routes. Table 4.2 shows the distribution of participants, listing their year and mode of study. Thirty eight percent of the participants were full time and 62% followed the part time mode of study. All of the part time students work full time and attend the course for four or five days a month, with an additional seven day residential, annually. The part time programme involves high levels of self-directed learning to satisfactorily complete the course. This requirement and the lower level of direct contact time were prime factors for Adam, Callum and Paige opting to enrol on the full time course. As returners to education and training for a second career, many other mature students needed to continue to work to support families and meet financial commitments. Enrolling on the part time course was therefore the only study option available to them. Those students not meeting the direct entry requirements gained access via an alternative level 3 route, as shown in table 4.2.

It was interesting to note that the majority of mature students were engaged in occupations of a practical nature, requiring hands on skills. Inclusion of previous learning and working experiences was considered important elements of the participants' profiles that demonstrate some of the influences impacting on the development of learning skills, approaches and behaviour.

Pseudonym	Year of study	Mode of study	Route of entry	Entry status
Adam	3	FT	Access	Personal trainer
Adele	4	PT	Access	Masseur
Aiden	3	PT	Access	Plumber
Alex	3	FT	Direct	Student
Bea	1	PT	Access	Administrator
Callum	1	FT	Access	Catering
Carley	4	PT	Access	Masseur
Dana	2	PT	Access	Health care assistant
Estelle	4	PT	Access	Apprentice
Faye	3	FT	Access	Student
Jade	4	PT	Access	Masseur
Larry	1	PT	Access	Youth worker
Paige	4	FT	Access	Public services
Reece	4	PT	Access	Instructor
Sam	4	PT	Access	Masseur
Zoey	3	FT	Access	Student

Table 4.2. Educational and occupational background

Bea was diagnosed at the age of 25. She was never aware of having any specific learning issues during her schooling years. '*I was an average student, quiet and preferred not to be noticed in class.'* Although Bea described herself as an average student, her behaviour suggested a less than average level of self-confidence. She described a continual desire to blend into the background, so that her teachers wouldn't

direct any questions at her. This approach which she considered to be quite normal, continued throughout her schooling. During her adolescent to teenage years, she described her social behaviour as *'coming out of my shell … going out and spending more time socialising with my friends. Looking back, that's when I was happiest – out of school. So I couldn't wait to leave.'* Bea left school with low grade GCSE passes. Her occupation since leaving school was as a retail assistant until her more recent position in administration. Encouraged by her new colleagues and line manager, Bea returned to formal education. Although she achieve a pass grade, she struggled through the Access to Higher Education study. During the first few months of her degree programme, Bea sought help with her learning difficulties which led to referral for dyslexia assessment.

Adam was diagnosed at 10 years old, '*by which time I was quite behind my peers in reading and writing.'* Adam recalls the battles his Mum had with the school to get him some help with his difficulties. Following a private assessment of his learning, the school remained reluctant to provide additional learning support: *'The headmaster said that dyslexia was an excuse of the middle classes for under performance of their children.'* His parents withdrew him from main steam schooling for one year of specialist intensive tutoring. *'I didn't quite get up to speed, but I went from not being able to write my name to being able to keep up reasonably well. Back in main stream I didn't really get the help I needed so I just messed around, checked out of school really and then a couple of teachers said to me well it's really not worth you taking the exams – so you think what's the point? At school and after, my confidence was rock bottom and labouring type of work was my only option.'*

The turning point in Adam's lack of self-confidence occurred following successful progression within the engineering division of the armed forces. He reflected on his

learning experiences, suggesting: *'It's a difficulty that I have to overcome. It's not a barrier nor an excuse.'* Renewed confidence in his learning ability encouraged Adam to return to education to pursue a new career.

Adele was diagnosed at 35 years of age. She recalled having a degree of difficulty with some learning tasks but put this down to the nature of the task rather than her learning. She never questioned why she needed to learn the same thing three or four times before it sunk in and believed everyone experienced the same way of learning as she. She trained as a masseuse because she *"has always been very good with my hands".* Upon entering university as a part-time student, the number of times she needed to relearn topics to make sense of it increased, subsequently leading to an assessment of her learning. She recalls her feelings to the positive diagnosis: *"I was really upset when I found out. I saw it as being told that I was of lesser intelligence. I know now that's not true, but even working harder, I now also know that it's not going to get any better."*

Aiden was diagnosed at 43 years of age. He describes his school years as being *'unhappy and sad'*, with memories of being written off by his teaches. He recalled being made to feel inadequate by teaches and fellow students because '… you just feel lazy, which leaves you insecure about your weaknesses.' Aiden never understood why other children were able to understand and learn what he could not. He assumed that *'Working three times as hard as the other children would show in my results, but my report had the standard thing of could do better. But how could I? I was working my socks off, to no avail!'* Leaving school without any qualifications were sad and despondent memories for Aiden, who believed he *'… had no future … being cast on to*

the scrap heap.' Gaining an apprenticeship to train as a plumber many years after leaving school, gave Aiden the confidence and self-respect he had been previously been deprived of. Aiden's response to diagnosis was one of anger and frustration *'It makes me so angry that no one recognised why I was struggling and all the time I was made to feel stupid and lazy. All that time I felt like such a failure, not knowing that there was a reason for it all.'*

Alex was diagnosed after entering university at the age of 18. Due to his older brother being diagnosed with dyslexia at a young age, his parents used this experience to home tutor Alex in his pre-school years. Alex believed this preparation gave him a head start and confidence in his learning ability throughout his school years. He noted more effort being required in his application to learning during the latter stages of sixth form study and the transition into higher education. He became increasingly puzzled by his difficulty to verbalise and contextualise information*: 'I can know something, but I just can't put it down on paper. I couldn't understand why or explain why. So when I was diagnosed I told my brother this and he just laughed, because I always thought I was the clever one.'* When asked whether he considered dyslexia to be associated with intelligence, he responded: *'Not now that I know I'm dyslexic too, because I know that I'm not stupid, but I used to have a dig at my brother about it.'*

Callum was diagnosed at the age of 48. His memories of school were described as difficult; because his learning progress was slow and laborious and because he was bullied *'for being thick.'* Callum recalls repeated episodes of not understanding what was being taught or his perceptions of set tasks. *'I was always asking questions because I just didn't understand, but the teachers got the hump when I still didn't understand. So the brighter kids used to get more attention while I was ignored.'* It

was clear that these early experiences had painful and lasting negative effects on his self-esteem. Rather than being praised and encouraged for excelling in school sports, Callum believed he was punished for being stupid. His participation in all sports was suspended until his grades improved. *'That backfired because I was even less interested and I started to pull away from everyone.'* With Callum's self-confidence at rock bottom, he recalls dismissing all thoughts of any training courses involving assessment: *'For years I've never studied because I've always run away from it because I've always been judged and people just think I'm thick.'* Working in the catering trade had given Callum the financial security for returning to study, but *'I've not spoken to anyone about it* [his degree course] *because I would just get – why are you doing it, you're never going to pass it!!'* Diagnosis and subsequent skills tutoring has begun to make incremental changes to Callum's academic progress, although self-confidence continues to be self-limiting.

Carley was diagnosed at the age of 19. She has an older brother and father with dyslexia. *'My Mum knew that something wasn't quite right from the age of 4 and it took her three lever arch files of evidence to get the school to listen to her.'* Carley did not receive any learning support until the final stages of senior school. Although not formally diagnosed at this stage, she began to receive study skills support from a teacher who had conducted cognitive testing as part of her doctoral research. This intervention provided Carley with the skills to improve her learning strategies.

However, Carley regretted the lateness of this learning support, since despite her enjoyment of science subjects, she chose to study arts that demanded less academic writing. Encouraged by the learning support she received following diagnosis at the start of her first degree programme, Carley went on to do *'brain training and brain gym … activating the brain at the right time is important to get me in the right space.'* Brain gym is reported as being 'educational kinesiology' for re-educating the mind and body

for improved efficiency of skills learning, although study evidence have not been substantiated by peers (Hyatt 2007). Carley considers she has *'never been a good grader in the written stuff because it's not one of my strengths'*. She believed aspects of her true potential began to show through as she continued to develop learning strategies. Her philosophical stance to her learning is*: 'If you look at things negatively you put more pressure on yourself and makes it more of an issue. So my learning issues are a hindrance, but I am very, very stubborn to give up.'*

Dana was diagnosed at the age of 22 during her study on the Access to Higher Education programme. She described herself as a shy and quiet child. As a young child, her parents used drama lessons as a mechanism for improving her social interaction and confidence levels. Dana considered her schooling to be unremarkable, until she entered senior school*: 'I always worked hard because I love learning and really just wanted to do well. For reasons that I couldn't explain, working hard began to make no difference. When I thought I was doing alright, my exam results said differently.'* Feeling embarrassed and confused by her low grade passes at GCSE, Dana left school to work as a shop assistant.

Frustrated by the lack of mental stimulation in her job, she was offered a position as a health care assistant in physical therapy. Inspired by her new environment and the work she was witness to, led Dana to seek new education and training opportunities. She explained: *'From the time of leaving school and starting on the access course, I forgot about how I really struggled. So I spoke with my tutor about my worries and it turns out that I was dyslexic all along.'* Diagnosis had been a positive outcome for Dana. She felt relieved by the explanation assessment had provided and encouraged by the learning support she subsequently received. *'I still struggle but at least others know that I'm not stupid – there is a reason why I don't do as well as I think I should.'*

Estelle was diagnosed at the age of 7; her teacher recognised her unexplained difficulties during certain lessons. Following diagnosis, she had weekly additional one-to-one English and Math lessons. Throughout her schooling, the additional learning support Estelle received helped her to develop a range of strategies. This she remarked, had only become apparent to her following a re-assessment upon entering university *'Although there was still evidence of dyslexia, the coping strategies that I was using helped me to make my learning a lot more manageable. So by having different coping strategies, I wasn't being held back and was able to perform at similar levels to my peers.'* Estelle's level of self-confidence was clearly higher than many of the participants, whose personal targets where aimed at achieving their best, whereas Estelle would specify the level of achievement: *'I tend to aim to get over 70% for most things, but I've only been able to get high 60's and the odd low 70.'* It was apparent that Estelle has a good understanding of her learning limitations, utilising a range of learning strategies at her disposal yet also accepting the challenges her learning would continue to present.

Faye was diagnosed at the age of 19. She recalls being aware from an early age that she was 'different': *'When all the other boys and girls had finished their work and gone out to play, I was always the one left behind still working.'* Faye believed being the only girl in the family helped her to survive the bullying related to her learning challenges. *'I was very much a tomboy, hanging out with my brothers and their friends rather than doing girly things.'* She believed her loud and unruly behaviour detracted from her insecurity of feeling different and inadequate. *'I became very good at divergent tactics although the downside was that I got the blame for everything. I got grounded every time my parents were called into school.'* Averting attention from her learning difficulties was an interim coping strategy for Faye. She realised that whilst her

behaviour provided her a preferred public persona in the short term, she was slipping further and further behind with passing time. A supportive new friendship was pivotal at a crucial stage in Faye's learning. *'A new girl started at our school and having been the outsider myself, I was the first one to befriend her. We became good friends and she was really clever as it happens, so she helped me a lot. She was also the first one to make me believe that I wasn't stupid.'* Some years later, the same friend persuaded Faye to consider assessment for dyslexia.

Jade was diagnosed at the age of 45. She described her school experience as being *'…. pretty average for where I was brought up.'* Many of her family and friends were unskilled, working in industry and construction. *'I don't recall there being any expectations of any of us as kids, so we just went through the motions of going to school because we had to.'* Having left school without any qualifications, Jade worked as a shop assistant for many years before deciding to train as a masseuse. Although she found this learning experience extremely challenging, she also discovered acquisition of new knowledge to be hugely satisfying. *'Before I did this course, I never realised that learning new stuff would be so exciting and fulfilling to me. It's almost as though I found a missing link in my life. Having said that, I also didn't expect it to be so hard. Learning all that new stuff was really, really tough.'* Inspired by this new found confidence and thirst for knowledge, Jade pursued yet further study. Being the first in her family to attend university, Jade was determined to succeed. Recognising the concerted effort required to achieve pass grades on the second or third attempt, she devoting all her free time to her studies. In her qualifying year, Jade's copying strategies and health began to buckle under the intense strain and targets she set herself. It was at this point that Jade was diagnosed as dyslexic.

Larry was diagnosed at the age of 36, upon returning to education at the current university. He was Steiner schooled until well into secondary school age. He recalls enjoying the early learning approaches which focussed on story telling, with no expectation for reading ability. However, approaching the age of 7 he became aware of a widening gap between his own learning abilities and that of his peers: *'the class* [peers] *would get to a certain level and they're all progressing and all of a sudden I became aware that I couldn't read, and became completely embarrassed by the fact that I was now less able to do things.'* Larry became increasing rebellious as a means of diverting attention away from his learning deficiencies and absented himself from class when he became aware of pre-arranged reading activity. He described some of his in-class coping strategies: *' I would be sitting there thinking my turn* [for reading] *is coming around and I would look at how many kids were in front of me and if everyone was reading a paragraph, I would jump to my paragraph and read it first so that I didn't feel embarrassed when it came around to me and there was a word that I had to stop at ...'* Larry believes that his self-confidence has grown with increasing maturity: *'… with maturity comes acceptance of who you are, because I now know my strengths.'*

Paige was diagnosed at the age of 53. She recalls experiences of childhood: *'People were quite unkind ... I very much felt the subject of ridicule, and there were reasons for it. We used to play hockey, which I loved, was very enthusiastic, but every time I played there was an accident – I couldn't get it into my head about not having it* [hockey stick] *above the shoulder.'* Although Paige loved playing hockey, she was forced to withdraw from the team because none of the other players would sign up to a team that she was playing in. She would recall other difficulties she experienced that set her apart from her peers: *'I had to be in the right room at the right time, but I was always wondering around the corridors not really knowing where I was going. When I was younger I would wonder off and go home, thinking it was home time – of course it*

wasn't! Paige recalls being constantly reprimanded for 'not working' and failing to hand in her homework: *'It wasn't that* [lack of work], *it was just that I found it difficult to organise myself.* With her strengths in verbal communication and problem solving, Paige began working in law enforcement after a range of short term employments. She excelled in the daily routine work and quickly rose through the ranks. At senior level, her poor organisational skills hindered her further progress. Working temporarily in a higher grade, Paige was put forward to fifteen consecutive annual promotion boards to permanently take up this position. Seeking solutions to the difficulties she experienced during these times, Paige was diagnosed with dyspraxia and dyslexia.

Reece was diagnosed at the age of 15. He completed all of his schooling outside of the UK where the system was somewhat different. He described his parents as being *his '… ambassador, constantly fighting my corner because they knew there was something not quite as it should be and wanting the best for me.'* Reece recalls being moved from one school to the next, because his parents were unhappy with the learning provision and support. *'They finally found a school that recognised I wasn't being lazy, but it was another couple of years before they* [the school] *worked out what the issue was.'* Study Hall sessions were opportunities for students to catch up with class work, but for Reece, these were dedicated to one-to-one tutoring sessions. Although most of what was covered during this time was reiteration of previous class work, Reece felt he was learning this material for the first time. *'It's as though the two teachers were speaking completely different languages.'* This dedicated time provided Reece with a range of learning strategies which he believes addressed some of his weaknesses*: 'I was forced to read as many books as I could get my hands on to improve my comprehension. Although I absolutely hated it at the time, I could tell that my reading was getting better.'* Returning to study following a lengthy break, Reece believes he is challenged more by organisation of time now than strategies for learning.

Sam was diagnosed at the age of 48. From an early age he recalled believing something was not quite right. His teachers would tell him: *'content is good, but working and thinking is very, very slow.'* He constantly lagged behind in class, resulting in many unfinished pieces of work. Sam was often left alone in class to finish off his work while his class mates went out into the playground for their break; '*I felt unique in that regard. I didn't feel stupid, just slow.'* He recalls his teacher recognising his ability but being intolerant of the time it took for him to complete tasks. Sam believed in most instances his slowness was due to lack of interest in what was being taught but accepts now these experiences were partially due to the effects of a specific learning difficulty. Although he recalls no negative experiences regarding his learning he attributes his survival to his work ethic instilled by his parents. *'They taught us that if you want something you have to work for it, and that achievement gives you the confidence and pride to hold your head up.'* Leaving school without any qualifications, Sam exploited his musical talents to become an internationally renowned guitarist. Forced by family pressure, he retrained to work as a masseuse. His desire to increase his therapeutic skills led him to his degree course of study. Upon entering higher education as a part-time student, a discrepancy between in-class ability and examination results lead to educational psychology assessment.

Zoey was diagnosed during her studies at Sixth Form College at the age of 17. Suffering from ill health as a child, Zoey had frequent episodes of absence throughout her schooling. Zoey described the many hours her mother would sit and read to her: *'I'm not sure if this is what developed my enquiring mind, but I got bored very easily if I wasn't being fed different sorts of information.'* Zoey considered the high levels of learning support her parents continued to provide throughout primary and secondary schooling may have concealed the learning difficulties she began to experience in sixth

form. She recognised beginning to lag behind her peers in the quality and quantity of work produced: *'For the first time I had to up my game. This one teacher told me that I wasn't good enough, and I'm the kind of person who if they tell me I can't do something, then I have to prove them wrong.'* This spirit and determination has spurred Zoey on to setting her sights on qualifications her teachers thought she would not achieve.

4.3 Conclusion

Although participants' backgrounds are varied, common themes of learning experiences are threaded through each of their narratives. The distracting behaviour of the older participants contrast the experiences of younger participants who describe mostly supportive learning environments. The early experiences of participants demonstrate lasting effects on their ego; the younger more confident individuals versus tentative and often self-doubting more mature individuals. To avoid negative behaviour toward them as children, the older participants described their coping strategies as avoidance by distracting attentions away from their learning issues. Some chose to blend into the background in the hope of not being noticed, while others chose to portray their character as unruly and destructive. Both types of behaviour could equally be interpreted as silent cries for help; being quiet and withdrawn may suggest being resigned to being overlooked and unworthy of attention, contrasting with a demand for care and attention through disruptive behaviour.

Participants diagnosed during their schooling years reported higher levels of self-confidence and awareness of a wider range of learning and coping strategies. Contrasting, were the experiences of participants diagnosed during their post-compulsory education years; low self-esteem and self-deprecation.

Furthermore, it is interesting to note that a number of participants were anxious about being typecast and labelled as less intelligent. Many expressed 'the need' to work harder than their peers, although it appear that this need may be driven by an intrinsic desire to prove others wrong rather than an extrinsic demand. Those participants who have felt 'let down' by the system, are returning to education to satisfy their own learning needs. Over time and with increasing maturity, these participants have the determination and courage (all be it with some level of trepidation), to confront their childhood learning challenges to fulfil their inner desires and aspirations.

Chapter 5: Knowledge of Cognition

5.1 Introduction

Chapters 5 and 6 are organised around the categories and subcategories defined within the quantitative inventory. These categories provide a logical framework for discussion of outcomes since although not all inventory statements were specifically focussed on during the interview, the concepts of metacognitive and self regularity behaviour were the focus of discussion and as such provide a structure for examination of the outcomes of the two approaches.

This chapter discusses the convergent findings of the interview and inventory related to knowledge of cognition. These outcomes are illustrated graphically to provide a quick overview of the response to inventory statements, and tabulated to show inventory statement and response results. This data is integrated with subsequent analysis and discussion of participant's knowledge about how they learn; awareness of their skills and strategies as well as appropriateness to specific tasks. Within this context are considerations of external and internal promoters or barriers to learning.

The interview transcripts were examined line by line and subsequently coded to the statements within the subcategories of declarative knowledge, procedural knowledge and conditional knowledge of the inventory. As intended, the interview provided the backdrop of the lived experiences against which to examine metacognitive and self-regulating learning behaviour. Prior to completion of the interview, participants were invited to discuss any issues related to the inventory; miscomprehension or misunderstandings.

Excerpts from the interviews are used as illustrative examples of the narrative relating to inventory data and interspersed with discussion and relevant literature. Inventory statements are tabled for discussion purposes and where excerpts are used to discuss a particular inventory statement, the statement number would appear in the text as for example, (S5) for Statement 5, together with the percentage response for that statement. Collectively, these tables constitute the inventory in its entirety.

5.2 Declarative knowledge

Declarative knowledge is the body of knowledge we acquire as a set of facts. This knowledge builds through relationships and inter-relationships of the abstract and specific (Schneider and Stern 2010), to events and objects which allows us to think and communicate about the world around us (Anderson 1976). Within the learning environment, this declarative knowledge is based on the facts acquired through formal instruction, self-directed or peer learning; such as task comprehension, text structure and beliefs of own competencies (Lorch et al 1993).

Eighty eight percent of the participants considered they had a good understanding of their intellectual strengths and weaknesses (S5). During the interview discussion of learning strengths and weaknesses, one participant drew my attention to the word *'intellectual'* stated within the inventory: *I know what my strengths and weaknesses are, but not sure if this is the same as intellectual strengths and weaknesses.'* This was the case for all subsequent participants, all of who ignored the word 'intellectual' but honed in on the wording 'strengths and weaknesses.'

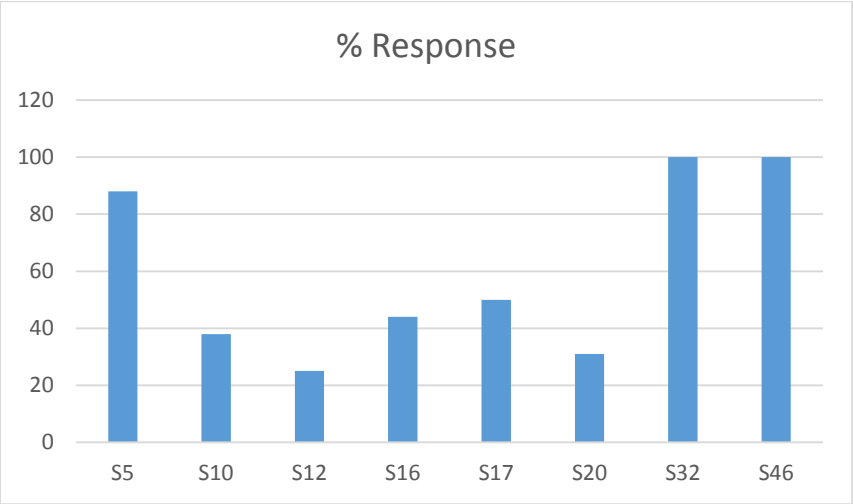

Figure 5.1 – Percentage Responses for Declarative Knowledge

Statement No.		% Response
S5	I understand my intellectual strengths and weaknesses.	88
S10	I know what kind of information is most important to learn.	38
S12	I am good at organizing information.	25
S16	I know what the teacher expects me to learn.	44
S17	I am good at remembering information.	50
S20	I have control over how well I learn.	31
S32	I am a good judge of how well I understand something.	100
S46	I learn more when I am interested in the topic	100

Table 5.1 – Declarative Knowledge Statements

Many of the participants identified reading and writing as particularly weaknesses, for example: *'... I've never been a good grader in the written stuff, because it's not one of my strengths'* (Carley). *'English and reading in particular is still my big thing, it takes me too long to get into it'* (Larry). Carley and Larry were two of the many participants able to identify the weaknesses in the learning practice that posed challenges. It could

be that poor readers lack the ability to decode and extract the meaning contained within text and thus what is important to focus on (Wong 1987; Graham and Bellert 2004; Winograd1984).

Aiden and Dana indicated a lack of understanding of their intellectual strengths and weaknesses in their inventory responses, but explained at interview that *'I've always been very good practically, so having lectures that have more practical helps a lot. If its just lectures, that's when it* [learning] *becomes less tangible and that's when I need more input, and when I get more input I can do ok'* (Aiden). Dana made similar references to hands on work and application but also explained difficulty in grasping certain concepts explained in class when she wasn't able to visualise it: *'It would take me longer than the standard amount of time that normal people would need and then I'm left without the full knowledge and understanding.'* These discrepancies indicate the difficulties some of the participants experienced with the survey language, and suggests the need for more careful planning during the design and piloting of such research and practice tools.

One of the weaknesses identified by 75% of participants was in their ability to organise information (S12). '*Assignments are a nightmare - I could spend ages just rewriting one sentence. When I read my stuff back there's like half sentences or I've left out words.'* (Adele). Although thoughts and composition of mental discourse are complete, these ideas and words may flow at a faster rate than the ability to transcribe (Graham et al 2004). This misalignment between the speed of thinking and writing may well explain the gaps Adele reports to be present in her work. Having transferred her thoughts to paper, Adele then grappled with the composition of her sentences. To be articulate in the written form, work requires a complex combination of knowledge of vocabulary, syntax and semantics (Nation and Snowling 2000) with a cohesive

argument. The need to continually re-read all her written work was time consuming and extended the time required to execute such tasks.

Aiden expressed similar frustrations in the organisation of information: *'If I had to put together an essay, any essay I'd done would be rubbish.'* Asked to explain further what he meant by 'rubbish', Aiden added: *'The sentences and ideas don't string together and when I read it back, even I don't know what I was trying to say!'* Pursuing discussion suggested difficulties usually lie in the step by step process beginning with producing ideas, through to organising the information in a coherent and structured manner. The generation of ideas that builds into a rounded and substantiated argument is usually lacking in work produced by students with dyslexia, resulting in work that is short and poor in structure and presentation (Re and Conoldi 2010; Wong et al 1989; Hatcher et al 2002). This is because the writing process involves a series of executive processes (such as planning, attention, working memory, organisation and monitoring) that present challenges to many individuals with learning difficulties (Seidman 2006; Logue and Gould 2014). This is also particularly frustrating and challenging when the performance criteria and learning outcomes are not clearly stated for set tasks. In the absence of explicit frameworks or guidelines, participants struggled to understand what was expected of them.

Precision of attentiveness in executive functioning is thus considered to be the higher order cognitive abilities that enable self control and attainment of goal directed behaviour (Struss 2011). Many students endorsed this by describing the challenges and difficulties experienced through attention deficit. Some demonstrated how semantics of the written form could easily be misinterpreted; such as honing in the word 'organisation' in the statement regarding organisation of information. It's not clear if this error was a result of inattentiveness or reading deficiency, since their response

to this statement related to their general organisation skills and not that of information presentation. Despite misreading of the statement, the original inventory responses were left unchanged to demonstrate the true responses of the participants. Although attentiveness greatly influences the quality of work produced, it could also be argued that lack of access to an extended vocabulary would curtail and limit the ability to express creative ideas (Peer and Reid 2003).

Knowing where to begin a piece of written work is integral to understanding the remit of the task, which begins with the extent of subject knowledge (Alexander and Schwanenflugel 1994). Larry was not alone in his difficulty in determining the importance and relevance of information (S10) and demands of the task. Thirty eight percent of participants expressed difficulty in knowing what kind of information was important to learn. It may be that since the development of memory improves as a child grows, due to automaticity of the control processes, these control processes that govern the choices of what is important to remember and conscious repetition of information to enhance future recall are deficient in students with learning disability (Swanson et al 2004). Individuals with a deficiency in decoding, comprehension and reading strategies, would lack awareness of what is important within a text (Winograd1984; Graham and Bellert 2004) and therefore less likely to extract meaning (Wong 1987).

For Larry and many of the students, knowing what was relevant information would be a good starting point in sourcing important information: *'... you've got to read and find research, that's where I'm struggling – even having the confidence to know where to start.'* In the face of such uncertainty, students can become overwhelmed by the task (Kahn 2014) when learning objectives are not transparent. Larry exemplified this in further discussion of the observed practices of other students he would study with. He

noted*, '...* [students] *would look at the front of a book* [contents] *and sometimes at the back of the book* [index] *and then just go straight to what they are looking for. Even if I knew how to do that, I wouldn't even know what I should be looking for!'* What appeared to be implicit knowledge and skill for most students in the sourcing of relevant information, cannot be assumed for students with dyslexia. Unless specifically taught, recognition of important factual informational does not become an automatic skill for learning disabled readers (Weisberg and Balajthy 1989). This example exemplifies that construction of knowledge is not an automatic outcome of exposure to ideas. Meaningful understanding comes from being able to connect with new knowledge. Larry couldn't make sense of the practice he was observing until it was explained to him. His exposure to such reading and research skills was lacking, having not been taught this skill during his schooling and his chosen career in industry thereafter.

Metacognition is crucial to reading comprehension, promoting academic learning (Paris and Winograd 1990) through purposeful information gathering (Alexander 2006). What appeared to be an obvious means of sourcing information in a book, appeared bewildering to Larry. In contrast to skilled writers, individuals with learning disabilities tend not to engage in planning and reflection of writing prior to embarking on a writing task (Graham et al 2004) which would help to provide the overall structure of the written work and a focus for getting started. Metacognitive skills and awareness in this instance would begin with acknowledgment and understanding of prior knowledge, understanding of the learning objectives for a given task and the motivation to seek solutions (Afflerbach et al 2013). However, some dyslexic students do not readily consolidate new learning due to automaticity difficulties, requiring time to repeatedly learn and relearn (Fawcett and Nicholson 1992). Thus for the participants responding to this statement, strategies are needed to enable understanding of information in an incremental process to build the foundations of their knowledge base, which is key to

understanding relevance and importance of information. Having an understanding of ones intellectual strengths and weaknesses provides the opportunity for exploiting those strengths to optimise learning outcomes, while building on and improving weaknesses to prevent their impedance as possible barriers to learning.

Sixty nine percent of participants indicated that they did not have control of how well they learnt (S20). It may be that some of the participants perceived that their learning difficulties skewed their ability to demonstrate their potential: *'I aim at over 70% in most things and I've come to realise it's just not going to happen'* (Estelle). '*Even working really hard, I know it's* [learning] *not going to get any better'* (Adele). *'There has to be an easier way of doing it' (Aiden).* A large proportion of participants declared similarly in this vein, recognising that the process of learning required the need to work harder than their peers. Many expressed frustration at not being able to explain or understand this aspect of their learning, and therefore considered that this aspect was not something that they could control, but needed to accept: *'I know that I put 3 or 4 times the amount of time and effort in than the rest of my class'* (Jade) and *'I know that it takes me much, much longer than it should'* (Bea).

Students often associate the level of success to be proportional to the level of study effort (Winne 1996). However it was evident that for many of the participants in this study, that they attributed the partial achievement of goals to their learning deficits and not to their ability (Zimmerman 2000). Their epistemic beliefs of needing to work harder (Afflerbach et al 2013) than their peers to achieve similar outcomes were motivated and driven by their personal goals they had set for themselves (Zimmerman 2000; Pintrich and De Groot 1990). Bauer and Emhert (1984) found that the difference in the information processed during repetition between learning disabled and non-learning disabled students was associated with the quality and not quantity. This may well be

because consolidation of new learning occurs gradually with each repeated learning of the same information, due to automaticity difficulties (Fawcett et al 1996). Lack of consistency in performance was another reason for low confidence levels. Some of the participants who considered that they did not have control of their learning, also referred to the sporadic nature of being able to do something one day, but not the next; *'It's just so frustrating – I can do something one way and it works, but if I do the same thing another day it won't* (Jade). Such frustrating experiences, by their very nature, increase stress and anxiety even further and thus exacerbate the difficulty of the task (Peer Reid 2003).

These participants are clearly aware that the quality of their understanding is not what it should be and thus feel the need to relearn the topics until information in the short term memory becomes consolidated within the long term memory. It was noted that the 31% of participants who considered they did have control over their learning (S20), received learning support from an early age, thus presumably acquiring strategies to aid their learning. It would follow therefore that their learning consisted of more constructive means for consolidation of knowledge and understand, that increased their confidence to a certain extent, in their ability to control how they were learning.

Other expressions regarding uncontrollable learning was the difficulty to transcribe thought processes: *'I know I know it - I just can't put it across'* (Alex). Many of the participants described this "feeling of knowing" phenomenon (Nelson 1996). Many of the participants indicated a lack in providing sufficient detail in response to questions in an assessment situation. Further discussion of this point suggested a difference in the perceived and actual responses of the participants; believing they had answered questions satisfactorily, but then disappointed by their subsequent grades. Their difficulties also related to misunderstanding the information required, rather than the

lack of knowledge, as well as being deficient in adequate recall strategies which often meant not being able to recall key words. *'The frustration is those blank words - I've got it there, but it just won't come. Then afterwards, slowly through the day it filters through'* (Carley). This means being able to provide some information on the topic but not enough to fully answer the question (Metcalfe 1986). It may be that when students with dyslexia switch from one learning task to another, the judgement of their learning does not account for deficiencies in working memory. Once the information of the previous task or examination question has cleared from the working memory, the *filtering through* of the required information for the next task occurs by interrogation of the long term memory (Nelson and Dunlosky 1991).

Since information retrieval from long term memory is deficient in some dyslexic students (Snowling 2006), it is expected that the period of information retrieval between tasks is likely to be extended. For example, Carley (year 4 student) explains: *'The phrases or key words you use in every sentence can make all the difference in an exam.'* Some of the students expressing frustration by this type of memory lock down felt unable to bypass this temporary word blindness, because *'… the channel that gave access to that information* [associated with the key word] *also becomes blocked.'*

Many of the participants described their dilemma when responding to S17; I am good at remembering information. For many, the correct response would have been 'some of the time.' It may be that some of the 50% of participants who agreed with the statement, related their good memory to instances where their recall strategies for specific tasks were effective. Estelle described the difficulties she had recalling the names of neurological tests. She explained her strategy of using imagery and the test information to trigger her memory to name a test related to the quadriceps muscle (Ely's test), she would conjure up '*an image of eels riding a quad bike.'* The purpose

of such strategies were for the recall of key words and terms. However when faced with time constraints, Adele explained that understanding may become secondary to remembering facts for assessment purposes. Adele commented, that in certain situations: *'I can just memorise facts if I need to, even if I don't understand it.'* She considered that this 'means-end' strategy to be a suitable a short term solution, but accepted that although not ideal, the relationship between the means and the end could be justified if it achieved her goal (Marton 2015).

It was interesting to note that the remaining 50% of participants who indicated remembering information to be a weakness (S17), were mainly within the first two years of their studies. Many of the students referred to a need to alter their approaches to study (to be discussed further on), indicating some level of reflexivity of the impact their study approaches have on their ability to remember information. It may be that the academic experiences of participants in the later years had heightened their awareness to the challenges and demands of the course, enabling mental and study adjustments to be made over time. It could also be that the practice of repetition reported by many participants, improves the processes of memory which automatically classifies and links information with current knowledge, and thus facilitates retrieval (Swanson et al 2004). Building on this premise, incremental knowledge and experiences would alter the perspectives some students in the later years' place on their strengths and weaknesses. Carley for example, considered her dyslexia to be '*character building'*, while Adam believed that it *'isn't a disability ... just different.'* Such different perspectives and experiences influences how the question relates to their current situation and therefore the interpretation of the question. Some participants also related the quality of their memory to an interest in the topic; *'I do find that once I've learned something, I remember it quite well'* (Adam). A unanimous agreement amongst all participants within the inventory responses and interview discussions was learning best

when interested in the topic (S46). Being interested in a topic usually stems from being able to make tangible connections with subject matter which motivates and stimulates learning. Interest engages, holds the attention and provides self satisfaction (Dewey 1913). Learning that does not capture interest becomes a task requiring effort with little internal involvement of excitement or pleasure. This is exemplified by Estelle's experience: *'If I don't understand it, I can't learn it. It's like times tables when I was younger, Mum spent so long going through them every single night with me and I still don't know it'*

The power of interest drives individuals to explore the object of interest further and to be challenged by it. Dewey used an example of an individual being interested in engineering but was never very good at maths and therefore always avoided it. The person then finds that to understand a particular engineering concept involves grasping the mathematical theory. This keenness and interest to gain more knowledge in a particular subject drives the individual toward challenges they may not normally consider, to incrementally grow in experience and become capable of extending personal knowledge beyond the individual items as part of the larger whole. In common with many individuals with dyslexia, Zoey avoided reading whenever she could and never read for pleasure. She recalls choosing to study history at school as an 'easy option', but very quickly became fascinated by the subject: *'I never thought that I would be looking for books to read. I still love these books, not all books – I don't read novels, ever!'*

Such recognition and understanding enables the learner to gain control over their learning practices by maximising their strengths in a seemingly natural and progressive way that promotes learning. Procedural knowledge is linked and integrated with declarative knowledge through the learning practices of students.

5.3 Procedural knowledge

Procedural knowledge describes knowledge of how particular strategies may be deployed to effectively manage learning. It also relates to knowledge and understanding of the appropriateness of different strategies to the specific task. It is the suitability to specific problem types that makes procedural knowledge somewhat inflexible (Schneider and Stern 2010).

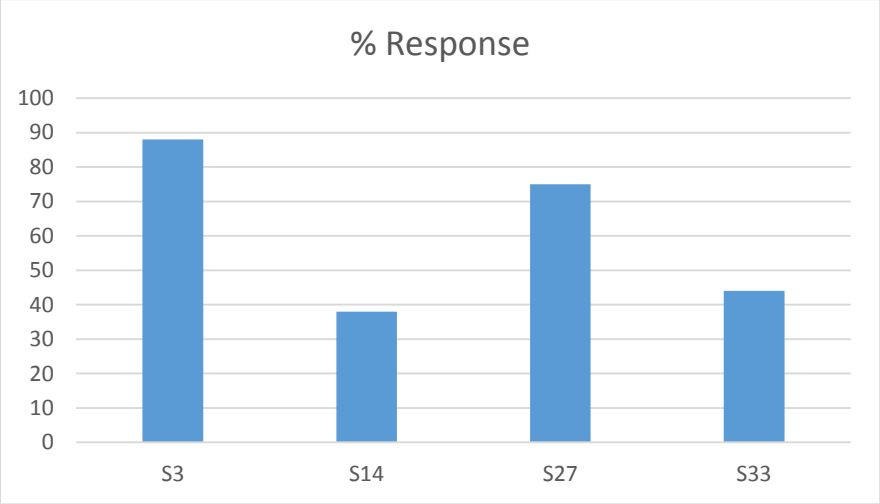

Figure 5.2 – Percentage Responses for Procedural Knowledge

Statement No.		**% Response**
S3	I try to use strategies that have worked in the past.	88
S14	I have a specific purpose for each strategy I use.	38
S27	I am aware of what strategies I use when I study.	75
S33	I find myself using helpful learning strategies automatically	44

Table 5.2 – Procedural Knowledge Statements

Interview discussions revealed that many participants were confused about how to respond to questions in this category. Although 88% of participants reported to using strategies that had *worked* in the past (S3), some participants suggested during the

interview that their 'true' response to the statement indicated the strategies they had *used* in the past, but they had not stopped to consider if these strategies 'had worked.' Therefore although such misreading or misrepresentation of responses to statements were acknowledged, it was not possible to discuss all statement responses with all participants, but where appropriate, interpretations were taken from interview discussions.

For example, the learning strategy that many of the participants used, was the reading of class notes or text books as their first 'go to' learning approach. When tasked with learning a specific topic, they would instinctively learn as much as possible connected with that topic, without considering learning objectives. *'I get as many books and evidence as I can and slowly try and work through them.'* '*I think that if I read, I would learn more – but I hate it. I don't read as a pastime, it's purely for learning.'* Carley used this approach because she felt comfortable doing so, but recognised that it was not a reliable strategy. Reflecting on learning approaches and strengths should lead the student to choose an effective learning strategy that is most likely to have a positive effect on learning outcomes (Wong and Nunan 2011). However, many students tend to approach their learning in the way they were taught (Clarke et al 2010) and since the didactic approach is based on the provision of factual notetaking, this may be the approach that some students would tend to gravitate toward.

Similarly, although Adam recognised that reading as a revision strategy was not an efficient approach, he nevertheless continued with what had become a default method: *'I always begin in the same way, I don't know why because I don't get very much from doing that.'* Adam recognised text as a primary source of information, but he also recognised the importance of syntax and sentence structure in the creation of meaning. This he considered to be a particular barrier to his learning, since he was particularly

aware of the value his fellow students gained from text. This may well explain why Adam persists with what currently does not work for him, in the hope that reading practice would improve his knowledge of text structure and the different purposes of text which would eventually lead to improved automaticity (Nicholson and Fawcett 1990; Wimmer et al 1999).

Many participants considered the strategy that did work, was associated with their learning style; *'If I have to say which one is best, it has to be auditory'* (Faye). Learning styles indicate how students prefer to receive and process information to support their learning and understanding (Felder and Silverman 1989). *'I have to hear it before I can understand it'* (Adele). *'I can't focus or write quickly enough, so I just listen'* (Larry). These participants understood the actions and behaviours necessary to improve their learning in particular situations. Some of the participants describe the methods used to maximise their learning: *'I have a list of questions that I ask myself about the topic – this I find really useful'* (Estelle). *'Visual and imagery really works for me, working with diagrams and video clips'* (Larry). An executive approach to learning supports the learning of students with learning disabilities by virtue of the established guidelines that are set within a clear and structured approach (Felder and Silverman 1989).

From this starting point, some participants then migrated toward different learning approaches. Although many of the participants (75%) considered that they were aware of their study strategies (S27), only 44% considered that they automatically used helpful learning strategies (S33). The level of response to S33 indicates a mismatch with the 88% response to S3, which referred to using strategies *that had worked in the past*, and thus confirms an erroneous response rate since a helpful strategy would be considered as one that had been successful (worked) in the past, as suggested by Alex: *I read through it and then try and find any videos or some verbalisation of it is*

very good reassurance that I understood it. The appropriateness of a learning strategy often becomes most apparent during the study process, when the effort required to learn specific types of information emerges (Pressley and Ghatala 1990). Interview discussions revealed how insecure many participants felt about their learning strategies. Many described the frustrations of inconsistent learning achievements when using the same strategy for similar tasks. There was a general assumption that if a strategy worked in one situation and was therefore *helpful*, that it should work in another situation.

Discussion around the learning requirements of different types of information revealed a lack of study skills for some participants. It was often the case that precise and clear information was more easily recalled than imprecise information that required elaborate study skills to improve recall and thus additional effort (Pressley and Ghatala 1990). Therefore due to a lack of alternative strategies, some of the participants more readily recognised the strategies that were unhelpful: *'If I just read text, the words just don't go in'* (Dana). This could be related to Dana's learning style or it may be that when Dana is learning a new topic that unfamiliar words cannot be linked to what is already known and therefore impacting on the level of comprehension (Graham and Bellert 2004). Discussion with Dana around this difficulty, revealed that since most of her attention was focussed on recognition and phonetic decoding of words to correctly register the words being read, that it impacted on her speed of reading and comprehension. A slow reading speed makes it difficult to retain the information in the working memory long enough for meaning to be constructed (Graham and Bellert 2004). This was a common theme amongst the participants and one that Aiden also identified with: *'A book on its own just wouldn't work for me, especially if it's all text'* (Aiden).

So whilst participants were aware of the strategies they used and the strategies that were helpful or unhelpful, some were less confident in judging the appropriateness of their current strategies to different learning demands.

Many of the participants had, with the help of friends and family, been exposed to a diverse range of approaches to learning. Thirty eight percent of participants indicated employing strategies for specific purposes (S14). Some participants described the methods used for the purpose of recalling key words or processes: *'Attaching silly or rude words to stuff'* (Larry). Taking an active approach to learning by creating some type of connecting with the material is likely to be more successful in recall than simply reading it (Schwartz et al 2011). Aiden similarly described a technique taught to him by a fellow student: *'Making up a story around names, shapes or objects has really helped me to learn nerve plexuses.'* He explained that this was not something he could have done without being shown the technique nor would he have been able to create a memorable story. Such sympathetic peer support was echoed by many participants who had been introduced to new study methods in an attempt to improve attainment: *'People used to say try this or that technique, but I found it all very confusing, in fact that didn't actually work for me'* (Estelle).

Being able to make an accurate judgement of the type of learning strategies most likely to aid recall of information is a valuable skill. Such judgements of learning are driven by a solution seeking need (Son and Kornell 2010). For Estelle, introducing a new learning strategy that brought increased confusion rather than clarity was not a risk worth taking at this stage when her considered best option was to stick with strategies that had previously worked. Faced with a similar situation, Bea also chose not to use a different strategy: *'I thought to myself, this is going to take ages to learn this new way. I've got this far doing what I do, so just keep going.'* However, in Bea's case, she chose

to continue to use the same approach she uses in most situations and not for a specific purpose.

It would seem that for many of the participants, the strategies that they are drawn to when constrained by time pressures, tended to be the deep rooted approaches; the approaches that were familiar, rather than newer approaches that required high levels of conscious effort. *'I still go back to what I know, probably to what feels natural'* (Adam). Acquisition of new skills is dependent on cognitive abilities such as memory, reasoning or knowledge retrieval, and the perceptual speed (Voelkle et al 2006). Poor short term or working memory would therefore impact on the speed with which a new skill is acquired. For these participants, time pressures are a constant and significant factor and exacerbated when time management strategies are deficient or ineffective. It is therefore understandable that when participants are faced with perfecting a new learning strategy considered to improve learning outcomes, the required time to achieve automaticity outweighs the time available. *'I know that there are different ways of doing things, and these may be better, but I have a hundred things to learn – it's time and time management'* (Sam). *'I just revert back to the old ways'* (Adele).

For others, the strategy tool kit was reported as being very limited: *'I was never really taught how to learn – I just copy what other people do'* (Larry). Larry and many of the other participants continued to use the same learning approach used at school. He described the enjoyment his alternative schooling afforded. The flexibility embedded in the learning approaches enabled him to disguise and avoid the learning problems he was experiencing. Disruptive behaviour and becoming the 'class clown' were the smoke screen tactics used to divert attention away from his literacy difficulties.

5.4 Conditional knowledge

Conditional knowledge relates to knowing when strategies are used in which situations and why those strategies are appropriate. Therefore it is the understanding of the when and why particular strategies are employed, that enables a flexible and adaptive approach to learning, to increase learning performances (Lorch et al 1993).

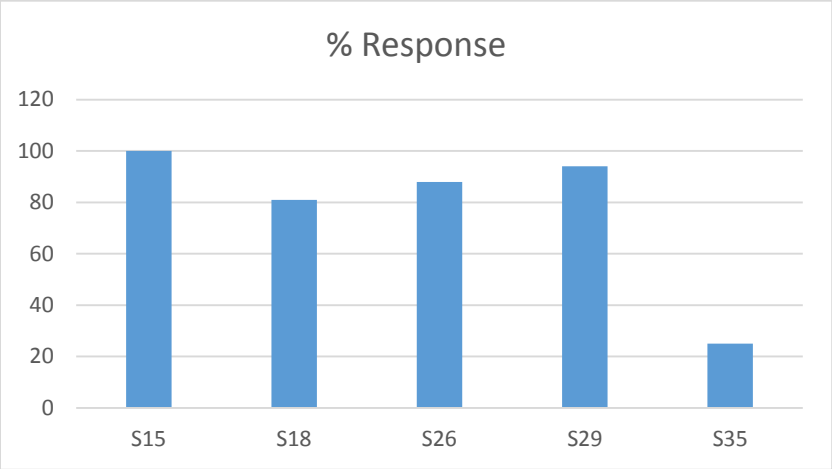

Figure 5.3 – Percentage Responses for Conditional Knowledge

Statement No.		**% Response**
S15	I learn best when I know something about the topic.	100
S18	I use different learning strategies depending on the situation.	81
S26	I can motivate myself to learn when I need to.	88
S29	I use my intellectual strengths to compensate for my weaknesses.	94
S35	I know when each strategy I use will be most effective	25

Table 5.3 – Conditional Knowledge Statements

This sub-category of conditional knowledge recorded the most positive inventory responses within the category of knowledge about cognition. All participants unanimously agreed to learning best when there was some prior knowledge of the subject (S15). The construct of scaffolding knowledge provided the contextual hook to make learning more meaningful, by linking and integrating existing knowledge with new knowledge. *'Having Physics and Anatomy* [studied at school] *made Biomechanics so much easier to get a handle on'* (Alex). Although prior knowledge is beneficial in providing the bridging knowledge, linking new and established knowledge that enable more efficient assimilation and synthesis, participants explained that an interest in the subject was more important for learning motivation. For Zoey who had little previous science knowledge other than the foundational level provided through her access programme, her new found fascination with human biology provided the impetus for learning: *'... because it's to do with the body and how it works, it makes sense'* (Zoey).

Jade on the other hand, recalled a subject that she didn't particularly enjoy and although the preceding year had provided the basis for further learning in this subject, she believe that her dislike of the topic affected her connection with new learning of the extended subject matter: *'I used to sit there and think yeah, yeah, done this or really? Do I really need to know this stuff?* It is generally accepted that course content is relevant to the learning outcomes for the programme, but if this relevance is not apparent to students (Krause and Coates 2008) then it could have damaging effects on learning achievements.

Although many participants concurred with this concept, some raised concerns relating to troublesome knowledge that created barriers in connecting with new knowledge. Faye explained that although she knew something about a topic, a missing link would prevent her from progressing: *'... then I don't understand and I can't learn it.'* It could

be that what Faye described as a 'missing link' may have been naïve or superficial understanding of concepts that hindered her progressing to more complex knowledge (Perkins 2006; Meyer and Land 2006). She described a topic that she struggled with for a long time, but although *'it makes perfect sense to me now, but I just couldn't work out where it fitted in, you know, and so I couldn't build that connection or link to the other things.'* Inadequate prior knowledge prevented learning progression due to troublesome knowledge. Such troublesome knowledge could have a positive or negative influence on seeking learning solutions. The transformation of knowledge that Faye experienced not only enabled her to gain a new perspective on the problem; as a threshold concept (Meyer and Land 2006; Meyer and Timmermans 2016; Felten 2016), but also an opportunity to consolidate her existing knowledge.

To facilitate learning and understanding, 81% of participants considered using different learning strategies, depending on the situation (S18). Participants describes the type of learning situation when visual imagery techniques such as mind-maps and use of colour in note taking or revision has been used: *'I'm very visual, so imagery helps a lot' (*Larry). Larry engaged the use of diagrams and flow charts such as mind maps to trigger recall of information. The use of non-linear learning methods helps to support memory retention by facilitating an overall picture of the topic.

This is especially useful for visual learners to understand and recall concepts by simplifying the learning process (Fabio and Antonietti 2012). Many of the participants who described such strategies explained the methods as particularly appropriate to their learning styles. Ninety four percent used their intellectual strengths to compensate for their known weaknesses (S29). Visual and auditory learners often benefit from explanation or demonstrations of concepts they find difficult to grasp. Although not confined to students with learning difficulties, audio-visual tools have

proved to be a useful learning tool. Adam explained how he would use video recording to compensate for deficits in attention during lectures: *'I'm never going to be able to learn that, so that's when I would go to YouTube.'*

A multi-sensory approach to learning proves to be more productive for students with learning difficulties than a single method approach because it opens up more cognitive pathways from which to retrieve information (Mayer 2003). Using pictures or video recordings focuses the attention of the learner to specific topics as well as providing them with the opportunity to control the learning pace. Efficient learning is also influenced by the sequence in which the information is disclosed, such that the learner is not able to jump ahead of the information stages (Fabio and Antonietti 2012).

Despite the confidence levels indicated in the inventory responses to understanding intellectual strengths (S5) and using strategies that have worked in the past (S3), participants showed less confidence (25%) in their response to S35: knowing when strategies would be most effective. The low percentage response may relate to the limited number of strategies many of the participants had at their disposal, and since the statement specified: '*I know when <u>each</u> strategy I use will be most effective'*, the honest response would be *'false.'* Some participants were also confused by why a particular strategy would work on one occasion, but not on the next. Very few participants were able to give examples of strategies that were consistently effective, which may be partly due to the intrinsic characteristics of inconsistent learning behaviour. Adam for example, understood his intellectual strengths, recognising a need to understand and make connections with the knowledge content: *'I'm not good at cramming information, so I don't tend to go for that.'* The benefits of intensive learning in a short period of time are short lived, since the long term memory of information is not retained (Kornell 2009) but begins to diminish rapidly after a few hours. Although

cramming has proved to be a popular last minute approach to learning by many students, this strategy is less effective for many participants with short term memory deficiencies. Therefore, many of the participants would opt for their primary strategy or resort to desperate measures: *'I tried to build up pictures and use peoples names for association which worked for short term memory and generally gets me through the exams, but not for long term memory'* (Paige). Paige has recognised that this approach to learning is effective in meeting the assessment goal, but ineffective for long term reliance.

Alex explained that although his preferred approach to learning was talking it through with fellow students, there were occasions when this approach was ineffective. He described his approach to a particular assessment when the structure of the work was as important as the content.: *'I would learn how to do it by writing out answers to past questions.'* He recalled frequent use of this strategy during his school years, which has became an inappropriate approach in a more complex and challenging higher education environment (Haggis 2003). In a similar way to Alex's reflection of the strategies he found to be effective in particular situations, Carley described how she stumbled across a method that improved her concentration levels in class. She was aware that to prevent herself from fidgeting during lectures, that she would doodle. Doodling prevented her from fidgeting by occupying her hands and prevented daydreaming. Unlike other dual tasks, doodling is thought to benefit cognitive performance (Andrade 2009). However, extended periods of doodling led to her being distracted by the creative drawings which subsequently led to distraction and diminished attention.

She recalled being able to improve her focus of attention when knitting whilst revising, and believed this might improve her in-class attention span. She admits that her knitting during lectures was initially distracting for her class mates, but they subsequently accepted this when the apparent benefits for Carley became obvious. It is not clear how this dual task of motor activity and cognitive processing would harness the attention span to enhance learning. It may be that the rhythmic action and repetition of the automated knitting process influences the affective domain to promote feelings of calm and relaxation (Riley et al 2013). For learning to take place under these conditions, the secondary task (knitting) should not consciously interrupt the primary task; i.e. each task would operate through a different sensory channel. Additionally, the complexity of the cognitive load of the primary task should not overburden the resources or efficiency of the short term and working memory (Park and Brünken 2015). Furthermore, within the context of this scenario, automaticity of the secondary task demanded low level cognitive loading (Schneider and Stern 2010) and therefore minimal interference of the primary task, enabling sensory priority to the latter. In this aspect of her learning, Carley has shown clear evidence of reflecting on her learning practice and employing strategies that have proved to be effective in particular situations.

Many of the participants have demonstrated the strategies used to engage in learning. Eighty eight percent of participants considered being able to motivate themselves to learn when necessary (S26). To achieve success in the vocational training programme enrolled on, students need to engage in the learning tasks and activities of the programme and institution (Trowler 2010). Paige described some of the difficulties she experienced in connecting with the programme demands: *'I came bottom in my coursework because I just wasn't organised enough. So when it came to exams, I had*

to pull it out the bag!' Paige was motivated by doing well but also recognised the need to compensate for her weaknesses in order to achieve her goals. Although 'bottom' was still a pass grade, Paige had her sights set higher than just achieving the minimum.

Sam's counter argument was that knowledge and skills are not necessarily demonstrated by written examination, because *'you have an hour and a half to regurgitate it all and then that's it – you can't come back in a little while and tweak it.'* He described being motivated by the challenges presented in coursework; formulating ideas and expressive writing over an extended period of time. Although he considers time organisation to be one of his major weaknesses, he has also learned that his best work has been produced when writing a few paragraphs at different times which allowed him the time and space to reflect on the task: *'I would put it down and come back to it later, and I'd be, wow that came out of my brain? Even the vocabulary I'd be surprised at!'* Sam declared that it was this revelation of his hidden ability that motivates him most about his learning. In common with many of the participants, Sam, Paige and Larry were motivated participants of study groups, sharing their skills with others and willing to experiment with new techniques. *'I still get a kick out of it when my class mates come to me for help*' (Larry). Larry's need to seek new and more successful approaches to learning was rewarded with empowerment and self-assurance. He was pleased and proud that his learning engagement extended beyond self, to involve and support the learning of others (Archer 2003).

Although Alex indicated negatively in his inventory response to being able to motivate himself when necessary, discussion during the interview indicated otherwise. He was proactive in his learning approaches, writing up class notes at the end of the day and highlighting areas for further research that were unclear. His preferred research sources included talking to fellow students or internet searches, but would rarely seek

out text book information. Furthermore, his approaches to revision included writing summaries in his own words and verbalising his understanding to fellow students. However, Alex confessed: *'I really, really hate exams – so I would leave revision 'til the last minute.'* It may be that Alex interprets this lack of enthusiasm as a lack of motivation to learn when he needed to. Reece similarly spoke very enthusiastically about his pleasure in learning new skills and knowledge. This enthusiasm and engagement in a subject area of interest was a key a factor in learning motivation (Kahn 2014).

5.5 Conclusion

Many of the participants employed a range of learning strategies in different ways and different situations to demonstrate and manage their learning. Such engagement resulted from being sensitive to their learning styles and knowing what would work for them and what would not. However, some participants believed exploring and experimenting with different learning strategies to be too time consuming. Whilst many participants engaged in such strategies at varying intervals during the course, when under time pressures of approaching examinations, participants would often revert to more familiar strategies. Although all participants agreed that an interest in a topic was a key motivator, many were frustrated by not being able to control their learning performance. Many participants described how a strategy could be successfully employed in one situation, but when repeated at a different time would be unsuccessful. This is considered to be particularly significant since all of the participants who raised this as a particular concern could not associate this lack of success to any particular external factor, and thus considered their achievement to be inconsistent with their potential. This experience was described as exasperating,

confusing and frustrating, presenting challenges that some participants continue to battle with while others have a quiet acceptance.

Chapter 6: Regulation of Cognition

6.1 Introduction

This chapter discusses the convergent findings of the interview and inventory related to regulation of cognition. This refers to the extent to which participants control and manage their learning over time; how they set goals, organise, monitor and problem solve within their learning. Problem solving within this context is in regard to appropriateness of strategies related to planning and management of information and correcting understanding.

Discussion and excerpts from interviews would be focussed around themes categorised as planning, comprehension monitoring, evaluation, information management strategies and debugging strategies.

6.2 Planning

This section analyses and describes aspects of learning activity participants undertook prior to learning. Effective planning of learning activities that involve goal setting, organisation of dedicated study time and approaches to learning are central to successful learning outcomes. Deficiencies in effective planning of time and learning resources contribute to the disruption of academic performances of students with learning disabilities (Snow 1992).

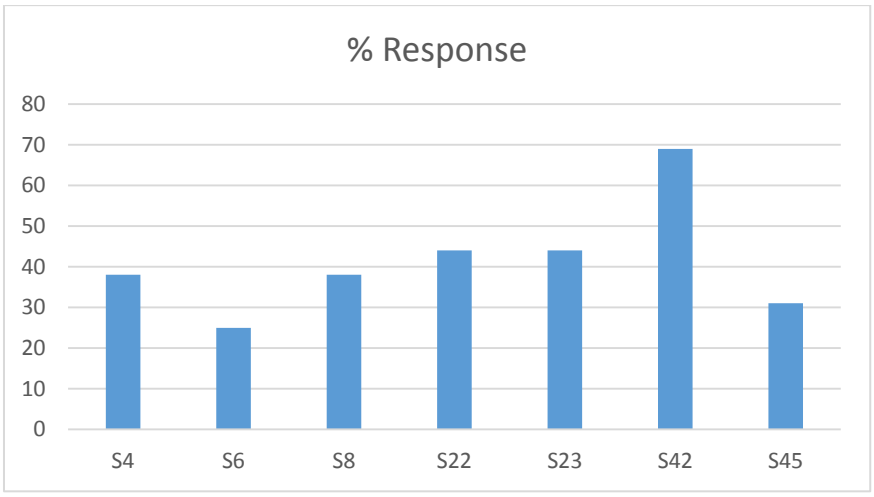

Figure 6.1 – Percentage Responses for Regulation of Planning

Statement No.		% Response
S4	I pace myself while learning in order to have enough time.	38
S6	I think about what I really need to learn before I begin a task.	25
S8	I set specific goals before I begin a task.	38
S22	I ask myself questions about the material before I begin.	44
S23	I think of several ways to solve a problem and choose the best one.	44
S42	I read instructions carefully before I begin a task.	69
S45	I organize my time to best accomplish my goals.	31

Table 6.1 – Regulation of Planning Statements

Many of the participants experienced difficulties in devoting adequate levels of time to achieve their learning goals. Thirty one percent of participants recorded organising their time to satisfactorily achieve goals (S45) while 38% declared that this time was managed in such a way (S4) as to provide sufficient time to realise specific goals (S8). Sam described his preference for composing assignments over an extending period

of time. He recalled episodes of reviewing his progress on a particular assignment: *'I thought wow, that's really good. That's come out of my brain – that's fantastic!!'* The goals he set for this type of work was to research/write in chunks which enabled him to reflect and think things through. Discussion with Sam indicated strategies for setting of goals as well as strategies for reviewing of such tasks, which were contrary to his responses to the inventory statements.

In contrast to Sam's organised behaviour, Zoey described the difficult transition from school to university with particular reference to the challenges of time management and goal setting: '*At school they tell you what you should be doing and you get time to do some of the work, but now I have to do this and in my own time.'* The pre-structuring and organisation of schooling did not teach Zoey these essential study skills. Adjusting to the changes in expectation and responsibilities within her new educational environment altered her sense of responsibility and identity as a learner (Archer 2003). The scope within this transformation is an inherent element of the learning environment (Kahn 2014) and very much dependent on the responses of the learner to such environment.

Other interview discussions reflected a high proportion of participants experiencing similar difficulties in the planning and organisation of time to the best effect. *'I'd like to be able to follow a proper timetable, because what happens is that I overflow into the next bit* [time allocated to another task] *because I haven't got the timing right'* (Adele). Underestimating the time required to complete specific tasks is well documented across the interviews in this study and literature. Many students with dyslexia report a need to devote considerably more time to completing set academic tasks than their peers (Rowan 2014; Mortimore and Crozier 2007). It is not clear whether this is due to slower processing times or inefficient use of appropriate study

strategies or both. As a recently diagnosed mature student, Aiden recalled always being disappointed with recent exam results, despite his concerted effort: *'It probably takes me six times longer than others because I have to listen to it* [recorded lectures or YouTube clips] *over and over again.'* The dual task of balancing the interpretation and capturing the meaning from the information, presented challenges for Aiden that were exacerbated by his ADHD (Wimmer et al 1999).

Aiden, Adele and Sam found their good intentions of planning academic commitments fell apart when their allocated times to complete certain tasks were inadequate: *I try to plan, but it's my time management. I know I could and should plan better - so I find I never have enough time (Sam).* As a mature student, Sam has needed to juggle family and work commitments, which he has managed reasonably well. He considered that this was mainly due to established routines that had been set up and supported by his partner. Although he benefitted from the established structure, he was unable to transfer these skills and concept to the academic domains (Wong 1987).

Reece described the organisation of his revision was planned in such a way as to maximise his available time: *'I usually try to start with a topic that I don't struggle with. This gets me into the swing of revision, because if I struggle from the start then I tend to get a bit stuck with that topic. So if I plan to do a particular topic, I get out my notes, diagrams, text books and anything else that relates to that topic. I get it all set up and then leave it 'til the next day. I find this better than wasting time looking for things before I start – I can just start and go through to the end.'* This systematic approach has clearly worked for Reece. Preparing for learning in this way reduced the distraction of wasted time in searching for information or diagrams that were required for the task. Adele and Carley admitted to using time pressure as a means of organising themselves: *'rightly or wrongly I tend to let things stack up until they get really bad, then*

I have to sort it – I wouldn't organise myself otherwise' (Carley). *I would leave it till the last minute and then panic sets in and I will work constantly to get to where I need to be. I need the pressure to get things done'* (Adele). When controlled, stress within the learning process can have motivating influences, but when uncontrolled would have a negative effect on cognition (McEwen and Sapolsky 1995; Mendl 1999; Schwabe et al 2010). However, Sam found juggling priorities when under time pressure to be ineffective: *'Because I don't have things mapped out, I jump from one thing to another until my time runs out, then I don't do my best because I have to work through the night'* (Sam). All of these students expressed a desire to be more organised; to have a schedule of work that enabled them to work toward goals in a calm and considered manner. However, Adele explained that she was easily distracted by other people, tasks or events around her. Therefore, when subjected to a time pressure, her attention became more focussed, such that she would engage in one task alone until completed, otherwise, in a similar manner as described by Sam, she would have a number of unfinished tasks on the go at any one time.

Alex reflected on the structure and organisation of his teachers that enabled him to meet set goals: *I used to need my teachers to nag me, but now I structure my own time and just get on with it*.' Whilst at school, Alex's teachers had one eye on the league tables and therefore students were monitored closely to ensure deadlines and standards were met. When teaching aims are focussed on achieving learning outcomes instead of the learning gained, the true purpose of education becomes lost (Rose 2014). So, even although it is these unmeasured elements of education (Barrett 2011) such as study skills that are often least attended to at school, it is fair to say that some students continue with the practice of organising their time once this external support is removed (Bruner 1975; Harris 2009).

Being tutored in a private school with smaller classes and higher teacher to pupil ratios, Zoey's teachers provided her with the knowledge for organising her time effectively and being pro-active in achieving academic goals: *' I set myself deadlines so that I can make sure it is all up to scratch and standard by then. I quite like setting out my own work and doing it how I want to do it.'* Such intensive teaching and learning support during her secondary schooling years, provided Zoey with 'fire-fighting' tools, enabling her to deal with learning challenges as they occurred. In contrast to these experiences, diagnosed at a young age Estelle received early learning support to help her develop the necessary skills for effective learning. She described the systems she found to be useful in organising her time: *'really important things like exams I put in my phone calendar and set myself reminders for when I need to start working*. *I usually start to revise 4 weeks before the exam.'* She explained that her planning also takes account of rest and leisure times, which are important for realistic goal setting: *'It isn't constant revision, because there are days when I just can't revise and need a break.'* Planning and organisation skills learnt during the pre-university stage supported these students through the transition into higher learning, rationalising their need to sacrifice particular aspects of social life whenever necessary to the good of their academic commitments (Kirby et al 2008).

To achieve the best possible outcome from organising learning activities, students need to carefully consider the dimensions of the task and the most effective approach to achieving specific goals. Although only 25% of participants thought about what they needed to learn before beginning a task (S6), the larger proportion of participants were undecided about what was important to learn or know beforehand. Jade was one of many participants who were undecided about what to learn before starting a task and would therefore blanket cover all the material: *'I tend to think, they've taught it so it must be important.'* Similarly, Bea felt more comfortable about not excluding any of the

topics taught: *'I don't focus on any specific topic, because I like to know that I've covered it all.'* It may be that Bea and Jade lacked the skills to discriminate between the more and lesser important information required for the task, thus defaulting to cover topics in their entirety.

Callum displayed a similar lack of self-confidence when tasked with presenting a topic to the class that had not been previously taught: '*I took one look at it and thought, I can't do it – I just don't know enough.'* This may have been due to learned helplessness engendered by the lack of reward in previously unsuccessful tasks over which he had little control (Teodorescu and Erev 2014; Seligman and Maier 1967; Hiroto and Seligman 1975). The material he needed to learn before he could embark on the task was daunting. Learning would have been more easily achieved if the objectives of set task were clear and levelled at his abilities (Pritchett and Beatty 2015) although it is generally expected that students entering higher education have the basic skills to perform at the entry level. Mortimore and Crozier (2007) argue this not to be the case, suggesting that many students entering higher education lack the learning skills for effective study.

This is particularly apparent in students diagnosed with dyslexia later in life. Many would have received very little structured learning support, due perhaps to lack of awareness of teaching staff regarding specific learning difficulties or the lack of available resources (Pritchett and Beatty 2015). These students may therefore be traversing learning territories, skirting the edges without fully participating. It could be argued that participation within a supportive, structured and non-threatening environment helps to build self-esteem and enhance learning within that social context. This is not to say that learning conditions are structured in such a way as to restrict reflexivity, but instead to provide opportunities of learning growth. However it could also

be argued that the lecturer may misjudge the opportunity to empower students when encouraging self-directed learning for students who are ill prepared.

Tasked with researching and presenting a topic, Callum lacked the confidence in deciding on appropriateness of learning material for the task. He considered his role as a student was to be taught and *'not to teach myself.'* When a student considers a task to be a threat or detrimental to their self-beliefs, they would reject the task as irrelevant or a high risk situation, responding in aversion or unmotivated behaviour (McCombs and Marzano 1990). Although peer and co-operative learning have benefits when effectively deployed (Margolis and McCabe 2004), the learning deficiencies in Callum's learning was not taken into account during the setting of the task. His immediate negative response was to disengage. Clear, unambiguous step by step instructions of the task aims and objectives are important to ensure student compliance and application (Foster 2008), especially where students with dyslexia experience difficulty in reading accuracy and comprehension. In addition to his uncertainty regarding the task, Callum also felt cheated of learning, rather than empowered by self-directed autonomous learning (Wilbur and Scott 2013).

Other participants increased their levels of confidence in deciding what they needed to learn by considering patterns or themes in past examinations. Dana would normally begin her revision tasks by compiling a list of popular examination topics: *'I would look at past exams and decide what to learn from that.'* This strategy was an approach that Dana and Alex engaged in during their school years. They utilised this approach to focus their revision and prepare for assessment. *'I write out the answers because it helps me to work out if I've answered it correctly'* (Alex). In doing this, Alex is able to challenge his knowledge of the topic and what he needs to know about the topic in answer to the specific question.

There was little evidence within the interview transcripts to support the 44% response to the statement (S22): *'I ask myself questions about the material before I begin.'* In essence, this statement considers the preparation to learn; examining prior knowledge and setting of goals, which are discussed elsewhere. Less than half of the participants (44%) suggested thinking of different ways to solve a problem and then chose the most appropriate strategy (S23). However, as previously discussed, many of the participants had a preferred way of working that they were able to apply to a wide range of learning situations: '*Because I'm visual, I know that building up images is the best way'* (Paige). Paige and Alex understand that their learning outcomes may be optimised when the chosen approaches to learning harness their intellectual strengths. '*I think of many different ways that I've used, but there is always this one way that I use*' (Alex).

As discussed in the procedural and conditional knowledge sub-categories above, many students were aware of a range of learning strategies and understood areas of strength that would compensate for their weaknesses. They were mostly able to rationalise the benefits of using such strategies, but were all limited by the time taken to perfect new ways of learning and thus as indicated by Alex, would tend to gravitate toward a default approach to learning. Reece believed that adhering to an established approach would be more time effective than approaches that may on the face of it appear to be more suitable: *'sometimes it's easier to just keeping flogging at it because I need to get it done.'* He went on to qualify this by contextualising his experiences: *'It's different when I'm working in a team, I find it easier.'* This exemplifies the experiences of other students who found it easier to work within processes when the structure was being set and supported by others. In some instances it may be that learning with and from others may enable focussing on the task in hand and not confused by extraneous or superfluous issues relating to the task. The latter was sometimes a source of frustration for Carley. When she struggles to focus on problem solving, she would: *'… do brain*

training exercises, take the dog for a walk or something.' Although the discussion around brain training was not pursued due to the time constraints of the interview, it was evident that Carley engaged in practices that she believes have shown to resolve situational issues.

In situations where students were faced with the need to read instructions, 69% reported to read these carefully, prior to beginning a task (S42). Assessment related tasks were the primarily discussed during the interviews where the majority of participants paid particular attention to the key words in examination questions. Some used techniques to highlight these key words by *'drawing circles'* (Bea), *'using colours'* (Adele, Larry), *'underline heavily'* (Faye) and *'use highlight pens'* (Carley, Adam, Alex, Estelle). By highlighting key words, participants were able to focus on ensuring that the meaning of the question was understood, but also as a means of referring back to the question to help ensure that the question was being appropriately answered.

Many students admitted never reading novels, as this was invariably not pleasurable. Reading instructions that were considered important, was therefore done with care and concentration because the complexities of automatisation in reading tasks requires phonological coding (Nicholson and Fawcett 1990) and morphological and syntax awareness that poor readers lack (Bowey 1986; Tong et al 2013), deterring them from engaging in regular reading. Due to the level of response, the highest in this sub-category, many of the participants related their responses to examination instructions. However, Bea and Adele who described the way they carefully read examination instructions responded negatively to the inventory statement and may therefore have taken different meaning from the statement. The meaning of text may not always be understood as intended (Swanson et al 2004), especially when difficulties in decoding of the written word exists (Snowling 2006). Callum who also responded negatively,

described his difficulty in accurately reading paragraphs without holding a ruler underneath the sentence. He would become 'word-blind' if the sentences were not sufficiently spaced and the paragraphs overly long. Becoming overwhelmed by the volume of text, he suggested, affected his ability to take meaning from the text.

6.3 Comprehension Monitoring

In this context, comprehension monitoring refers to the understanding and active reflection on learning. In the reflective process during or after a learning activity, the learner assesses their understanding of what they have learnt and analyses the effectiveness of the learning strategy employed in achieving satisfactory learning goals.

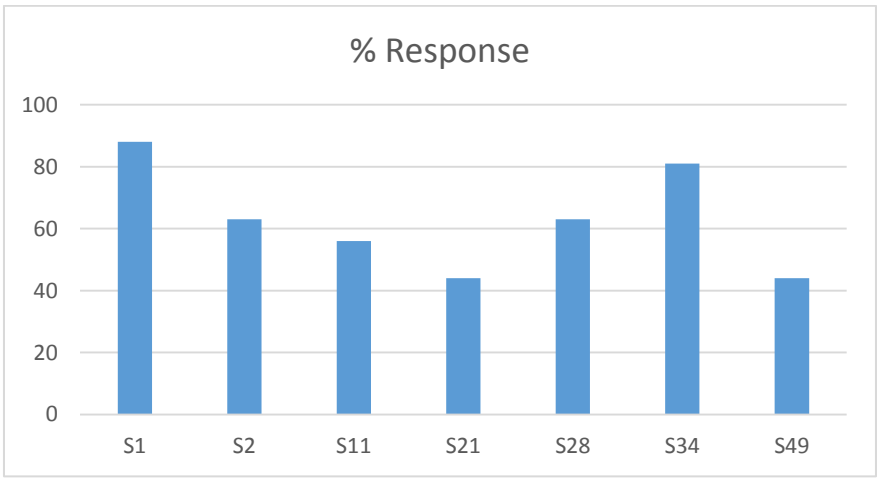

Figure 6.2 – Percentage Responses for Regulation of Comprehension Monitoring

Statement No.		% Responses
S1	I ask myself periodically if I am meeting my goals.	88
S2	I consider several alternatives to a problem before I answer.	63
S11	I ask myself if I have considered all options when solving a problem.	56
S21	I periodically review to help me understand important relationships.	44
S28	I find myself analyzing the usefulness of strategies while I study.	63
S34	I find myself pausing regularly to check my comprehension.	81
S49	I ask myself questions about how well I am doing while learning something new.	44

Table 6.2 – Regulation of Comprehension Monitoring Statements

The inventory responses indicated 88% of participants considered whether they were meeting their set goals (S1). The interview discussions suggested many participants were actively engaged in this process with their main focus being related to assessment outcomes. The majority of these participants considered achieving a pass in their assessments to be their main focus. However Paige, Adele and Estelle set themselves high personal goals. '*I do set my myself really high goal and when things don't go as I would expect it to, I would really try and think about all the things that I've tried and worked, and didn't work' (*Paige). Keen to maximise her achievements, Paige tried to create some meaning and understanding through reflecting (Dewey 1997) on her learning behaviour and outcomes, with the intent of regulating or modifying her practice (Caprara et al 2013). Self efficacy and self-belief in cognitive abilities (Margolis and McCabe 2004) were important goal achieving factors, as Adele and Estelle described: *'I know I'm capable of a 2.1, so that's my aim'* (Adele). *'I always aim for 70's and 80's but so far I* seem to be stuck in the 60's' (Estelle). Sawyer et al (1992) suggests students with learning difficulties have unrealistic high pre-task expectancy

when they are not yet capable. Whether the difficulties these students experience result from misperception of assessment demands, lack of ability or inappropriate learning strategies, they all demonstrate drive and motivation to achieve their goals.

These behaviours reflect Zimmerman's triadic model of self regulation; forethought, performance and self-reflection (Schunk and Zimmerman 1997). The forethought of these students are embodied in the conscientious planning and setting of goals. Paige described the performance and self-reflective phase; employing the strategies she considered appropriate to the task and followed by more than a simple review of the outcomes. Inferential suggestions here are that the self-reflection phase is primarily implemented as a tool to identify and rectify ineffective learning strategies or behaviours, and not a routine process. However, reflection without further action would not lead to required development of the self-regulated learner (Zusho and Edwards 2011).

Self-efficacy and beliefs are situation dependent and when related to such learning practices, alter in accordance with ongoing development and experiences (Harris et al 2004). Adele and Estelle had the self-belief in their ability that at times did not appear to be directly based on the performance of others (Zusho and Edwards 2011), but on self-confirmation of ability. It may be that since neither Adele nor Estelle reported damaging early learning experiences that would adversely affect their continued self-belief, that failure to achieve set goals was primarily attributed to a lack of consistent strategic learning behaviour. As such, failing to achieve their target grades did not hamper their self-belief as might be expected (Margolis and McCabe 2004), but instead fuelled their perseverance (Wigfield and Eccles 2000) and intrinsic motivation (Ryan and Deci 2000) toward their desired goal. Although Estelle had a number of different

strategies at her disposal, the same was not true of Adele. The interview discussion did not reveal practice of strategic review for either participant.

Carley on the other hand, was more resolute when her assessment results did not match her expected outcomes. Rationalising her expectations and the effects on her self-esteem, Carley made an insightful resolution: *'I've stopped beating myself up, because all I can do is my best.'* Her philosophy suggests that her ability beliefs (Wigfield and Eccles 2000) had not affected her self-worth (Covington 1992), since not all assessment methods are authentic or accurate in their measurement.

One of the 12% who responded negatively to this inventory statement stated: *'It takes me longer to get there, but I will just keep flogging at it'* (Reece). This infers that Reece would not consider whether he is on track or not, especially as he also responded negatively to a previous goal setting statement (S8). However, since Reece is currently in his penultimate year of the course, he has clearly met the assessment goals at each academic level to date. Dana on the other hand who also responded negatively to this statement, reported setting goals prior to a task (S8). '*I always feel that I could have done better'* (Dana). This suggests that although Dana had a set target that she was striving toward and also questioned why this has not been achieved at the end of the task, she does not periodically review her progress toward that target.

During interview discussions, all participants described their motivation and drive to be directed toward passing the course. In meeting set goals, 63% of participants indicated analysing the usefulness of strategies while studying (S28). This was a surprising level of response to this statement since evidence of such practice was not apparent from the interview, although this statement content was not specifically discussed. Many other aspects related to the usefulness and appropriateness, of learning strategies

were discussed in respect of time constraints, familiarity with learning strategies and influence of the learning environment. In doing so, many participants were able to reflect on the usefulness of strategies in these contexts, such as: '*When it comes to reading, the information that I hold is minimal, so it takes me so long when I do it this way'* (Dannielle) or *'I started using mind maps but it doesn't really help me'* (Bea), or *'I tend to start working at night when it's quieter'* (Carley).

Although these excerpts demonstrate participants' consideration of the effectiveness and appropriateness of strategies here and elsewhere (S18, 33, 35), there is little evidence to substantiate analysis of such strategies *while* studying, as stated in the inventory statement. I would argue therefore that yet again, the participants may have misread the statement. Syntax errors therefore infer different meaning and subsequent responses. Furthermore, Alex and Zoey described the learning approach they had adopted as the norm, during their school years which was dictated by the teaching style. Because *'… that's how we were taught at school.'* (Zoey), the learning method focused primarily at passing exams was never questioned nor analysed. Exposed to different approaches to learning in higher education have alerted them to the drilling type of instruction that deprived them of the opportunity to develop and acquire the range of skills and capacity to make judgements in other learning situations (Dewey 1997).

During the period of study, 81% of participants regularly checked their understanding (S34) whilst only 44% indicated they would ask themselves how well they are doing when learning something new (S49) and consider what they understood about relationships (S21) within the content. During the interviews and inventory responses, all participants considered themselves to be a good judge of how well they understood a topic (S32). Such judgment by its very nature would require some assessment of

what is and is not known. It is noted that the responses to such closely related statements (S32, S34) received different responses (100% vs 81%). It may be that some participants considered not to 'pause regularly' but on completion, to examine their understanding as stated in S34, giving rise to the discrepancy. For the 81% of participants adopting this approach, indicates a deep approach to learning. Paige was a good example of such behaviour, arguing the importance of her understanding core concepts and relationships: '*I ask questions and challenge my knowledge. My classmates get really irritated because I ask too many questions in class when I'm trying to make sense of something.'*

This notion of needing to understand what is being learnt and thus adopting a deep approach to learning was supported by Kirby et al (2008), who compared the learning approaches of dyslexic and non-dyslexic students, suggesting dyslexic students in higher education are more likely to adopt a deep approach to learning than their achieving peers. Paige demonstrated awareness of a clear tension between meeting her own learning needs and that of her peers. She described being torn between foregoing her questions in class to satisfy her classmates but then becoming mentally preoccupied by an ill understood concept which often resulted in her missing information that followed. Such mastery-orientation goals where understanding is important to learning and progression (Zusho and Edwards 2011) was notable for a number of participants. Frustration may result when tussling with concepts containing seemingly inaccessible hooks; hooks that are necessary upon which to hang current understanding and build new knowledge.

In common with the frustration experienced by Paige, Adele described her concerns that a lack of understanding had on her learning progression. '*I get all flustered when I get to something that I can't understand. I get frustrated that I'm not learning fast*

enough.' All participants expressed their battle with managing time and especially when the rate of learning is determined by the pace at which material is delivered in a course.

Whether learning disabled or non-learning disabled, peer acceptance and recognition is an intrinsic element of social learning. It is therefore not uncommon that at times, participants would make comparisons of their own performance with others, as a normative benchmark. (Zusho and Edwards 2011). So for Adele and other participants, keeping pace with their peers would be a constant pressure. In this regard, the internet has revolutionised the learning resources and approaches available to learners. All participants considered the internet to be an essential learning tool, especially since it offered multi-sensory solutions to students with learning difficulties, which traditional style lecturing often fails to provide. Multisensory approaches to learning were conferred as being the most natural and preferred study method by many of the participants. The physical act of 'doing' during the learning process, included drawing, writing and verbalising understanding of the topic content: *'I google a lot for stuff I don't understand, then I compare it to what I have in my notes so that it becomes clearer to see how it fits with what I thought'* (Faye).

It is clear that for some participants, their command and knowledge of approaches to learning, facilitate their progress and enable a deeper approach to learning; appropriate learning strategies complement intellectual strengths and supports intellectual weaknesses to ameliorate deficiencies. Alex described an incident that exemplified this: *'Most people would say that if you understand something, you can retain the information, but that's not the case for me.'* He went on to explain an incident when helping a fellow student to understand a concept he knew well and realised that the impact teaching others had on his own learning: *'When I'm revising I now find it useful*

to check if I understand something by explaining it to other students.' Repeated re-enforcement of his learning not only helped to embed and consolidate knowledge, but also helped to clarify strengths and weaknesses within this knowledge. This strategy was endorsed by Adam: *'Unless you can explain it to someone else, you don't know it.'*

This has been shown to be the case in so far as being able to adequately respond to questions and knowledge challenges (Chi et al 1994), however, many individuals with dyslexia report difficulties in sequencing words to verbalise their thoughts. In this instance terminology and terms of expression may not be appropriate or precise due to difficulties with phonological processing (Snowling 1995). For Alex, it may be that teaching a topic to someone else would involve some preparation of how to explain concepts and therefore terminology used. For Adam, knowledge and understanding could be checked through thinking aloud, that facilitates verbalising cognitive processes and knowledge base (Van Someren et al 1994) with the use of memory aids such as demonstration or illustration (Scruggs and Mastropieri 1990).

Understanding what works and what doesn't work are therefore important aspects of effective learning. Jade understood the powerful impact the act of hand writing her work had on reinforcing her thinking processes: *'I always rewrite my notes and that way I do stop to make sure I'm picking up the key points.'* Such active approaches to learning not only helped Jade to concentrate on her learning task in hand, but rewriting information also helped to revisit and refresh topic content. Seeing the information deemed to be relevant to core knowledge in one place, where key words or concepts may be colour highlighted, underlined, capitalised or manipulated in a way that appeals to the intellectual strengths of individual student. Faye took a more strategic approach to her learning, pausing at end of each topic to compose what she considered to be exam type questions: *'I do ask myself when I'm revising, what type of question they*

could ask on it.' This not only demonstrated deeper thinking and analysis of the topic, but also consideration of the content from different perspectives. Such approaches to learning improve memory of the subject as well as diagnosing knowledge deficiencies (Kornell and Son 2009).

Interestingly, Estelle who responded negatively to the inventory statements regarding checking her understanding regularly and asking herself questions about new material, stated in the interview during the discussion relating to approaches to learning: *'I ask myself questions about what I know.'* She described her techniques of developing questions related to the content as a means of testing her knowledge, understanding and memory. Flavell (1978) suggests that the metacognitive experience of reviewing and questioning ones understanding by engaging cognitive strategies such as Estelle and Faye's practice of posing questions on the content, gives rise to further metacognitive experiences of active learning. The interview discussion demonstrated Estelle's metacognitive practice, but since the responses to these two inventory statements (S34, 49) were identified by Estelle as being misread and thus incorrect, the reponses remained unchanged as a true representation of the inventory statement responses.

Forty four percent of participants considered they would periodically review to help understanding of important relationships (S21). Remembering facts that were not linked together as a coherent body of knowledge proved to be difficult for many participants. Many participants discussed the need to see how information fitted into the bigger picture and therefore understanding important relationships are central to this understanding. Zoey described the difficulties she sometimes experienced in understanding the importance of relationships between concepts: *'I do have to mull over some stuff over and over and analyse how it relates'* This may be reflective of

poor comprehension, a trait of poor readers (Tong et al 2013; Nicholson and Fawcett 1990) whose efforts are split between deciphering the form and structure at the word level rather than the meaning (Bowey 1986), or it may be lack of understanding of the knowledge connectors that link and unify bodies of knowledge.

For Aiden, periodic review of his understanding proved to be challenging and time consuming: '*I don't have the time to work out connections because it takes me long enough as it is.'* Aiden was challenged by many aspects of his learning; each written assessment proved to be a hurdle. Diagnosed with dyslexia as a mature student, the demands of higher education surpassed his expectation. Failing to achieve pass grades for written assessments brought back painful memories of underachieving at school; casting doubt over his ability to succeed in higher education.

The schooling experiences intended to enable personal growth and development (Dewey 1997) proved to be a negative experience for Aiden, resulting in low self-esteem and self-efficacy. Low self-efficacy not only reinforces negative cycles that hinder personal growth, but also any further academic development (Margolis and McCabe 2004). Aiden's deficient learning strategies may well be representative of the challenges other participants experience in not investing time to understand important relationships. Achieving a pass grade in assessments thus becomes the primary focus at all costs and enhancing and extending knowledge becomes secondary.

Carley considered some techniques that modify her notes in such a way as to highlight relationships between information and aid recall: '*I tend to use images and highlighting with colours a lot with that, but I've not found a way that helps me every time.'* Highlighting and underlining are common text marking practices to aid memory recall. The process of deciding what to highlight results from evaluating textual information for

importance and relevance (Yue et al 2015). As a visual learner, Carley's use of images and colour was a favoured technique to highlight important information, although Yue et al (2015) suggest that the benefit of highlighting would only be realised if reading of the chosen text is repeated after short time intervals.

Contrary to the challenges posed by some aspects of academic knowledge, many of the participants considered problem solving ability to be an asset. Interestingly, more participants (63%) consider several ways of solving the problems at the outset (S2), while a lesser percentage (56%) consider options during the problems solving process (S11). It is not known whether these percentage response rates were representative of participants learning behaviour or not, since only 44% of participants responded positively to both statements. Although the problem solving process was not discussed, many participants described being able to *'… find a solution quicker than others in a task'* (Aiden). Reece described similar behaviour in his personal and student life: *'I can look at something and know the best way to do it straight away, while the others are still debating it.'*

Creative thinking and finding solutions to problems by taking different or unusual perspectives are often considered a strength for many individuals with dyslexia (Everatt et al 1999). It may be that as the interview discussion indicates, participants actively engage in problem solving strategies, but may not consider whether there are alternative options to resolve the problem prior to, or during the task. It may also be that considering such learning responses out of context colours their judgement of their 'actual behaviour.' Alex explained the ease with which he was able to transfer and apply his knowledge to different situations when he felt a real connection with the subject matter through a deep seated interest in the topic: *'When you're passionate about a subject, it just comes naturally.'* This suggests that he may have an instinctive

response to problem solving in particular subjects, without feeling the need to examine options, or an in-depth knowledge of a topic eases the tension of conflict between pros and cons enabling problem solving at a somewhat subconscious level.

Similarly, many participants reflected a high level of confidence in the concept of 'show me the problem and I'll give you a solution'. They discussed being able to solve problems more quickly through observation than reading text. Slow reading speed impedes comprehension due to the decay of information within the slow working memory speed, before this information can be decoded (Kirby et al 2008). With a reputation as a low academic achiever at school, Larry believed he had always been quicker to resolve problems than his peers, especially when problem statements were read to him. He proclaimed*: 'I know that I'm not stupid, I know that I have the intelligence … give me anything practical to solve and I'd be streaks ahead.'* Recognising and understanding his strengths in problem solving and the practical aspects of learning allows Larry to demonstrate his underpinning knowledge and associated skills.

Equipped with a toolkit of strategies at a younger age, Estelle was better placed to resolve learning problems. For example, to establish memory triggers, Estelle experimented with a range of amusing images and associations as a means of recalling the names given to conditions or diagnostic tests, although surprisingly, Estelle's inventory response indicated that she did not consider options to problem solving. Although it is clear that Estelle was confronted with a need to devise some means of recalling particular information, she may not have considered such actions to be problem solving.

Although some of these aide memoire techniques were not considered problem solutions by some participants, Carley described a situation when mnemonics proved

to be the problem, and not the desired solution: *'I did try that but then I couldn't remember the rhyme I made up – so that didn't work.'* She discarded this approach as unsatisfactory for her needs. I noted in my field notes, the sense of despondency I perceived from her description of the situation. She was unable to offer any solution nor indicated a desire to further discuss this aspect of her learning, other than describing her short term memory as 'a hindrance.'

It is clear from the discussions, that on the face of it, participants had different perceptions of a problem, but considered logical or lateral thinking to be an intellectual strength.

6.4 Evaluation

This category discusses how the learner evaluates and analyses their learning performance once a learning task has been completed. In doing so, the analysis takes account of the learner's ability to judge the outcome of their performance in learning tasks or assessments. Successful academic performance hinges on the evaluation of performance which is the culmination of good planning and monitoring of learning prior to, during and after a learning episode.

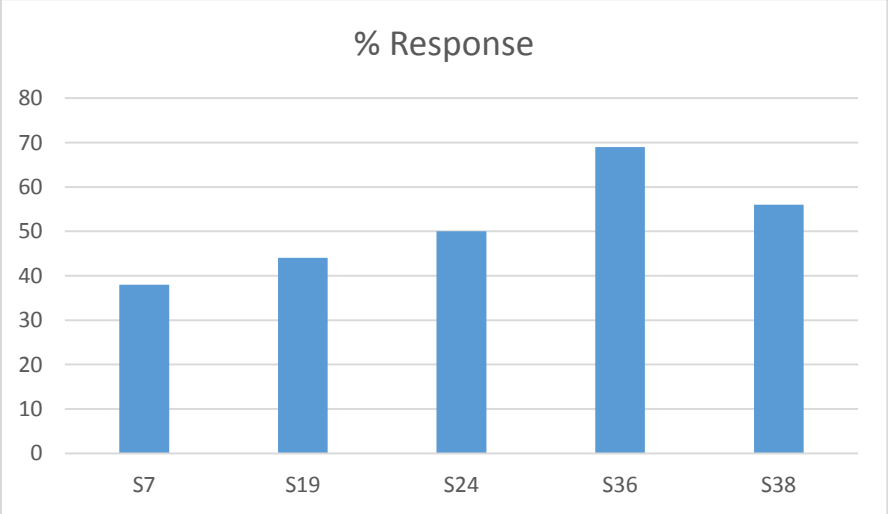

Figure 6.3 – Percentage Responses for Regulation of Evaluation

Statement No.		% Responses
S7	I know how well I did once I finish a test.	38
S19	I ask myself if there was an easier way to do things after I finish a task.	44
S24	I summarize what I've learned after I finish.	50
S36	I ask myself how well I accomplish my goals once I'm finished.	69
S38	I ask myself if I have considered all options after I solve a problem	56

Table 6.3 – Regulation of Evaluation Statements

To successfully accomplish set goals would require careful planning and regular monitoring of progression toward such goals. Responses to inventory statements and interview discussions indicated general planning weaknesses, as previously discussed, although 69% of participants indicated that they did review accomplishment once goals had been achieved (S36). During the interview, many of the participants discussed the outcomes of their goal setting to successful completion of assessments, but overall there was little sense of an evaluative process in this regard: '*I definitely evaluate more than most, but when it comes to written stuff, when it's done I don't think anymore about it'* (Carley). Carley was not uncommon in her attitude toward written assessments. In common with many other participants, Carley struggled to adequately express herself in writing, but favoured the practical aspect of her training; in which she excelled. For some participants achieving a minimum pass grade in a practical examination was unsatisfactory: '*If it's a practical then maybe I would reflect and evaluate to make sure I've done it the best way'* (Jade). Although participants accept that theory underpins practice, when goals are linked with practice, participants were more confident in predicting these outcomes than in written assessments.

Callum was very negative in his discussion of goal setting and evaluating. As a first year higher education student, his damaging school experiences filled him with trepidation: *'Teachers just gave up on me because they thought I was thick.'* This self perpetuating behaviour resulted in Callum lagging behind his peers throughout his schooling; *'Of course I always expect to fail exams first time.*' Lacking the necessary study skills, he struggled to achieve adequate assessment grades, and yet despite bad schooling experiences, Callum set himself some challenging goals in returning to education after a number of years of absence.

He was not one of the 38% of participants able to judge how well they performed in a test (S7). He talked at length during the interview about his distress of '*exam blackout'* episodes, which he related to deficient learning strategies. *'As soon as I read the first question I started to panic, my pulse was racing and I could hear my heart pounding in my ears. But then it was like time stood still, there was nothing happening – I wasn't reading anything, I wasn't thinking anything, just blank.'* The panic that set in as soon as Callum began reading the exam question may be due to the effort required to decode and make sense of the assessment task (Graham and Bellert 2004; Kirby et al 2008; Wong 1987), while simultaneously retrieving required information from the cognitive pathways (Mayer 2003). The impact a lack of automaticity (Fawcett and Nicholson 1992) has on learning performance during times of stress thus becomes exacerbated.

Estelle was amongst the 38% of participants who declared knowing how well they did after the test finished (S7). This confidence was however, related to passing an assessment rather than the quality of achievement: 'S*ometimes I think the exam went ok but my results haven't been as good as I've been expecting.' (Estelle).* The majority of participants appear to be challenged by what they considered to be the unpredictable

nature of their learning. Comprehension and reading errors of dyslexic students increase under time pressure (Kirby et al 2008). Some of the participants identified misreading of assessment questions and not providing sufficiently detailed answers to examination questions as their main downfall. Examples given of the former, were misreading key words such as 'neuron' for 'nephron' or vice versa. Additionally, honing in on the stem of the question with little attention being paid to the definitive element, such as 'Describe the processes involved in a nervous impulse, beginning at X.' Although it could be argued that such errors are not exclusive to students with dyslexia, all participants excluding Alex, Paige and Sam recalled repeating the 'neuron' for 'nephron' error when reviewing their post-examination marked scripts, often only noting this error when it was specifically pointed out to them.

Misreading of assessment questions was a re-occurring theme within the interview discussions. Misinterpretation also occurred when a key word within the question was taken out of context, leading to misunderstanding and confusion.

It is accepted that adverse assessment conditions are exacerbated by stress and vice versa, that may in turn lead to panic. In such as a situation, the short term memory that engages during the reading of text becomes overwhelmed by panic, blocking further processing within the working memory. Strategy training would be an effective means of dealing with such situations; re-reading strategies involve questioning the meaning and context of the text (Graham and Bellert 2004) and minimising misreading or misinterpretation errors.

Such realisations become apparent when participants were given the opportunity to review their marked examination scripts. *'It's a hard one to swallow when I get it all wrong because I didn't read the question properly'* (Reece). It is usually at this point that participants become alerted to deficiencies in examination techniques that

subsequently adversely affect their performances. Adam explained that even when he was confident about his subject knowledge, review of his script showed *'I was ok with the concepts but the detail was lacking.'* Estelle similarly explained: *'Even when I think I've answered the question well, afterwards I see it's the detail that I lack, it's always about the detail.'* Not knowingly underperforming during assessment therefore makes predicting the outcome extremely difficult.

Fifty percent of participants believed that summarising what they had learnt at the end of a revision period (S24) was a means of assessing their understanding. Adele, Bea, Faye, Paige, Reece, Zoey and Sam routinely summarised their notes as a means of monitoring their understanding as they progressed through the topic. Although Larry's response to this statement was that he did not summarise what he had learnt, his interview discussion described the difficulty he had in making class notes due to his slow writing speed and not being able to listen and write simultaneously. His practice involved audio recording the lecture and writing down a list of key words or phrases he believed to be important within the lecture content. During a break, while the content was still fresh in his mind, he would use his list of key words to run through his understanding of the topic *'with the clever guys.'* This he found to be an effective means of clarifying any misconceptions and consolidating his understanding when he put pen to paper at the end of the day. It is clear to me that Larry does summarise what he has learnt, filling in some detail considered necessary from core texts or YouTube videos. It may be the discontinuity between the learning event and note writing that was not recognised by Larry. Such compensatory measures are an attempt to address some of the short term memory deficiencies experienced when attempting to note take while listening, coupled with slow writing speeds.

Reece explained his approach to summarising learning*: 'If I understand what I just covered then I'll summarise it in my own words, otherwise I'd leave it and come back to it*.' Past study habits revealed that any interruption to his mental flow provided opportunities to become distracted and therefore less productive within the timeframe he had allocated to the particular topic. Experience taught Reece that filling-in-the-gaps at the end of a study period was a more effective approach for his purposes. Whilst the above mentioned participants described summarised in writing, Jade, Adam and Alex found verbal summary; explaining subject matter to fellow students or family, a more effective means of evaluating their comprehension. *'I usually try to run through it with* [student name] *first to make sure I understand it right, before I explain it to my partner. It's helpful when she say's no I don't get that or why does that happen? If I can't explain it then I know I have more work to do'* (Jade).

It is evident that the number of participants who discussed summary approaches to their learning differed to the percentage responses to this particular inventory statement. It may be some participants were confused by the wording of the statement (S24) 'after I finish'; especially if some summarise as they go along, but have not completed the topic. Reflecting on their understanding of the subject areas was unanimous (as discussed in section 5.2) and summarising may be one strategy to achieve this, although participants used varying phrases such as 'consolidate' or 'review' to assess their knowledge. It may be that differences in terminology used or misinterpretation of the statement wording had given rise to the differences between interview and inventory responses. Such misunderstanding or misreading were reported as being an issue for many participants when problem solving.

Fifty six percent of participants reviewed their approach taken to problem solving, on completion of the task (S38). Aiden, a part-time student who works in a manufacturing

environment, considered problem solving to be a key aspect of his work. Although he considers his approach to academic problems be quite similar, he usually finds that *'I do this but then afterwards I find that I misunderstood the question or task. Then I can kick myself, because it makes me look like an idiot.'* In common with many participants, Aiden and Callum considered problem solving to be a particular strength: *'I didn't know this until I was assessed. I never really thought about it, but chatting with* [Assessor], *I started thinking of examples when I would be the one to come up with a solution'* (Callum). Due to previous learning experiences, Callum lacked the self-confidence to offer solutions in a group situation. He explained that one-to-one situations were less threatening, because if his suggestion did not work first time, he would be able to offer alternatives immediately. In a group situation he felt judged by others, especially when there were many other ideas and some that conflicted with his own. In such situations he would often question and review his thinking of his solution just in case he is asked, but would not offer it unless asked.

Although the overall responses to S38 were similar to S11 (section 6.3), it was interesting to note that only Larry and Aiden responded differently to each of these statements. Whilst Larry considers options during the problem solving process (S11), his response suggests that he tends not to consider further any alternatives once he has decided on a solution (S38). Given Aiden's employment background and his explanation of the nature of his work, his declaration of not considering all options when problem solving (S11) is somewhat surprising. To consider what might be the best approach to solving a manufacturing problem prior to production, might be more cost effective than considering (as Aiden indicated while being escorted to the door at the end of the interview) if all options had been considered after solving the problem (S38). Comments contained within my field notes have highlighted Aiden's specific comments regarding his confusion caused by the wording of many statements within

the inventory. While such comments were noted, no changes were made to any of the inventory responses.

The 69% response to S36; *I ask myself how well I accomplish my goals once I'm finished,* suggests that participants set goals and reflect on their achievement of such goals. However only 38% of participants (S8, section 6.2) declared setting specific goals before beginning a task. The lower response to the latter statement may well relate to how the terms 'specific' and 'task' were interpreted by participants. It is clear from the interview discussions that participants do set goals; whether it be focussed on assessment achievement or general organisation of learning. Adele was aware that she constantly compared her achievements with those of her peers: '*I always set goals but I'm always disappointed because I haven't done as well.'* Adele believed that despite her learning deficiencies, she was capable of achieving higher grades. Disappointment in her expected learning achievement could either be because Adele has overestimated the quality of her learning (Dunlosky and Nelson 1992; Dunlosky et al 2005) or experienced subconscious or comprehension errors (Kirby et al 2008) or performance was hindered by poor working memory and attention reading span (Dutke and von Hecker 2011). Carley however took a more philosophical approach to goal achievements: *'I realised that I needed to use more of my energy in investing in myself and less time worrying about what others thought. So now I spend less time worrying when an exam is over, I don't think about it if I can help it, I just focus on the next hurdle.'* It would seem that bitter experience had lead Carley to adopt this approach, however, further discussion revealed that 'not thinking any further about it' also included not reflecting on any future changes that could be made.

6.5 Information Management Strategies

The skills and strategies students do or do not employ to manage information is

inherent within the learning process. This process is omnipresent in our daily lives within formal and informal learning settings. Marketing companies for example are adept in the use of images, colours and slogans that capture our attention, embedding their message within our subconscious minds. Such skilful use of strategies can be equally powerful when adapted to the formal academic setting.

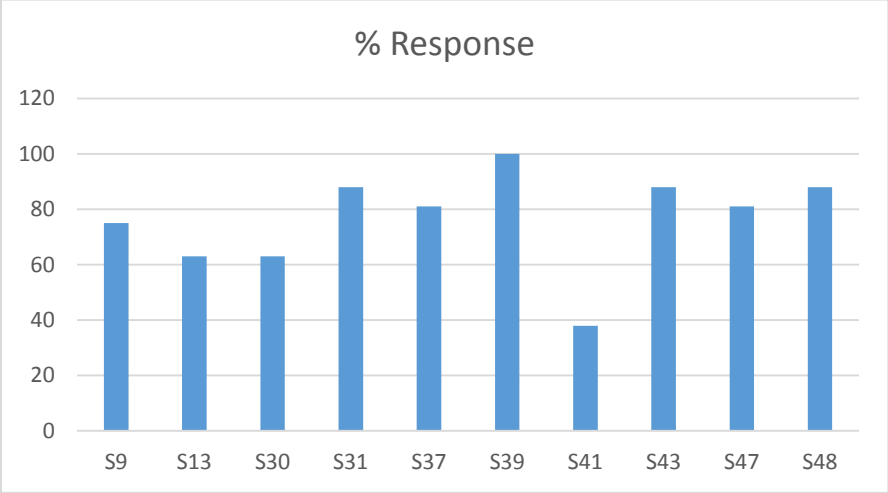

Figure 6.4 – Percentage Responses for Regulation of Information Management Strategies

Statement No.		% Responses
S9	I slow down when I encounter important information.	75
S13	I consciously focus my attention on important information.	63
S30	I focus on the meaning and significance of new information.	63
S31	I create my own examples to make information more meaningful.	88
S37	I draw pictures or diagrams to help me understand while learning.	81
S39	I try to translate new information into my own words.	100
S41	I use the organizational structure of the text to help me learn	38
S43	I ask myself if what I'm reading is related to what I already know.	88
S47	I try to break studying down into smaller steps.	81
S48	I focus on overall meaning rather than specifics.	88

Table 6.4 – Regulation of Information Management Strategies Statements

Overall, this category received strong and positive responses to all inventory statements except S41; *use the organizational structure of the text to help me learn*. Many of the participants expressed difficulty in developing any level of meaningful understanding of this statement. In many instances the responses were negative. Half of the 38% of participants who agreed with the statement, declared during the interview, to a lack of understanding or misreading of the statement. In common with other incidences of misreading, participants latch on to one word within the sentence. Taken out of context, participants attached a different meaning to the word 'organisational.' Alex, for example, immediately associated this word with the management of his study workload – completely overlooking the key phrase '*of the text.'* He explained his interpretation led him to consider the manner within which he managed his study commitments that portrayed a skewed impression of his academic abilities during his transition from school to higher education: '*For me it wasn't so much about the big jump in terms of how intelligent you had to be, but about time management.'* Reaching such a conclusion would require metacognitive skills and internal feedback resulting from reviewing and monitoring his progression against personal goals (Nicol and Macfarlane-Dick 2006).

Despite the low inventory response rate to S41, interview discussions suggested otherwise. Many participants capitalised on the organisational structure of the text to support their learning. Many referred to the use of mind maps, bullet pointing and image assisted information within their personal notes or text books. Reece described being introduced to setting out information in tabular format: '*I've started using a spreadsheet to learn conditions and how they are managed. It's simplified it for me because it's there all spread out in front of you.'* Altering the structure of the information, by stripping away unnecessary wordage and exposing key words aids the

learner in ‘drilling down’ to important information within the text. Paige explained that reorganising the structure of the information, helped her to bridge her established knowledge with new information: *‘… joining up the dots when I am able to see a clear path within the information that I have in front of me, so that I can map it all out and make connections.’* Interacting with the organisational structure of learning material in this manner, transforms her conceptual understanding so that she is able to internalise meaning through connections with her established knowledge base (Nicol and Macfarlane-Dick 2006).

Paige was also one of the 88% of participants who related new information to what they already knew (S43). Creating links with new information provides a means of positioning the new information within the scheme of existing knowledge, functioning to add clarity and extension of established knowledge. Larry similarly used multi-sensory media that is structured in such a way as to bridge knowledge gaps. ‘S*ometimes with a new topic, I can’t connect it to what I’ve already learnt, so I go to YouTube because it’s quicker than reading.’* Audio-visual material that is widely available on the internet has proved to be a real boon to students seeking a range of alternative explanatory approaches. Discernible use of learning technology enables students to exercise agency through control of their learning (Sha et al 2012; Liaw et al 2010). Students may often fail to identify the relevance of new information or recognise associations with what they have already learnt.

As previously discussed (S15, section 5.4), all participants believed they learnt best when they knew something about the topic because it provided a base upon which to build new knowledge. It is surprising therefore that 37% of participants appear not to focus on the meaning or consider how significant new information was (S30) to their knowledge base. It may be that as in previous instances, participants became

confused by the wording of the statement, leading to different interpretations. It may also be that since the statement referred to two parameters of knowledge; meaning and significance that participants agreed with only one of the parameters thus opting for a negative response. This assumption is further borne out by the 88% response rate to statement S48. This level of response indicates that a greater proportion of participants do focus on the meaning of information at some level. It would seem logical to assume therefore that if a large proportion of the participants relate new knowledge to what they already know, that participants may also consider the overall meaning of this new information i.e. overarching concepts rather than specifics, and how important it would be to what they already know or should know.

Larry and Zoey adopted different perspectives to the management of overall meaning or specific details within information. Larry's strategies were to take a broad view before considering the detail: '*I usually look at the bigger picture in a new topic before focusing on specifics.'* Zoey on the other hand needed to understand the underpinning facts that created the foundations upon which her understanding of the topic rested: '*I much prefer to focus on the detail of topics because it helps me to hold the whole thing together.'* Understanding the meaning and relevance of new information helps to build the links between new and existing knowledge such that new information may become consolidated and embedded within an extended and increasingly comprehensive body of knowledge.

For Zoey, knowing information did not equate to understanding it; free of inferences, accurately decoded, interpreted and contextualised information (Snowling 2006; Swanson et al 2004; Schulz et al 2008). Although, as Dana explains, when particular aspects of information prove to be challenging, a strategic approach to learning may prove to be the best option: '*I tend to forget the specific sometimes, so I tend to go for*

understanding the general system of things and hopefully that would help me recall specifics.'

Adam described his reaction to new material where connecting links were not immediately obvious: '*If it's a new concept that I've never come across before, I usually think - Oh I'll never be able to learn that.'* Specific details of a new concept may well cause confusion and lead to the learner becoming overwhelmed or frustrated by the inaccessibility of that information, where linking information to existing knowledge is not apparent. Therefore, focussing on overall meaning builds the linking bridges, which over time strengthens and renews learner confidence.

Sourcing additional resources for clarification of meaning and relevance, signifies the beginning of a learning journey into new knowledge territories, starting with a focus on the overall meaning. Focussing on overall meaning consciously draws the attention of the learner to the relevance and in some instances, the importance of information (S13). The interview discussion revealed a similar inventory response (63%), with some participants explaining their lack of confidence in identifying which information was important: '*I often find that what I think is important may not be'* (Bea). Some of the participants explained reliance upon clues given by lectures regarding which information is important to know (section 5.2; S16). Other participants suggested that the time period allocated to the teaching of a particular topic determined the importance placed upon it. Much of the interview discussion tended to be in line with the 38% response to S10 (section 5.2); participants indicate knowing what kind of information was important to learn.

This response contrasted with 63% of participants who declared consciously focussing attention on important information (S13). It may be that the responses are associated

with a discrepancy between *knowing* what is important and *assuming* what is important. It was with this level of uncertainty that Carley, a year 4 student, was not able to identify material of importance: *'I usually just learn it all because I haven't worked out what is important or not.'* It would appear that this lack of judgement may not be associated with the stage of study, since Larry a year 1 student stated: '*I know for example that the nervous system is something we need to know well, so I've spent a lot of time with mnemonics to help me.'* Topics considered to be of relevance and importance to the programme of study are defined within the programme specification, which may be noted by some students.

Combined with this information and some subject knowledge and understanding, a student may be able to identify what they consider to be important subject information: 'W*hen I hear something that I think is important, I think I need to highlight that bit so that I make sure I know it.'* (Adam). Metacognitive awareness and self-regulation are associated with the ability of judging what information is important to know (Gul and Shehzad 2012; Pressley and Ghatala 1990; Flavell 1979), and is usually driven by an intrinsic desire to progress and succeed academically.

Although many students with dyslexia have the will and learner agency (McCombs and Marzano 1990), they often have limited capacity to extract the important ideas within a text, due to consecutive processing of information in the text and working memory (Kirby et al 2008). Sourcing important information is a primary and pivotal skill that Aiden, a mature learner returning to education lacked: *'I notice that people with more academic knowledge will look at the beginning of a book* [list of contents] *or at the back* [index] *and then go straight to what they want – they don't read the whole book. This is all new to me!!'* Although recognised as a fundamental research and

life skill, Aiden had not encountered this practice during his schooling and since he avoided reading most forms of text, had not previously experienced it as an adult.

Seventy five percent of participants indicated a tendency to slow down when encountering important information (S9). Very little discussion and recorded information regarding the slowing down of learning was evident. Repetition of learning which is discussed elsewhere, by its very nature, slows down the pace of learning to either grasp important information or gain understanding of challenging concepts. Slowing down during the learning process is an important reflective opportunity for students to examine the content of important information. Examining such information provides the prospect for establishing literary links and compartmentalising the information into a cohesive body of knowledge.

Reflexivity harnesses the internal conversations of motivation and ultimate goals (Archer 2003) to promote power and agency (Gao 2013). This notion of power and agency may be witnessed in the need discussed by many participants to understand concepts prior to learning new information. Bea explained: 'W*hen I struggle to understand stuff like in Biomechanics, I have to really focus, slow down and go back.'* Bea discussed the difficulties she often had with topics where she struggled with *'… figuring out where it fitted in.'* In such situations, Bea would often remind herself of previously covered topics by reviewing her understanding of the subject matter until such time that she is able to build enlightened connections with the troublesome topic. Such introspective and retrospective examination is important in transforming contextual and structural elements into enablement (Gao 2013; Archer 2003).

In addition to slowing down in order to improve understanding of important information, Faye was one of the 88% of participants who also sought ways of making information more meaningful (S31) and thus facilitating memory recall. 'W*hen I'm trying to work*

out how to remember new stuff, I stop and think about what would work.' Faye demonstrated some understanding of her learning style and associated strategies. She recognised and contemplated useful strategies such as visualising a process or drawing line diagrams that were appropriate and relative to the specific task. Interview discussions confirmed that for participants, information becomes more meaningful when contextualised, such that connections and associations to a known body of knowledge is established.

Many participants described a range of meaning-making examples, some of which helped to organize the information in their mind, gather information into categories or groups or creating mental images of enactment. Jade discovered creating *'… chains of information was a great way of summarizing information because you don't have to work through reams of linear text.'* Linking sequences of information in a visual format helps to create knowledge associations between distinct pieces of information with additional potential for creation of memory prompts that assist in recall of such information. Similarly, creating mental images of the enactment of sequences of events was a technique employed by Paige. She explained: *'For short term memory I try and build up pictures and also use images of people doing a particular action.'* By visualizing the practical application of information, positions the knowledge within a specific context and creates linkages with the theoretical base. Recognising a need to support deficits within her short term memory, Paige developed strategies that helped her to make sense of the information and situate the same to aid recall of the information (Dunlosky and Nelson 1992; Winne 1996).

Sam explained that when faced with a large body of complex information, none of his established strategies were helpful in making information more meaningful. A fellow student introduced him to strategies for categorising information as a more meaningful

means of managing the detail in medical conditions. Sam recognized the usefulness of such a strategy, although *'… sitting down and doing this stuff is a luxury. I don't have this time when I just want to crack on.'* It would seem that although Sam clearly recognises the inadequacies of his current learning strategies for managing complex information, his commitment to learning new strategies are taxed by time pressures. Being aware of the time required to filter key information from densely populated information sources and then remodelling these into cohesive categories, appear to negate any potential benefit for Sam.

Similarly, Aiden described his anxiety in the creation of new learning tools. Although expressing his need for meaningful understanding of information, he was anxious for the productivity of his learning time to be maximised: *'It takes me so long to look at different ways of doing things and then if it doesn't work for me I have to start again, and all the time I feel that its precious time I'm wasting and not getting anywhere.'* Although Aiden describes himself as being efficient in his working life, he lacks the ability to transfer similar strategy use from one situation to another, which is more notable in students with learning difficulties (Kavale 1980). Diagnosed with dyslexia as a mature student, Aiden's learning strategies were simple. As a visual learner, he was one of the 81% of participants who favoured drawing diagrams and pictorial representations to improve understanding while learning (S37).

Although Callum found images and diagrams a useful way to learn, he explained that his poor drawing skills were often a distraction during revision periods. He would consequently devote more time to the appearance of the drawing than the learning intent. Although his negative response to this statement was accurate, Callum indicated circumventing his lack of drawing skills by photocopying or downloading line diagrams, removing labelling and using these images as learning templates.

Organising information graphically can serve as mental maps, helping students to visualise complex concepts (Graham and Bellert 2004).

Almost all participants discussed the use of visual learning tools; for sense making or as memory aids. Dana described how by attaching meaning and association to particular aspects of a diagram, she could create a description that helped her to reproduce complex images: *'when I'm focused, I can draw out the brachial plexus that I've worked out how to do by making a story around it.'* Increasing use of this approach to learning has proved to be successful for Dana. Visualisation techniques have proved to be one the most effective memorisation techniques used by dyslexic adults (Burns et al 2013). Since learning the technique from a fellow student, she had modified and adapted this technique to suit her specific learning needs. In common with Dana, Reece, Zoey and Carley also favoured the use of visual imagery to enhance learning and understanding. All participants considered these strengthens to be compensatory to other weaker learning areas (section 5.4; S29): *'I use diagrams a lot. In an exam the word CSF jumped out at me and I immediately saw this diagram in my head.' (*Reece). Similarly, Zoey recalled: '*I'm good at remembering pictures and stuff, so with exams I do a lot of this in revision so that I can recall it in the exams.'* Carley explained that the use of colour in addition to the physical act of drawing were key to her memory recall: *'I use lots of visual things like coloured pens, stickers, diagrams that I can see and feel, so it holds my attention.'* All of these participants demonstrate a good understanding of their learning strengths that enable a deep approach to learning that trigger memory of key processes, but also to simpler recall facts (Kirby et al 2008).

All of the participants (100%) expressed the need to translate new information into their own words (S39). Some participants felt the need to rewrite class notes, paraphrasing

sentences and blocks of explanations into their own words. This, they believed was one way of judging how well they understood the topic (S32). Adele explained paraphrasing as a necessary exercise that provided the opportunity for choice of expression, without the pressure of an examination situation: *'I sometimes struggle to put it into a sentence. I know what I want to say, but can't find the words to say it.'* It could be that since students with dyslexia are poor readers, they tend to read less than typical readers, and thus acquire a more restricting range of vocabulary (Ferrer et al 2010). Additionally, accessing and organising information stored in the long term memory are often reported challenges for students with dyslexia (Fuller et al 2004). Adele explained that once she was satisfied with her word choice and sentence construction, the information became more clear and easier to recall. Difficulties in expressing ideas in writing and organisation of work escalate proportionately for dyslexic students with the challenges related different levels of study within higher education (Mortimore and Crozier 2007).

Although Carley described very similar situations within her learning, she was more emphatic about the frustration surrounding this aspect: *'It is like looking at a full page of text and the word that you want has a black dot over it. After a while you may be able to see 1 or 2 letters in it, but you still can't see the word.'* She described instances during a written examination when her thoughts would flow freely but then suddenly halted by not being able to recall a specific word. For Sam, this connection with and identification of words was equally crucial to this learning progress. He explained a similar scenario when the meaning of words failed to register during the learning process*: 'I try to put it into my own words so that I can internalise what I am learning.'* He explained that his thinking reflected his written sentence construction and therefore if what he was reading or had learnt was not written in his words, he would sometimes have difficulty learning it. It may be that his decoding strategies that enable memorising

and storing of information is insufficiently developed to encode and make unfamiliar terminology more memorable and meaningful.

Other participants such as Alex for example, believed their understanding of material was confirmed through verbalization: '*I find that if I read and then discuss it, I learn that a lot quicker than even just hearing it.'* Verbalising his understanding by choosing how to explain his interpretation of information was of key importance for Alex. He explained that since discussion was a two-way conversation, he sometimes needed to justify his interpretation, thus challenging his own perspectives and understanding. This is an example of how social interaction may confirm or clarify reflexive deliberations (Archer 2003) to enhance and promote personal power (Gao 2013). Personal power in learning takes on many guises and for Estelle and Zoey, an important approach to their learning was talking out loud; verbalization of the information. Estelle would write summaries on index cards that she would read out load to control her level of attention and focus. Zoey on the other hand considered her approach was more to do with thinking out loud: *'I think for me it's to do with hearing me say the words – it's much better for me than writing it.'* Zoey suggested the process of thinking out loud improved her ability to create images in her 'minds eye.' Such self-talk not only enhances motivation and interest in set goals (Wolters and Rosenthal 2000), but verbalization which could also be thought of as being self-instruction, helping to direct ones attention toward the task or minimize external distraction (Meichenbaum 1980).

Although there was general consensus among participants that breaking down study into smaller steps (S47) was an effective approach to learning, 19% of participants did not do so.

Many of these participants cited a lack of organisational skills as the major contributing factor for not doing so. Jade explained that she would often identify a time to devote to study, although her good intentions seldom materialised: '*I mark off the days on my calendar when I'm going to work on the topics, but then the time just goes.'* Jade found that she was often distracted by her home environment. She found that her thoughts would often drift to household chores or she would become distracted by email pop-ups on her computer. Experiencing similar episodes of time wasting, Paige resigned herself to extended periods of study: '*I know that it's probably better to do it in smaller chunks, but because I'm so badly organised, I tend to do it in bigger chunks*.' Paige accepted her allocated study time would include time for gathering all the necessary resources for study, with additional interruptions for resources she had forgotten to have accessible. These longer periods of study time therefore eliminated the frustration to some extent of Paige not meeting her daily goals. However, Bea's experience of planning her study periods for the weeks leading up to an examination proved to be quite stressful. She explained: *'I waste so much energy because I'm not working as efficiently as I should.'* Bea recognised that she needed to improve her approach to study, although the strengths within her organisational skills that would enable this, were not apparent. These responses appear to be congruent (S4, section 6.2) where 38% of participants declared not pacing themselves while learning in order to have enough time.

Aiden, who confessed to a chaotic approach to learning, described the chunking technique being taught to him by his study skills tutor: '*You break projects down into smaller pieces and then chunk down to even smaller pieces.'* Aiden aspired to approaching his learning in a *'calmer and more organised'* way. His aspirations reflected the attitude of many participants, but few claimed to be working in this way, thus conflicting with the responses indicated in the inventory. Callum confessed that

his attention span dictated the need for frequent short episodes of study. He added: '*I do like to work at my own pace and doing bits a little at a time.'* Understanding his learning needs and limitations, such an approach appeared to work well for Callum. Reece who chose a similar approach, explained this chunking approach to coursework provided him with an opportunity for reflection: '*I work better when I can just put it down and go back to it later, when I can re-evaluate*.' Understanding their learning and taking control of when to work and when to take a break, evaluating contextual and structural components within such situations demonstrates aspects of autonomy and agency (Gao 2013).

6.6 Debugging Strategies

This section describes and analyses the strategies participants employed to improve or correct understanding. Although the appropriate choice of learning strategy is key to a successful learning outcome, the level of personal effort is the ultimate driver determining such success (Larkin and Ellis 2004).

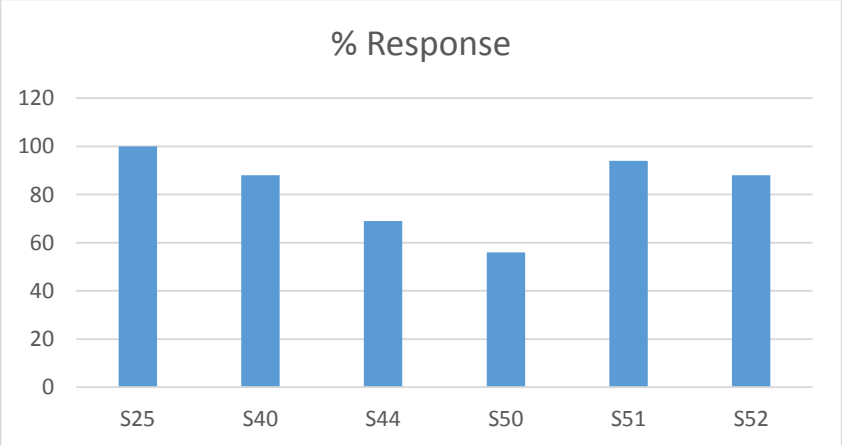

Figure 6.5 – Percentage Responses for Regulation of Debugging Strategies

Statement No.		% Responses
S25	I ask others for help when I don't understand something.	100
S40	I change strategies when I fail to understand.	88
S44	I re-evaluate my assumptions when I get confused.	69
S50	I ask myself if I learned as much as I could have once I finish a task.	56
S51	I stop and go back over new information that is not clear.	94
S52	I stop and reread when I get confused.	88

Table 6.5 – Regulation of Debugging Strategies Statements

Participants were unanimous in their response to seeking help when understanding eluded them (S25). The sources and the stages at which help was sought varied amongst participants. Callum and Adam for example rarely asked for help from peers or teaching staff. Callum explained: *'I've stopped asking people to explain things because the looks I get from people. They don't understand what my problem is, so it becomes even more frustrating for me.'* Adam on the other hand believed that if he worked hard enough he could achieve targets: *'I struggle to ask for help if I'm honest because I don't see my dyslexia as a disability, it's just something that I have to manage.'* It may be that for Callum and Adam, it was important for their self-esteem and self-confidence to be accepted as or be perceived as being of equal ability.

Reflexive internal conversations in both instances may be motivating and constructive, or may equally cause personal distress (Archer 2003). For Adam, admitting to needing help might be admitting to learning deficiencies. Whereas for Callum it appeared to be more about self image and how he is perceived by others, since societal attitudes of self worth is based on achievement (Covington 2000). Previous learning experiences had impacted on Adam and Callum in different ways; if would appeared that Adam had

become more determined to confront and 'conquer' his learning difficulties, whereas Callum appeared to be degraded and down-trodden by the behaviour of others toward him. These levels of stress and anxiety and social identity (Archer 2003) might inform his academic success in higher education and impact on life beyond (Madriaga 2007; Margolis and McCabe 2004).

Those diagnosed with dyslexia in their pre-twenties, tended to seek help and support from friends and families at all stages during their course of study. For Carley, seeking help from her family was always her first and last resort: *'I get amazing support from my family'* because, as Carley explained, *'They understand how I think and what I struggle with.'* Carley and Alex described the positive impact on their learning and subsequent support received from family when other family members were also diagnosed with dyslexia. As Alex progressed from school and into university, he sought less help from his parents and more support from his dyslexic brother, who in many instances had faced similar learning challenges at university level. Reflexive consideration of learning in the form of internal conversations that are subsequently discussed with important others (Archer 2003) inside and outside of the learning environment have been revealed as an important strategic approach to learning by many participants.

Technology has revolutionised the important support links with home as individuals move further away from their home base to far flung learning institutions (Hofer et al 2009). Hypermedia maintains distant relations via phone, audio-visual and social media. The same facilities builds new relations and connections within the student learning community. Reece described the interface between his learning and reaching out to his peers for support via social media: *'I have the support of my class because I only have to post* [on Facebook] *something I'm struggling with and someone is there.'*

Full access to the curriculum is often facilitated by achieving peers as social learning becomes an increasingly accepted learning activity (Pearl and Donahue 2004). Social media and virtual learning networks are especially important for part-time students, although may have hidden frustration for some individuals with dyslexia. Although Aiden experienced a similar peer support environment as Reece, he described his on-line communication with frustration: '*Sometimes I've asked other students but when they don't understand what I'm asking because I've not used the right words, then I'm really struggling because then I become even more confused.'*

Confusion is a normal if somewhat frustrating element of the learning process. Sixty nine percent of participants claimed to re-evaluate assumptions when confused (S44). In many instances, participants described self-perpetuating cycles of increasing confusion over time. Faye suggested her re-evaluation often led to frustration due to over thinking of the subject matter. Over time, cyclical thinking and assumptions become unnecessarily complex. Faye explained: *'Sometimes I get so bogged down that I don't see the obvious.'* Going back to basics was one approach Dana adopted. She explained that re-evaluating her understanding often led to further confusion when no new information was available. She suggested her most effective strategy during episodes of confusion was to canvass the views of fellow students: *'... and especially when I'm confused will I want to hear different people talking about the same thing.'* In doing so, Dana felt better able to assess her knowledge and understanding in light of discussion with her peers. Some students described the disruptive effects confusion had on their learning. Aiden suggested that since confusion became a barrier to progression within the topic, his tendency was to avoid addressing misunderstanding in the first instance*: 'If I get confused I just move on to something else and come back to it if I have time, but often I just run out of time anyway.'* Aiden considered particular aspects of his study of more interest (S46), often determining how well he understood

the material (S32). Based on this premise, he would evaluate his need to re-examine any misunderstanding of information in view of the available time and complexity of the subject.

Most of the participants (94%) declared an active approach to re-evaluating understanding, by stopping and going back over new information to clarify misunderstanding (S51). I would argue that re-examination and evaluation of assumptions (S44) of new and existing knowledge is integral to this process of clarification. I therefore attribute the difference in responses to these statements to be determined by terminology used in qualifying understanding of knowledge; S44 referring to 're-evaluating assumptions when confused' and S51 referring to reconsidering 'new information that is not clear.' It may also be that rather than re-evaluating their understanding when confused, in view of their response to S51, many participants would stop, go back and begin again. Repeated reinforcement of new knowledge was discussed by many participants as a means of sense making and key to committing the information to memory.

'I generally have to reinforce a lot, I can't just pick up something' (Zoey). This implies a need to become familiar with troublesome new information by making sense of the content; building links between new and existing knowledge (Meyer and Land 2006). The bridging of such knowledge gaps is dependent upon availability of appropriate and accurate nuggets of information, analogous with pieces in a puzzle (S15; section 5.4). Jade explained her experience of such an instance: *'I had to work out what's going on first. It was just be a tiny thing* [information]*, but I didn't get it and so I got stuck.'* In common with other participants who discussed a need for clarity prior to understanding, Bea described her approach in achieving this goal: *'When something doesn't make*

sense and I haven't a clue, I will pull out some words and google them. I will also go to YouTube, but last of all I will go to books.'

Although many participants (94%) would reread to address any confusion (S52), many would not consider reading *text books* as a first choice. Participants general approach to managing their learning involved making their own notes. Many found it especially difficult to listen to a lecture and write notes simultaneously (Fuller et al 204). Many chose to use the teaching material provided as a basis for re-writing class notes, sometimes with additional notes taken from other information sources. Rereading of notes written in their own words was often the first choice for some participants: *'Sometimes when I get things a bit mixed up, I just have a quick reread of my notes, just to check'* (Carley). Accurately constructed notes may function as accessible referencing on such occasions, providing some learners with the confirmation and confidence they need to consolidate their learning.

It may be considered that misconceptions or miscomprehension are resolved through rereading (Graham and Bellert 2004). However, Alex explained an incident in which his initial experience of misreading a key word during his research, confused his understanding of associated concepts. Such contradictory information lead him to reread his notes: 'S*ometimes re-reading for me takes on a different meaning.'* Reading the text again clarified misconceptions and provided Alex with a new enlightened perspective and understanding. Some learners may decide to go beyond their class notes to gain a different perspective or explanation: '*I will dredge through a lot of information if I think I've got it wrong'* (Sam). Rereading to improve understanding when confused, may not always prove to be a quick and straight forward process. Simply re-reading does not assist students with learning disabilities. The task of rereading has to be approached more strategically in a question-answer relationship

(Graham and Bellert 2004). When such assessment of understanding fails, reconceptualization of knowledge may require relearning which extends beyond rereading. In common with Sam's experience, Aiden described a similar scenario: '*I think I understand but then when I have to take one concept and use it in another context, I get confused and have to go back to my notes and start over again'* (Aiden). Aiden and Callum described their difficulties in making sense from reading text, but acknowledged the importance of basing knowledge on set texts and information provided within the course. Callum explained: '*Rereading doesn't work for me. I would probably do this a couple of times but then I know I have to try something different.'* Callum had a good understanding of the type of strategy that did not work well for him, although confessed to not really understanding his most effective or efficient approach.

This intimate knowledge of ones learning is a development that takes place over time, requiring patience and perseverance (Burns et al 2013). Diagnosed with dyslexia as a mature adult, Callum recalled many frustrating and bewildering learning experiences. Knowing what is not working was the trigger for 88% of participants to change strategies when they failed to understand (S40). The same proportion of participants indicated a tendency to use strategies that have worked in the past (S3). The frustration that arose from a failure to understand, was often stressful for Callum. 'M*y strategy is just to walk away and come back to it later. I have a short attention span so often not understanding is to do with not being able to concentrate long enough.'* Callum recognised that a poor attention span impeded his learning and thus taking a break was the best approach in such circumstances. He also recognised that in addition to taking breaks, he needed to develop more effective approaches for harnessing his attention for longer periods of study time. Returning to study after a considerable break in formal learning, Callum and Aiden had been recently diagnosed

with dyslexia. Both admitted to a lack of effective learning tools. However Aiden would engage in communicative reflexivity, discussing his internal conversations with his peers, whereas Callum was more inclined toward autonomous reflexivity (Archer 2003), choosing not to discuss his learning with peers.

Although Paige was also a mature learner when diagnosed with dyslexia, she has a tenacious approach to her learning: '*If I don't understand, I can't remember it - so I find ways that would help that. I evaluate a lot, always thinking about what I've tried and worked and didn't work, and what I can change.'*

Although some of the participants indicated a willingness to changes strategies, interview evidence was less supportive of this behaviour. Participants tended to favour familiar strategies that had worked in the past. Jade explained that her *'go to'* approach was underlining and highlighting key words: '*I usually do what works best at the start, so if it doesn't work then I'll just keep going because I don't know another way*.' Although she preferred this approach, she was aware that it may not necessarily optimise learning in some tasks. Reece similarly recalled the use of a largely single approach to learning: '*I just keep flogging at it because I need to get it done and don't think that perhaps I should try a different way.'* Some participants considered the use of familiar strategies to be the best use of study time since it felt more natural, comfortable and required less planning. New strategies they had been introduced to by peers or study skills tutors which appeared to meet learning needs for the task in hand, required more practice and thus equated to additional time required for the planning and preparation in the execution of this new skill. Despite the positive responses (88%) of participants indicating they would change strategies when they began to struggle to understand the content, Carley was one of many who discussed this change as not taking place at an early stage: '*I would probably stick at it unless I get really frustrated and then I'll change.'* The frustration expressed in this context by

many participants related to the slow speed of learning. More than half of the participants (56%) questioned how much they had learned on completion of a task (S50).

Many participants considered the number of repeated times required to learn a topic impacted on the volume of learning achieved within a given time period. Zoey and Adam made particular reference to quality over quantity; the need to understand, rather than covering volumes of information. '*I would go over it as many times as I need to until I'm really sure that I understand it completely'* (Zoey). *'I will go through things quite methodically, going over it several times until I'm happy'* (Adam). Achieving study goals (S36) was considered a priority for many participants, since as Aiden explained: *'It takes me so long to grasp new concepts, but once the light goes on it's such a relief because I know that it will stick then.'* Having taken account of the slow speed of learning, those participants who considered the volume of their learning in any given time, expressed disappointment. Adele described her frustration in her ineffective use of time. *'I'm never happy with how much I've learnt, I always feel that I could do more. It's frustrating because I don't get the best out of my time.'* Managing time and his application to the task in hand had always been a challenge for Sam. He accepted the need to devote extra time to planning his work and was resigned to the extended times his learning required: '*If I was to ask, could I do things more efficiently? - The answer would be yes. Do I waste energy? - The answer would be yes.'* Sam recognised the loss of time and effort required to complete necessary tasks, and an almost reluctant acceptance of his ways of working. Larry was similarly resigned to the amount of learning he could achieve in a given time. He explained the damaging effects life stresses had on the efficiency of his learning; personal relationships demanded additional time and often hijacked this thought processes during quiet study time: 'W*ith so much going on in my life right now, I just do what I can when I* can.'

6.7 Conclusion

Self regulation of learning is an important element of higher education. Taking control of learning through planning, monitoring and setting of goals enables students to maximise their learning potential (Azevedo 2007).

Participants who had been diagnosed at an earlier age or had siblings with similar learning difficulties, where more able to plan and organise their academic work than those diagnosed at a later stage. Being taught and supported in such skills enabled students to utilise these skills and develop coping strategies. Students diagnosed at a much later stage reported deficiencies in effective planning; often underestimating the time required to successfully complete tasks and thus subjected to pressure of time constraints. A few participants were aware of the impact of structure and agency on the efficiency of their learning (Ashwin 2008), and were able to describe situations although many appear to lack this insight. Although such conditions stimulated and motivated the students to focus sufficiently on the task in hand and drive it to completion, many considered this an unhealthy and undesirable construct. Additionally, although many participants were able to describe a range of strategies used at different stages in their learning, some declared resorting to what was easiest and not necessarily what may have been best, since practicing and perfecting new techniques were too time consuming, thus robbing them of valuable learning time.

Chapter 7: Conclusion

7.1 Introduction

This chapter considers the proposed research questions and in doing so, summarises the findings of this research. In concluding these findings, this section will also describe the key theories arising from the study and the implications for practice. Suggested areas for future research are also indicated.

7.2 Research questions

- How successful do the participants say their learning strategies are, or have been?

Many students find the transition into higher education a difficult one, for various reasons. A significant factor is likely to be that many are ill prepared for the learning challenges imposed by higher education. Lifelong learning policies in the UK have made it possible for students to obtain entry into post-compulsory education when they lack the minimum academic entry requirements. Many of the participants in this study gained entry on to a course of study to train as a practitioner within a health related profession, via an access programme. These participants did not have the academic requirements because they had either left school without the minimum qualifications or they had opted for art based subjects.

Overall, participants demonstrated in the inventory and interview to have a good understanding of their learning. The evidence provided by the in-depth interview established some of the reasoning and rationale behind responses to some of the inventory statements, although this was especially notable where the interview

discussions did not confirm inventory responses. Many of the participants were keen to explain that in many instances, their responses to the inventory statement were not done with any level of confidence, since much of their learning behaviour was not consistent. The temporal nature of research is evident, since the phenomenon is situated within time and context (Heidegger 1962). Although all participants were confident of being able to learn well when they were interested in the topic, the quality of this learning process would change from one day to the next. There were some days when learning was more difficult to focus, being easily distracted by the environment or wavering attention span.

Many participants expressed frustration at not being able to rely on consistent responses to particular learning strategies previously used. However, few admitted to having a range of different tactics from which to choose that would optimise learning in a given learning task or situation. For many, this was a weakness in their learning practice. Some admitted to relying on the same strategy employed during schooling, which no longer sufficed. Although all participants eluded to the supportive nature of peers and teaching staff, the lack of understanding these persons had of the learning difficulties experienced by participants meant that they continued to flounder. Since the process of learning new material was usually slow, study time was dedicated to the need for repetition, rather than learning new strategies such as mind maps, story building, associations or mnemonics. Those participants who were able to adjust strategies according to learning needs, used colours, diagrams, mnemonics, rhymes and teaching the topic to others, as a means of learning and remembering information. All participants described their use of social media, internet searches and YouTube as useful learning tools.

The high levels of motivation and dedication to pursue learning goals was evident despite the hardship and challenges posed by their learning difficulties. I would argue that overall, participants have a good understanding of their learning, for the most part, the strategies and approaches to learning of these participants in higher education are inefficient rather than deficient.

- How do the participants say their use of learning strategies in academic contexts has been/ could be enabled or limited?

The learning of many participants were supported by help received from friends, family, peers and teaching staff. Some of the participants discussed their preference to seek help from friends and family only, since these persons have greater understanding of their learning. However, the help received in these instances are short lived since they only deal with the immediate task and may not enable the learner to understand the appropriateness of learning strategies. Learning with compassionate peers was shown to be more productive, although many participants expressed concern about the time required to learn new ways of learning, which competed with study time commitments. The learning experiences of many of the younger participants were reported as being more supported by school teachers. These participants were exposed to a range of learning and teaching approaches whereas older participants experienced the single didactic teaching approach. In both instances, students tended to adopt approaches and methods of teaching as their acquired learn practice. Consequently, some older students were limited in their choice of learning strategies. For example, one participant who returned to education as a mature learner, having left school at an early age, had not acquired the knowledge or skill of sourcing information from resources available. He described the process his younger peers used to source information from a book, looking at the front or the back of the book and then going straight to the

page containing the information. This seemingly simple process that most learners take for granted was not a skill, this participant had acquired or been taught. This incident demonstrates the importance of study skills training for students, and especially those with dyslexia.

Some participants described having to contend with disparaging comments and judgmental glances from peers and teaching staff who lacked awareness or understanding of specific learning difficulties. Such behaviour of others during current times and also that experienced during previous learning experiences impacted negatively on self-esteem. Low self-esteem reduces the level of self-confidence with which some students would approach or become involved in learning tasks. One participant described some of the damaging feedback received to independent tasks during his time at school that had continued to threaten his self-confidence and haunting any further learning tasks. Self doubt prevented him from speaking out in class or contributing to group work, which could very easily be perceived as disinterest. Such detrimental experiences are barriers to learning that limit the acquisition of effective learning strategies.

- How far do the participants say they are able to regulate their learning?

Participants recognised the strengths and weaknesses in the regulation of their learning as discussed during the interviews. There was general agreement regarding the strategic deficit in planning and evaluation of learning. Although all participants recognised the usefulness of staging their learning over a period of time, only a few participants admitted to achieving this approach in practice. Learning goals were almost always focussed toward assessment, with monitoring of goals only undertaken

following assessment, although one participant gave no consideration to goal achievement once the examination had been completed. However, many of the participants were unable to evaluate their degree of assessment success. Failure to succeed was reported as not being due to lack of knowledge but attributed to insufficient detail in answers provided.

The strengths within self-regulation of learning were unanimously agreed as being strategies for managing information and checking understanding. Many of the participants used colours, diagrams, post-its, index cards to summarise information and check understanding. All participants used reiteration, re-reading, re-writing new information in own words and re-visiting topics repeatedly until such time that the information made sense or could be recalled.

7.3 Overall reflections of the study

My findings are in accordance with literature, indicating the difficulties students with dyslexia have in planning, organising, reading and producing written work (Kisac and Budak 2015; Mortimore and Crozier 2007; Harris et al 2004). This study highlights the challenges planning and evaluation of learning presented to the participants. However, many demonstrated more confidence in information management, monitoring their learning and strategies for correcting their understanding.

Many examples are evident, where the learning and development of particular participants had been hindered by the lack of knowledge and awareness of dyslexia within the teaching profession and wider community. Participants detailed their experiences of being punished and ridiculed for the learning deficiencies they personally struggled to understand. Many expressed feelings of frustration caused by inherent learning deficits and being neglected and deprived of early learning input.

Those returning to study with little academic involvement since leaving school, possessed fewer learning strategies, and lower levels of self-efficacy than participants who continued in formal learning.

Such evidence alerts all interested parties to the damaging effects resulting from ignorance. It also provides valuable insights into the sensitive nature of adult dyslexia and the metacognitive and self-regulatory practices of some participants with dyslexia. I would argue therefore, that in the absence of learning support that is timely and focussed, students with dyslexia in particular, would continue to be inefficient in their studies.

All participants believed teachers to be responsible for teaching learning strategies, although some agreed that the responsibility should be shared. Students accepting ownership of their learning possess high levels of self-efficacy and self-confidence which are central to agency (Kleitman and Gibson 2011; Bandura 1982). The teaching of study skills and the setting of tasks that encourages the skills to be practiced, represents good teaching and learning practice, and a necessity for supporting the development of efficient learning (Raoufi et al 2014; Kisac and Budak 2015; Foster 2008; Kirby et al 2008; Pintrich and Zusho, 2002). Active involvement in such practices, presents opportunities for further research that I would be keen to pursue; extending further the research field of metacognition and self-regulatory practices of students with dyslexia in higher education. Furthermore, although the infrastructure of educational institutions frame the pedagogical and social culture and practice, my belief is that as educators, we have ultimate responsibility for our own practice. It is worth considering therefore, that teachers who are aware of their own metacognitive skills are more likely to incorporate metacognitive skills in their teaching (Sadler 2013; Kolenick and Hillwig 2011).

This study highlighted the ranges of strategies participants had at their disposal varied relative to the stage in their course of study, previous learning experiences, family support and whether diagnosed during the pre-university stage. Participants who had progressed further into their course of study were more aware of a range of learning strategies, although did not always employ them. Early learning experiences detrimental to emotional well-being appear to impact negatively on self-esteem and willingness to trust others in providing much needed learning support. Participants who discussed the role of family members in their learning support, explained the knowledge and insight of these family members regarding their specific learning difficulties and therefore the targeted support they were able to provide. Lastly, those participants diagnosed with dyslexia while at school or college received life changing learning support. This last point is evidenced in literature where it was noted that the earlier diagnosis occurs the sooner intervention could be introduced.

This study therefore concludes that rather than the metacognitive practices of dyslexic students being deficient (Goldfus 2012), they are instead inefficient. Importantly, although these skills and practices gradually improved over time, timely intervention was a vital factor for enhancement of the learning experiences of these participants.

It is worth noting that since this, and all research, is situated within a particular context and timeframe, the confidence levels across the varying metacognitive skills may well reflect the stage at which the participant receives study skill training and level of progression within the course. For example, if a programme of study skill training was available upon entering higher education for students who received little learning support during their school years, it would be an interesting study to chart development of metacognitive skills over the time of study.

The methodology used in this study is unique in the examination of the metacognitive skills of dyslexic students in higher education. I was drawn to a mixed methods approach during my planning phase following revelations of repeated themes within the topic area and parallel fields. The use of an inventory, I believe, extended the boundaries of the data collected within the same available timeframe. Furthermore, a complimentary method would add value to the data collection and analysis. However, driven by a need to extend the available evidence, this supplementary albeit complementary method, began shaping and driving data analysis. This approach serviced the need to examine specific elements of learning practice. As discussed in section 3.7.3, this aspect of the methodological approach could arguably be a considered weakness of the data analysis. What had become apparent in examination of the metacognitive and self-regulatory practices of the participants, is that for information to be meaningful to them, it had to be explicit.

By methodically addressing the specific learning behaviours indicated within the inventory statements, dyslexic students would gain a clearer understanding of the specific behaviours being discussed, thus making meaning more accessible. It follows therefore, that the primary qualitative method as intended, became a servant to the framework of the quantitative approach, serving as a channel for highlighting participants' specific experiences within this phenomenon. Personal information was crucial to building the stories of events and experiences that participants and other interested parties could relate to, and provided the backdrop that was inaccessible by inventory alone.

Narrowing the scope of the study by restricting the topic area to metacognition with exclusion of self-regulatory practice, would have shifted the emphasis and position of the study to one of required depth within a single qualitative approach. I argue however,

that self-regulation is integral to metacognitive practices and a necessary inclusion if the study outcomes were to be of value to the participants.

One of the interesting and noteworthy outcomes of this study are the discrepancies that arose in participants responses to the same item within the inventory and interview. As noted in Chapter 6, some responses to inventory statements did not tally with interview discussions. Participants explained the difficulty experienced with the language used in some questions. For example, many struggled to understand the meaning of the inventory statement 'I use the organisational structure of the text to help me learn'. Failing to understand the meaning or significance of 'organisational structure' led participant responses to be inconsistent with interview discussions. During the interview, participants spoke at length about strategies used to modify and alter texts to promote their learning, although did not relate this practice to their interpretation of the statement. In addition to misunderstanding or misreading of inventory statements, it was noted that the temperament and mood of the participant also impacted on the study outcomes. For example, one participant received negative feedback on an assessment on the day of completing the self-administered inventory and attending for the interview. Her negative mood became apparent at the start of the interview, although slowly dissipated during this time. I considered her responses to be reflective of her negative mood.

It was apparent that a number of participants provided inventory responses based on desirable rather than actual behaviour. These incidences also highlighted discrepancies in response to specific aspects of metacognitive and self-regulation practices, relative to the inventory. Such examples raises the question of the reliability of survey responses and the importance placed on the outcomes of such single approach quantitative methods. I argue that conclusions drawn solely from the

inventory would portray a different and somewhat inaccurate picture compared to the evidence presented at the interview where clarification and situated context was integral to the data collection.

The significance of my findings is threefold; firstly it provides the theoretical argument for inefficiency rather than deficiency of metacognitive and self-regulatory practice of the dyslexic participants in higher education. This is currently not evident in research literature. The heterogeneous nature of dyslexia demonstrated that not only did the learning skills of these participants vary dramatically between individuals, but some were also underdeveloped and therefore the effectiveness of learning practices were inconsistent. Secondly, it demonstrates a mixed methods approach as a unique complementary means of examining this field, using two opposing epistemological paradigms, but also some of the tensions and pitfalls inexperienced researches are susceptible to.

Lastly, an additional original contribution of this study to the field is the integration of methods during the data collection stage. Theoretical models of mixed methods research adopts concurrent data collection with convergence during the analysis phase. I argue that integration of the quantitative survey with the qualitative interview provided a robust and transparent approach to data collection, enabling enhancement of the data while exposing strengths and weaknesses of the two methods.

7.4 Further research

- To examine the coping and learning strategies of learners with early and later diagnosis.
- To examine further, potentially conflicting responses to different data collection methods.

- A longitudinal study of the impact one-to-one skills tutoring might have on the learning efficiency of students with dyslexia.
- Metacognitive and self-regulatory practices of dyslexic students of typical higher education age ranges.

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References

Aaron, P. (1994). Differential diagnosis of reading abilities. In Hales, G. (Ed). *Dyslexia Matters,* (pp 3 – 18). London: Whurr.

Afflerbach, P., Cho, B-Y., Kim, J-Y., Crassas, M. and Doyle, B. (2013). Reading: What else matters beside strategies and skills? *The Reading Teacher,* 66(6): 440 – 448.

Al-Yagon, M., Cavendish, W., Cornoldi, C., Fawcett, A., Grünke, M., Hung, L-Y., Jiménez, J., Karande, S., van Kraayenoord, C., Lucangeli, D., Margalit, M., Montague, M., Sholapurwala, R., Sideridis, G., Tressoldi, P., and Vio, C. The proposed changes for DSM-5 for SLD and ADHD: International perspectives – Australia, Germany, Greece, India, Israel, Italy, Spain, Taiwan, United Kingdom, and United States. *Journal of Learning Disabilities,* 46(1): 58 – 72.

Allen, B. (2013). The use of useless knowledge: Bergson against pragmatist. *Canadian Journal of Philosophy,* 43(1): 37 – 59.

Alexander, J. and Schwanenflugel, P. (1994). Strategy regulation: The role of intelligence, metacognitive attributions, and knowledge base. *Developmental Psychology, 30: 709-723.*

Alexander, P. (2006). The path to competence: A lifespan developmental perspective on reading. *Journal of Literacy Research, 37*(4):413–436.

Allison, B., O'Sullivan, T., Owen, A., Rice, J., Rothwell, A. and Saunders, C. (1996). *Research Skills for Students.* London: Kogan Page.

Altheide, D. and Johnson, J. (2011). Reflections on interpretive adequacy in qualitative research. In Denzin, N. And Lincoln, S. (Ed). *The SAGE Handbook of Qualitative Research,* (4th Ed) pp 581- 594, Thousand Oaks, CA: Sage

Alvesson, M and Skölberg, K. (2000). *Reflexive Methodology. New vistas for qualitative researchers,* Thousand Oaks, CA: Sage

Anderson, J. (1982). Acquisition of cognitive skill. *Psychological Review,* 89: 369 -406.

Anderson, J. (1976). *Language, memory, and thought,* Hillsdale, NJ: Erlbaum.

Andrade, J. (2009). What does doodling do? *Applied Cognitive Psychology,* 24: 100 – 106.

Archer, M. (2003). *Structure, agency and the internal conversation,* Cambridge: Cambridge University Press.

Ariel, R. and Dunlosky, J. (2011). The sensitivity of judgment –of-learning resolution to past test performance, new learning and forgetting. *Memory and Metacognition*, 39 (1): 171 – 184.

Ashwin, P. (2008). Accounting for structure and agency in 'close-up' research on teaching, learning and assessment in higher education. *International Journal of Educational Research,* 47: 151 – 158.

Ashwin, P. (2009). *Analysing teaching-learning interactions in higher education: accounting for structure and agency*, London: Continuum.

Asselin, M. (2003). Insider research: issues to consider when doing qualitative research in your own setting. *Journal for Nurses in Staff Development,* 19(2): 99 – 103.

Attout, L., van der Kaa, M., George, M., and Majerus, S. (2012). Dissociating short-term memory and language impairment: The importance of item and serial order information. *Aphasiology,* 26(3–4), 355–382.

Augustinova, M. and Ferrand, L. (2014). Social priming of dyslexia and reduction of the Stroop effect: what component of the Stroop effect is actually reduced? *Cognition,* 130: 442 – 454.

Azevedo, R. (2007). Understanding the complex nature of self-regulatory processes in learning with computer-based learning environments: An introduction. *Metacognition and Learning,* 2: 57–65.

Azevedo, R., Moos, D., Johnson, A. and Chauncey, A. (2010). Measuring cognition and metacognitive regulatory processes during hypermedia learning: issues and challenges. *Educational Psychologist,* 45(4): 210-223.

Bäckström, B. and Sundin, K. (2007). The meaning of being a middle-aged close relative of a person who has suffered a stroke, 1 month after discharge from a rehabilitation clinic. *Nursing Inquiry.* 14(3): 243 -254

Baddeley, A. (1998). Working memory*. Comptes Rendus de l'Académie des Sciences – Sciences de la Vie,* 321:167 – 173.

Baddeley, A. (2000). The episodic buffer: a new component of working memory? *Trends in Cognitive Sciences*, 4 (11): 417 – 423.

Baddeley, A. (2002). Is working memory still working? *European Psychologist*, *7*: 85–97.

Bandura, A. (2001). Social-cognitive theory: an agentic perspective. *Annual Review of Psychology,* 52: 1–26.

Bandura, A. (1977). *Social Learning Theory,* Englewood Cliffs, N.J.: Prentice Hall.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2): 122 – 147.

Barnes, C. (2003). What a difference a decade makes: reflections on doing 'emancipatory' disability research. *Disability and Society,* 18(1): 3 – 17.

Barrett, A. (2011). A millennium learning goal for education post-2015: a question of outcomes or processes. *Comparative Education,* 47(1): 119–133.

Barsalou, L. (2008). Grounded cognition. *Annual Review of Psychology*, 59: 617 – 645.

Bauer, R. And Emhert, J. (1984). Information processing in reading-disabled and nondisabled children. *Journal of Experimental Child Psychology*, 37: 271 – 281.

Benton, A. and Pearl, D. (1978). *Dyslexia: An Appraisal of Current Knowledge.* New York: Oxford University Press.

Bergin, M. (2011). NVivo 8 and consistency in data analysis: reflecting on the use of a qualitative data analysis program. *Nurse Researcher,* 18(3): 6-12.

Bergman, M. M. (2010). Hermeneutic Content Analysis. In Tashakkori, A. and Teddlie, C. (Eds). *SAGE Handbook of Mixed Methods in Social and Behavioral Research* (2nd Ed) pp. 379- 396, Thousand Oaks, CA: Sage

Berninger, V., Winn, W., Stock, P., Abbott, R., Eschen, K., Lin, S., Garcia, N., Anderson-Youngstrom, M., Murphy, H., Lovitt, D., Trivedi, P., Jones, J., Amtmann, D. and Nagy, W. (2008). Tier 3 specialized writing instruction for students with dyslexia. *Reading and Writing,* 21: 95–129.

Bertilsson, T. (2004). The Elementary Forms of Pragmatism: On Different Types of Abduction. *European Journal of Social Theory*, 7 (3): 371–389.

Bhaskar, R. (2002). The Philosophy of Meta-Reality: Part ll: Agency, Perfectibility, Novelty. *Journal of Critical Realism,* 1(1): 67 – 93

Bhaskar, R. (2000). Introducing Transcendental Dialectical Critical Realism. Alethia, 3(1): 15-21.

Biggs, J. (1987). *Student approaches to learning and studying,* Hawthorn, Australia: Australian Council for Educational Research.

Bjork, R., Dunlosky, J. and Kornell, N. (2013). Self-regulated learning: Beliefs, techniques, and illusions. *Annual review of psychology*, *64*: 417-444.

Boekaerts, M. (1996). Self-regulated learning at the junction of cognition and motivation. *European Psychologist*, 1(2):100–112.

Business, Innovation and Skills (BIS), (2014). *National Strategy for access and student success in higher education.* UK, pp 16 – 65, Available at: www.gov.uk/government/publications

Business, Innovation and Skills (BIS), (2016). *Success as a Knowledge Economy: Teaching Excellence, Social Mobility & Student Choice.* UK, pp 18 – 80, Available at: www.gov.uk/government/publications

Büttner, G. and Hasselhorn, M. (2011). Learning disabilities: Debate on definitions, causes, subtypes and responses. *International Journal of Disabilities, Development and Education.* 58(1): 75-87.

Borkowski, J., Estrada, T., Milstead, M. and Hale, C. (1989). General problem-solving skills: Relations between metacognition and strategic processing. *Learning Disabilities Quarterly,* 22: 57-70.

Borkowski, J. (1996). Metacognition: Theory or chapter heading? *Learning and Individual Differences,* 8(4): 391 – 402.

Borland, J. and James, S. (2010). The learning experience of students with disabilities in higher education. A case study of a UK university. *Journal of Disability and Society, 14(1):* 85 – 101

Botvinick, M., and Plaut, D. (2006). Short-term memory for serial order: A recurrent neural network model. *Psychological Review,* 113(2): 201–233.

Bowey, J. (1986). Syntactic awareness and verbal performance from preschool to fifth grade. *Journal of Psycholinguistic Research*, *15*: 285–306.

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology,* 3(2): 77 – 101.

Braun, V. and Clarke, V. (2012). Thematic Analysis. In Cooper, H., Camic, P., Long, D., Panter, A., Rindskopf, D., and Sher, K. (Eds). *APA handbook of research methods in psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological.* pp. 57-71. Washington, DC, US: American Psychological Association

Braun, V. and Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners.* London: Sage.

British Dyslexia Association (BDA). (2015). Available at: http://www.bdadyslexia.org.uk/educator/what-are-specific-learning-difficulties#Dyslexia.

British Dyslexia Association (BDA). (2008). *The Dyslexia Handbook 2008/9*. Bracknell: British Dyslexia Association.

British Psychological Society (1999). *Dyslexia, Literacy and Psychological Assessment*. Report of a Working Party of the Division of Educational and Child Psychology of the British Psychological Society. Leicester: British Psychological Society.

Brooks, P. and Weeks, S. (1998). A comparison of responses of dyslexic, slow learning and control children to different strategies for teaching spellings. *Dyslexia*, 4: 212 – 222.

Bruner, J. (1975). From communication to language: A psychological perspective. *Cognition*, 3: 255–287.

Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research.* 1(1): 8 – 22.

Burns, E., Poikkeus, A-M, and Aro, M. (2013). Resilience strategies employed by teachers with dyslexia working at tertiary education. *Teaching and Teacher Education, 34: 77 – 85.*

Burr, V. (2003) *Social constructionism*, London: Routledge.

Cahan, S., Fono, D. and Nirel, R. (2012). The regression-based discrepancy definition of learning disability: A critical appraisal. Journal of Learning Disabilities. 45(2): 170 – 178.

Cameron, H. and Billington, T. (2015). Discursive construction of dyslexia by students in higher education as a moral and intellectual good. *Disability and Society,* 30 (8): 1225 – 1240.

Caprara, G., Vecchione, M., Barbarnelli, C. and Alessandri, G. (2013). Emotional stability and affective self-regulatory efficacy beliefs: proofs of integration between trait theory and social cognitive theory. *European Journal of Personality,* 27: 145 – 154.

Case, J. and Gunstone, R. (2006). Metacognitive Development: A view beyond cognition. *Research in Science Education,* 36: 51 -67.

Catts, H. and Kamhi, A. (1999). *Language and Reading Disabilities,* Massachusetts: Allyn and Bacon.

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through quantitative analysis,* London: Sage.

Chen, S. and Huang, P-R. (2013). The comparisons of the influences of prior knowledge on two game-based learning systems. *Computers and Education, 68: 177 – 186.*

Chi, M., de Leeuw, N., Chiu, M., and LaVancher, C. (1994). Eliciting self-explanations improves understanding. *Cognitive Science: A Multidisciplinary Journal, 18*: 439-477.

Chowdry, H., Crawford, C., Dearden, L., Goodman, A. and Vignoles, A. (2013). Widening participation in higher education: analysis using linked administrative data. Journal of the *Royal Statistical Society,* 176(2): 431 – 457.

Clarke, T., Lesh, J., Trocchio, J. and Wolman, C. (2010). Thinking styles: teaching and learning styles in graduate education students. *Educational Psychology,* 30(7): 837 – 848.

Cohen, L., Manion, L. and Morrison, K. (2000). *Research Methods in Education*, London: Routledge.

Connelly, V., Campbell, S., MacLean, M. and Barnes, J. (2006). Contribution of lower order skills to the written composition of college students with and without dyslexia. *Developmental Neuropsychology,* 29: 175–196.

Connor, M. (1994). Specific learning difficulty (dyslexia) and interventions. *Support for Learning,* 9: 114 -119.

Cooke, A. (2001). Critical response to Dyslexia, Literacy and Psychological Assessment (Report by a working part of the Division of Educational and Child Psychology of the British Psychological Society). A view from the chalk face. *Dyslexia*, 7: 47 – 52.

Cope, J. (2011). Entrepreneurial learning from failure: an interpretative phenomenological analysis. *Journal of Business Venturing,* 26: 604 – 623.

Covington, M. (2000). Goal theory, motivation, and school achievement: An integrative review. *Annual Review of Psychology*, 51:171–200.

Covington, M. (1992). *Making the grade: A self-worth perspective on motivation and school reform*. New York: Cambridge Univ. Press.

Cowan, N. (2005). *Working Memory Capacity.* Hove: Psychology Press.

Craik, F. and Lockhart, R. (1972). Levels of processing: A Framework for Memory Research. *Journal of Verbal Learning and Verbal Behavior,* 11: 671 – 684.

Creswell, J. (1994). *Research Design. Qualitative and Quantitative Approaches,* Thousand Oaks, CA: Sage

Creswell, J. and Tashakkori, A. (2007). Developing publishable mixed methods manuscripts*. Journal of Mixed Methods Research*, 1: 107 – 111.

Creswell, J. and Plano Clark, V. (2011). Designing and Conducting Mixed Methods Research, (2nd Ed). Thousand Oaks, CA: Sage.

Creswell, J. (2013). *Qualitative Inquiry and Research Design. Choosing Among Five Approaches,* (3rd Ed). Thousand Oaks, CA: Sage.

Crotty, M. (2004). *The foundations of social research: meaning and perspective in the research process*, London: Sage.

Crotty, M. (1996). *Phenomenology and Nursing Research,* Melbourne: Churchill Livingstone.

Dewey, J. (1913). *Interest and Effort in Education.* Suzzalo, H (Ed). Boston, NY: Houghton Mifflin Co. Available at: https://en.wikisource.org/wiki/Interest_and_Effort_in_Education

Dewey, J. (1997). *Experience and Education,* Touchstone Edition. NY: The Kappa Delta Pi.

Denhart, H. (2008). Deconstructing barriers. Perceptions of students labelled with learning disabilities in higher education. *Journal of Learning Disabilities,* 41(6): 483 – 497.

Denzin, N. and Lincoln, Y. (2005). Introduction: The discipline and practice of qualitative research. In Denzin, N. and Lincoln, Y. (Eds). *The Sage handbook of qualitative research,* (3rd Ed). pp 1 – 32, Thousand Oaks, CA: Sage.

Deyzac, E., Logie, R. And Denis, M. (2006). Visuospatial working memory and the processing of spatial descriptions. *British Journal of Psychology,* 97: 217 – 243.

Diggins, J. (1994). *The Promise of Pragmatism: Modernism and the Crisis of Knowledge and Authority*, Chicago: University of Chicago Press.

Disability Discrimination Act 2005, Chapter 13. Available at: http://www.legislation.gov.uk/ukpga/2005/13/pdfs/ukpga_20050013_en.pdf

Dutke, S. and von Hecker, U. (2011). Comprehending ambiguous texts: a high reading span helps to constrain the situation model. Journal of Cognitive Psychology, 23(2): 227 – 242.

Dunlosky, J. and Metcalfe, J (2009). Metacognition. Thousand Oaks, Ca: Sage.

Dunlosky, J. and Nelson, T. (1992). Importance of the kind of cue for judgments of learning (JOL) and the delayed-JOL effect. *Memory & Cognition, 20*: 373-380.

Dunlosky, J., Serra, M., Matvey, G. and Rawson, K. (2005). Second-order judgements about judgments of learning. *The Journal of General Psychology,* 132(4): 335 – 346.

Eide, B. and Eide, F. (2011). *The Dyslexic Advantage. Unlocking the hidden potential of the dyslexic brain.* London: Hay House

Elliott, J and Grigorenko, E. (2014). *The Dyslexia Debate.* NY: Cambridge University Press.

Elliott, J. and Gibbs, S. (2008). Does dyslexia exist? *Journal of Philosophy of Education, 42:*475–491.

Elliott, J. and Resing, W. (2015). Can intelligence testing inform educational intervention for children with reading disability? *Journal of Intelligence,* 3: 137 – 157.

Emden, C. and Sandelowski, M. (1999). The good, the bad and the relative, part two: Goodness and the criterion problem in qualitative research. *International Journal of Nursing Practice*, *5:* 2-7.

Eraut, M. (2007). Learning from other people in the workplace. *Oxford Review of Education*, 33(4): 403–422.

Everatt, J. and Reid, G. (2009). Dyslexia: An overview of recent research. In Reid, G. (Ed). *The Routledge Companion to Dyslexia,* pp 3 – 21. London: Routledge

Everatt, J., Weeks, S. and Brooks, P. (2008). Profiles of strengths and weaknesses in dyslexia and other learning difficulties. *Dyslexia,* 14: 16 -41.

Everatt, J. (2002). Visual processes. In Reid, G. and Wearmouth, J. (Eds*). Dyslexia and Literacy: Theory and Practice,* pp 85 – 98. Chichester: Wiley.

Everatt, J., Steffert, B. and Smythe, I. (1999). An eye for the unusual: Creative thinking in dyslexics. *Dyslexia,* 5: 28 – 46.

Equality Act 2010. Available at: http://www.legislation.gov.uk/ukpga/2010/15/contents

Fabio, R. and Antonietti, A. (2012). Effects of hypermedia instruction on declarative, conditional and procedural knowledge in ADHD students. *Research in Developmental Disabilities,* 33: 2028 – 2039.

Facoetti, A., Trussardi, A. N., Ruffino, M., Lorusso, M. L., Cattaneo, C., Galli, R., Molteni, M. and Zorzi, M. (2010). Multisensory spatial attention deficits are predictive of phonological decoding skills in developmental dyslexia. *Journal of Cognitive Neuroscience,* 22(5): 1011–1025.

Farmer, M., Riddick, B. and Sterling. C. (2002). *Dyslexia and Inclusion: Assessment and Support in Higher Education*, London: Whurr.

Fawcett, A. (2002). Dyslexia and Literacy: Key issues for research. In Reid, G. and Wearmouth, J. (Eds*). Dyslexia and Literacy: Theory and Practice,* pp 11 – 28, Chichester: Wiley

Fawcett, A. and Nicholson, R. (1992). Automatisation deficits in balance for dyslexic children. *Perceptual and Motor Skills,* 75: 507 – 529.

Fawcett, A.., Nicolson, R. and Dean, P. (1996). Impaired performance of children with dyslexia on a range of cerebellar tasks. *Annals of Dyslexia,* 46: 259 - 283.

Felder, R. and Silverman, L. (1988). Learning and teaching styles in engineering education. *Engineering Education, 78*(7): 674–681.

Felten, P. (2016). On the threshold with students. In Land, R., Meyer, J. and Flanagan, M. (Eds). *Threshold Concepts in Practice.* Educational Futures. Rethinking Theory and Practice, Vol 68. pp 3 – 10, Rotterdam: Sense Publishers.

Ferrer, E., Shaywitz, B., Holahan, J., Marchione, K. and Shaywitz, S. (2010). Uncoupling of Reading and IQ over time: Empirical evidence for a definition of dyslexia. *Psychological Science*, 21(1): 93 – 101.

Finkelstein, V. (2002). The Social Model of Disability Repossessed. *Coalition: the Magazine of the Greater Coalition of Disabled People,* pp 10 – 16, Manchester: The Greater Manchester Coalition of Disabled People.

Finlay, L. (2014). Engaging Phenomenological Analysis. *Qualitative Research in Psychology,* 11: 121 – 141.

Firth, N., Greaves, D. and Frydenberg, E. (2010). Coping styles and strategies: a comparison of adolescent students with and without learning disabilities. *Journal of Learning Disabilities,* 43(1): 77 -85.

Flavell, J. (1979). Metacognition and Cognitive Monitoring. A new area of cognitive-developmental Inquiry. *American Psychologist,* 34(10): 906 – 911.

Foster, I. (2008). Enhancing the learning experience of student radiographers with dyslexia. *Radiography,* 14: 32 – 38.

Fuller, M., Healey, M., Bradley, A. and Hall, T. (2004) Barriers to learning: a systematic study of the experience of disabled students in one university, *Studies in Higher Education,* 29: 303–318.

Franceschini, S., Gori, S., Ruffino, M., Pedrolli, K. and Facoetti, A. (2012). A causal link between visual spatial attention and reading acquisition. *Current Biology,* 22(9): 814 – 819.

Gabay, Y., Schiff, R. and Vakil, E. (2012). Attentional requirements during acquisition and consolidation of a skill in normal readers and developmental dyslexics. *Neuropsychology*, 26(6): 744 – 757.

Galaburda, A. (Ed.) (1993). *Dyslexia and Development: Neurological aspects of extraordinary brains,* Cambridge, MA: Harvard University Press.

Gao, X. (2013). Reflexive and reflective thinking: a crucial link between agency and autonomy. *Innovation in Language Learning and Teaching*, 7(3): 226 - 237.

Gathercole, S. (1999). Cognitive approaches to the development of short-tem memory. *Trends in Cognitive Sciences,* 3(11): 410 – 419.

Gathercole, S. and Baddeley, A. (2014). *Working memory and language*, Hove, UK: Psychology Press.

Gibbs, S. and Elliott, J. (2010). Dyslexia: A Categorical Falsehood without Validity or Utility. *Advances in Learning and Behavioral Disabilities,* 23: 287–301.

Gibbs, S. and Elliott, J. (2015). The differential effects of labelling: how do 'dyslexia' and' reading difficulties' affect teachers' beliefs. *Journal of Special Needs Education*, 30(3): 323 – 337.

Goldfarb, L., Aisenberg, D. and Henik, A. (2011). Think the thought, walk the walk: Social priming reduces the Stroop effect. *Cognition*, *118*: 193–200.

Goldfus, C. (2012). Intervention through cognitive development: A case study of a student with dyslexia and comorbid attention deficit disorder (ADD). *Journal of Language and Culture*, 3(3): 56 – 66.

Goode, J. (2007). 'Managing' disability: early experiences of university students with disabilities. *Journal of Disability and Society*, 22(1): 35 – 48.

Graham, L. and Bellert, A. (2004). Difficulties in reading comprehension for students with learning disabilities. In Wong, B. (Ed). *Learning about Learning Disabilities*, (3rd Ed). pp 251 – 279, San Diego, CA: Elsevier Academic Press.

Graham, S., Harris, K. and MacArthur, C. (2004). Writing Instruction. In Wong, B. (Ed). *Learning about Learning Disabilities*, (3rd Ed). pp 281 – 313, San Diego, CA: Elsevier Academic Press.

Graham, S., Harris, K. and Reid, R. (1992). Developing self-regulated learners. *Focus on Exceptional Children,* 24:1 – 16.

Graham, S. and Sheinker, A. (1980). Creative capabilities of learning-disabled and normal students. *Perceptual and Motor Skills*, 50: 481–482.

Green, J., Caracelli, V. and Graham, W. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, 11:255 – 274.

Green, J. and Azevedo, R. (2010). The measurement of learner's self-regulated cognitive and metacognitive processes while using computer-based learning environments. *Educational Psychologist,* 45(4): 201-209.

Grix, J. (2010). *The Foundations of Research.* (2nd Ed). Eastbourne, UK: Palgrave Macmillan.

Guba, E and Lincoln, Y. (2005). Paradigmatic controversies, contradictions and emerging confluences. In Denzin, N. and Lincoln, Y. (Eds) *The SAGE Handbook of Qualitative Research, (3rd Ed).* pp191 – 215, Thousand Oaks, CA: Sage.

Guest, G., Bunce, A., Johnson, A. (2006). How many interviews are enough? An experiment with data saturation and data variability. *Field Methods*, 18(1): 59 -82.

Gul, F. and Shehzad S. (2012). Relationship between metacognition, goal orientation and academic achievement. *Social and Behavioral Sciences*, 47: 1864 – 1868.

Gupta, P. (2003). Examining the relationship between word learning, nonword repetition, and immediate serial recall in adults. *Quarterly Journal of Experimental Psychology: Human Experimental Psychology*, 56A:1213–1236.

Gupta, P. and Tisdale, J. (2009). Does phonological short-term memory causally determine vocabulary learning? Toward a computational resolution of the debate. *Journal of Memory and Language,* 61(4): 481–502.

Gustafson, S. and Samuelsson, S. (1999). Intelligence and Dyslexia: implications for diagnosis and intervention. *Scandinavian Journal of Psychology,* 40: 127 – 134.

Habib, M. (2000). The neurological basis of developmental dyslexia. An overview and working hypothesis. *Brain,* 123: 2373–2399.

Haggis, T. (2003). Constructing images of ourselves? *British Educational Research Journal*, 29(1): 89–104.

Hammersley, M. (1992). *What's wrong with ethnography? Methodological Exploration*, London: Routledge.

Hammersley, M. (2008). Troubles with Triangulation. In Bergman, M (Ed) *Advances in Mixed Methods Research. Theories and Applications*, pp 22–36, London: Sage.

Harding, J. (2013). *Qualitative Data Analysis from start to finish*. Thousand Oaks, CA: Sage.

Harris, K., Reid, R. and Graham, S. (2004). Self-Regulation among students with LD and ADHD. In Wong, B. (Ed.). *Learning about Learning Disabilities*, (3rd Ed). pp 167 – 195, San Diego, CA: Elsevier Academic Press.

Harris, K. and Graham, S. (1999). Programmatic intervention research: Illustrations form the evolution of self-regulated strategy development. *Learning Disabilities Quarterly*, 22: 251 – 262.

Harris, K. (2009). Developing self-regulated learners: the role of private speech and self-instructions. *Educational Psychologist,* 25(1): 35 – 49.

Hatcher, J., Snowling, M. and Griffiths, Y. (2002). Cognitive assessment of dyslexic students in higher education. *British Journal of Educational Psychology,* 72, 119–133.

Hawking, S. and Mlodinow, L. (2010). *The Grand Design*. *New answers to the ultimate questions of life*, London: Transworld Publishers.

Heidegger, M. (1962). *Being and Time,* Southampton: (Camelot Press Ltd.) Blackwell.

HESA (Higher Education Statistics Agency). (2016). Available at: https://www.hesa.ac.uk/data-and-analysis

Hill, T. and Lewicki, P (2007). *Statistics: Methods and Applications,* Tulsa, OK: StatsSoft Inc.

Hofer, B., Souder, C., Kennedy, E., Fullman, N., and Hurd, K. (2009). “The electronic tether”: Communication and parental monitoring during the college years. In Nelson, M. and Garey, A. (Eds.) *Who’s Watching? Practices of Surveillance among Contemporary Families,* pp. 277–294, Nashville, Tennessee: Vanderbilt University Press.

Holloway, S. (2010). The experience of higher education from the perspective of disabled students. *Journal of Disability and Society,* 16(4): 597 – 615.

Hiroto, D. and Seligman, M. (1975). Generality of learned helplessness in man. *Journal of Personality and Social Psychology,* 31: 311 – 327.

Humphrey, C. (2012). Dilemmas in doing insider research in professional education. *Qualitative Social Work,* 12(5): 572 -586.

Hyatt, K. (2007). Brain Gym®. Building stronger brains or wishful thinking? *Remedial and Special Education,* 28(2): 117 – 124.

Inglis, P. (2013). Reinterpreting learning difficulty: a professional and personal challenge? *Disability & Society,* 28(3): 423 – 426.

International Dyslexia Association (IDA). (2012). *Dyslexia Basics*. Available at: http://www.ldonline.org/article/16282?theme=print.

International Dyslexia Association (IDA). (2002). *Definition of Dyslexia.* Available at: https://dyslexiaida.org/definition-of-dyslexia/

Johnson, B. and Gray, R. (2010). A history of philosophical and theoretical issues for mixed methods research. In Tashakkori, A. and Teddlie, C. (Eds) *SAGE Handbook of Mixed Methods in Social and Behavioral Research,* (2nd Ed). pp. 397 -430, Thousand Oaks, CA: Sage.

Jones, M., Snowling, M. and Moll, C. (2016). What automaticity deficit? Activation of lexical information by readers with dyslexia in a rapid automatized naming Stroop-Switch task. *Journal of Experimental Psychology: Learning, Memory and Cognition.* 42(3): 465 – 474.

Kafle, N.P. (2007). Hermeneutic phenomenological research method simplified. *Bodhi: An Interdisciplinary Journal*, 5: 181 – 200.

Kahn, P. (2014). Theorising student engagement in higher education. *British Educational Research Journal,* 40(6): 1005 – 1018.

Kanuha, V. (2000). "Being" native versus "going native": conducting social work research as an insider. *Social Work,* 45(5): 439 – 447.

Kavale, K. (1980). The reasoning abilities of normal and learning disabled readers on measures of reading comprehension. *Learning Disability Quarterly, 3:* 34-45.

Kendall, L. (2016). Higher education and disability: Exploring student experiences. *Cogent Education*. 3 (1): 1256142

Kinsella, K. (1995). Understanding and empowering diverse learners. In Reid, J.M. (Ed.), *Learning Styles in the ESL/EFL Classroom.* pp. 170-194, Boston, Mass : Heinle and Heinle Publishers.

Kirby, J., Silvestri, R., Allingham, B., Parrila, R. and La Fave, C. (2008). Learning strategies and study approaches of postsecondary students with dyslexia. *Journal of Learning Disabilities,* 41: 85–96.

Kirby, L. and Kaplan, B. (2003). *Fast Facts: Specific learning Difficulties – General issues of diagnosis and treatment.* Abingdon: Health Press Limited.

Kirwan, B. and Leather, C. (2011). Students' voices: a report of the student view of dyslexia study skill tuition. *Support for Learning,* 26(1): 33 – 41.

Kisac, I. and Budak, Y. (2015). Metacognitive strategies of university students with respect to their perceived self-confidence levels about learning. *Social and Behavioral Sciences,* 116 (21): 3336 – 33339.

Kleitman, S. and Stankov, L. (2007). Self confidence and metacognitive process. *Learning and Individual Differences,* 17: 161 – 173.

Kleitman, S. and Gibson, J. (2011). Metacognitive beliefs, self confidence and primary learning environment of sixth grade students. *Learning and Individual Differences,* 21(6): 728 – 735.

Koch, T. (1996). Implementation of a hermeneutic inquiry in nursing: philosophy, rigour and representation. *Journal of Advanced Nursing*, 24(1):174-184.

Koch, T. (2006). Establishing rigour in qualitative research: the decision trail. *Journal of Advanced Nursing,* 53(1): 91 – 100.

Kolenick, P. and Hillwig, S. (2011). Metacognition: A bit of Theory. In *Encouraging Metacognition. Supporting learners through metacognitive teaching strategies*, pp 3 – 12, New York: Peter Lang Publishing, Inc.

Konur, O. (2006). Teaching disabled students in higher education. *Journal of Teaching in Higher Education,* 11(3): 351 – 363.

Kornell, N. and Son, L. (2009). Learner's choice and beliefs about self-testing. *Memory*, 17(5): 493 – 501.

Kornell, N. (2009). Optimising learning using flashcards: spacing is more effective than cramming. *Applied Cognitive Psychology*, 23: 1297 – 1317.

Krause, K. and Coates, H. (2008). Students' engagement in first-year university. *Assessment and Evaluation in Higher Education*, 33:493–505.

Lafrance, E. (1997). The gifted/dyslexia child: characterizing and addressing strengths and weaknesses. *Annals of Dyslexia,* 47: 163 – 182.

Larkin, M. and Ellis, E. (2004). Strategic Academic Interventions for Adolescents with Learning Difficulties. In Wong, B. (Ed.). *Learning about Learning Disabilities*, (3rd Ed). pp 375 – 414, San Diego, CA: Elsevier Academic Press.

Law, J. (20004). *After Method. Mess in social Science Research*. Oxon: Routledge.

Liaw S.-S., Hatala M. and Huang H.-M. (2010). Investigating acceptance toward mobile learning to assist individual knowledge management: based on activity theory approach. *Computers and Education* 54, 446–454.

Leech, N. and Onwuegbuzie, A. (2011). Beyond Constant Comparison qualitative data analysis: using NVivo. *School Psychology Quarterly*, 26(1): 70 – 84

Leininger, M. (1994). Evaluation criteria and critique of qualitative research studies. In Morse, J. (Ed) *Critical Issues In Qualitative Research,* pp. 95-115, Thousand Oaks, CA: Sage Publications.

Liang, J-C. and Tsai, C-C., (2010). Relational analysis of college science-major students' epistemological beliefs toward science and conceptions of learning science. *International Journal of Science Education, 32*(17): 2273-2289.

Lifshitz, M., Aubert-Bonn, N., Fischer, A., Kashem, I. and Raz, A. (2013). Using suggestion to modulate automatic processes: From Stroop to McGurk and beyond. *Cortex*, *49*: 463–473.

Lin, C-L., Tsai, C-C. and Liang, J-C. (2012). An investigation of two profiles within conceptions of learning science: An examination of confirmatory factor analysis. *European Journal of Psychology of Education, 27*(4): 499–521.

Linton, S. (1998). *Claiming Disability, New York: New York University Press.*

Logie, R. (2014). *Visuo-spatial working memory*, Hove: Psychology Press.

Logie, R. (1995). *Visuo-spatial Working Memory*, Hove: Lawrence Erlbaum Associates Ltd.

Logue, S. and Gould, T. (2014). The neural and genetic basis of executive function: attention, cognitive flexibility, and response inhibition. *Pharmacology, Biochemistry and Behavior*, 123: 45 – 54.

Lorch, R., Lorch, E. and Klusewitz (1993). College students' conditional knowledge about reading. *Journal of Educational Psychology,* 85(2): 239 – 252.

Lovett, M., Borden, S., DeLuca, T., Lacerenza, L., Benson, N. and Brackstone, D. (1994). Treating the core deficits of developmental dyslexia: evidence of transfer of learning after phonologically – and strategy-based reading training programs. *Developmental Psychology,* 30(6): 805 – 822.

Lowes, L. and Prowse, M. (2001). Standing outside the interview process? The illusion of objectivity in phenomenological data generation. *International Journal of Nursing Studies*, 38(4): 471 – 480.

Mackey, S. (2005). Phenomenological nursing research: methodological insights derived from Heidegger's interpretive phenomenology. *International Journal of Nursing Studies*. 42: 179 – 186.

Madriaga, M. (2007). Enduring disablism: students with dyslexia and their pathways into UK higher education and beyond. *Disability and Society,* 22(4): 399 – 412.

Majerus, S., D'Argembeau, A., Martinez Perez, T., Belayachi, S., Van der Linden, M., Collette, F., Salmon, E. Seurinck, R., Fias, W. and Maquet, P. (2010). The commonality of neural networks for verbal and visual short-term memory. *Journal of Cognitive Neuroscience,* 22(11): 2570–2593.

Majerus, S., and D'Argembeau, A. (2011). Verbal short-term memory reflects the organization of long-term memory: Further evidence from short-term memory for emotional words. *Journal of Memory and Language*, 64(2): 181–197.

Mann, S. (2001). Alternative perspectives on the student experience: Alienation and engagement. *Studies in Higher Education,* 26(1): 7–19.

Margalit, M. (2003). Resilience model among individuals with learning disabilities: Proximal and distal influences. *Learning Disabilities: Research and Practice*, *18*(2): 82–86.

Margolis, H. and McCabe, P. (2004). Self-efficacy: A key to improving the motivation of struggling learners. *The Clearing House: A Journal of Educational Strategies, Issue and Ideas,* 77(6): 241 – 249.

Marshall, C. (1990). Goodness criteria: Are they objective or judgement calls? In Guba, E. G. (Ed). *The Paradigm Dialog,* pp. 188-197, Newbury Park, CA: Sage.

Martin, J. (2004). Self-regulated learning, social cognitive theory, and agency. *Educational Psychologist,* 39: 135–145.

Martinez Perez, T., Majerus, S. and Poncelet, M. (2013). Impaired short-term memory for order in adults with dyslexia. *Research in Developmental Disabilities,* 34: 2211 – 2223.

Martinez Perez, T., Majerus, S. and Poncelet, M. (2012).The contribution of short-term memory for serial order to early reading acquisition: evidence from a longitudinal study. *Journal of Experimental Child Psychology,* 111: 708–723.

Marton, F. (2015). *Necessary conditions of learning*. New York: Routledge.

May, H. and Bridger, K. (2010). *Developing and embedding inclusive policy and practice in higher education,* York, UK: The Higher Education Academy.

Mayer, R. (2003). The promise of multimedia learning: Using the same instructional design methods across different media. *Journal of Educational Psychology*, 83: 484–490.

Mayer, R. (2014). Incorporating motivation into multimedia learning. *Learning and Instruction,* 29: 171 – 173.

Maxwell, J. (1992). Understanding and validity in qualitative research. *Harvard Educational Review*, *62*: 279-299.

Maxwell, J. and Mittapilli, K. (2010). Realism as a stance for mixed methods research. In Tashakkori, A. and Teddlie, C. (Eds). *SAGE Handbook of Mixed Methods in Social and Behavioral Research,* (2nd Ed). pp. 397 -430, Thousand Oaks, CA: Sage.

McCombs, B. and Marzano, R. (1990). Putting the self in self-regulated learning: the self as agent in integrating will and skill. *Educational Psychologist,* 25(1): 51 – 69.

McCormick, M. (2000). Dyslexia and Developmental Dyspraxia. *Dyslexia,* 6: 202 – 214.

McEwen, B. and Sapolsky, R. (1995). Stress and cognitive function. *Current Opinion in Neurobiology,* 5(2): 205 – 216.

McGaugh, J. L. (2000). Memory – a century of consolidation. *Science, 14:* 248-251.

McGrath, L., Pennington, B., Shanahan, M., Santerre-Lemmon, L., Barnard, H., Willcutt, E., DeFries, J. and Olson, R. (2011). A multiple deficit model of reading disability and attention-deficit/hyperactivity disorder: searching for shared cognitive deficits. *Journal of Child Psychology and Psychiatry, 52(5): 547 – 557.*

McKoon, G. and Ratcliff, R. (1992). Inference during reading. *Psychological Review, 99: 440-466.*

MacLoed, C. (2015). The Stroop Effect. *Encyclopedia of Colour Science and Technology.* New York: Springer Science.

Meichenbaum, D. (1980). A cognitive-behavioral perspective on intelligence. *Intelligence,* 4: 271 – 283.

Mendl, M. (1999). Performing under pressure: stress and cognitive function. *Applied Animal Behaviour Science,* 65: 221 – 244.

Merrell, K. (1990). Differentiating low achieving students and students with learning disabilities: An examination of performances on the Woodcock-Johnson Psycho-Educational Battery. *The Journal of Special Education,* 24: 296 – 305.

Mertens, D. (2007). Transformative Paradigm: Mixed Methods and Social Justice. *Journal of Mixed Methods Research,* 1: 212 – 225.

Mertens, D.M., Bledsoe, K.L., Sullivan, M. and Wilson, A. (2010). Utilization of Mixed Methods for Transformative Purposes. In Tashakkori, A. and Teddlie, C. (Eds). *SAGE Handbook of Mixed Methods in Social and Behavioral Research,* (2nd Ed). pp. 193 - 214, Thousand Oaks, CA: Sage.

Metcalfe, J. (1986). Feeling of knowing in memory and problem solving. *Journal of Experimental Psychology: Learning, Memory and Cognition,* 12(2): 288 – 294.

Meyer, J. and Land, R. (2006). Threshold concepts and troublesome knowledge: Issues of liminality. In Meyer, J. and Land, R. (Eds). *Overcoming Barriers of Student Understanding: Threshold concepts and Troublesome Knowledge,* pp 19 – 32, Abingdon, Oxon: Routledge.

Meyer, J. and Timmermans, J. (2016). Integrated Threshold Concept Knowledge. In Land, R., Meyer, J. and Flanagan, M. (Eds). *Threshold Concepts in Practice.*

Educational Futures. Rethinking Theory and Practice, Vol 68. pp 25 – 38, Rotterdam: Sense Publishers.

Miles, E. (1995). Can there be a single definition of dyslexia? Dyslexia: An International Journal of Research and Practice, 1(1): 37 – 45.

Miles, T. (1996). Do dyslexic children have IQs? *Dyslexia*, 2(3): 175 – 178.

Molfese, V., Molfese, D., Barnes M., Warren, C. and Molfese, P. (2008). Familial predictors of dyslexia: evidence from preschool children with and without familial dyslexia risk. In Reid, G. Fawcett, A. Manis, F. and Siegel, L. (Eds). *The Sage Handbook of Dyslexia,* pp 99 – 120, London: Sage.

Moody, S. (2014). Dyslexia, dyspraxia and ADHD in adults: what you need to know. *British Journal of General Practice,* 64(622): 252.

Morgan, D.L. (2007). Paradigms lost and pragmatism regained — methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research,* 1(1): 48-76.

Mortimore, T. and Crozier, W. (2007). Dyslexia and difficulties with study skills in higher education. *Studies in Higher Education,* 31:235–251.

Moustakas, C. (1994). *Phenomenological Research Methods,* Thousand Oaks, CA: Sage.

Nation, K. and Snowling, M. (2000). Factors influencing syntactic awareness skills in normal readers and poor comprehenders. *Applied Psycholinguistics*, *21*: 229–241.

Nelson, R. and Hayes, S. (1981). Theoretical explanations for reactivity in self-monitoring. *Behavior Modifications,* 5: 3-14.

Nelson, T. and Dunlosky, J. (1991). "When people's judgments of learning (JOLs) are extremely accurate at predicting subsequent recall: The delayed-JOL effect." Psycholog*ical Science, 2: 267-270.*

Nelson, T. (1996). Consciousness and metacognition. *American Psychologist, 52: 102-116.*

Newman, I. and Benz, C. (1998). *Qualitative–quantitative research methodology: Exploring the interactive continuum,* Carbondale, Illinois: Southern Illinois University Press.

Nicholson, R. and Fawcett, A. (1990). Automaticity: A new framework for dyslexia research? *Cognition,* 35: 159 – 182.

Nicholson, R. And Fawcett, A. (2011). Dyslexia, dysgraphia, procedural learning and the cerebellum. *Cortex,* 47(1): 117 – 127.

Nicholson, C. (2012) Education and the pragmatic temperament. In Malachowski, A. (Ed). *The Cambridge Companion to Pragmatism,* pp 249 – 271, Cambridge, *UK: Cambridge University Press.*

Nicol, D. and Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education,* 31(2): 199 – 218.

Norwich, B. and Lewis, A. (2005). How specialised is teaching pupils with disabilities and difficulties? In Norwich, B. and Lewis, A. (Eds). *Special Teaching for Special Children? Pedagogies for Inclusion*, Maidenhead: Open University Press.

Ojose, B. (2008). Applying Piaget's theory of cognitive development to mathematics instruction. *The Mathematics Educator,* 18: 26 – 30.

Onwuegbuzie, A. J. and Collins, K. M. (2007). A typology of mixed methods sampling designs in social science research. *The Qualitative Report*, 12(2): 281 – 316.

Onwuegbuzie, A and Combs J. P. (2010). Emergent Data Analysis Techniques in Mixed Methods Research. In Tashakkori, A. and Teddlie, C. (Eds) *SAGE Handbook of Mixed Methods in Social and Behavioral Research,* (2nd Ed). pp. 397 -430, Thousand Oaks, CA: Sage.

Onwuegbuzie, A. and Leech, N. (2005). On becoming a Pragmatic Researcher: the importance of combining quantitative and qualitative research methodologies. *International Journal of Social Research Methodology,* 8(5): 375 – 387.

Paris, S. and Winograd, P. (1990). Promoting metacognition and motivation of exceptional children. *Remedial and Special Education, 11*(6): 7–15.

Park, B. and Brünken, R. (2015). The rhythm method: a new method for measuring cognitive load – an experimental dual-task study. *Applied Cognitive Psychology,* 29: 232 -243.

Pavey, B., Meehan, M. and Waugh, A. (2010). *Dyslexia-Friendly Further and Higher Education,* London: Sage.

Pearl, R. and Donahue, M. (2004). Peer relationships and learning disabilities. In In Wong, B. (Ed.). *Learning about Learning Disabilities*, (3rd Ed.), pp 133 – 165, San Diego, CA: Elsevier Academic Press.

Peer, L. and Reid, G. (2003). *Introduction to Dyslexia.* London: David Fulton Publishers Ltd.

Pennington, B., Grossier, D. and Welsh, M. (1993). Contrasting cognitive defects in attention deficit hyperactivity disorder vs reading disability. *Developmental Psychology,* 29:511 – 523.

Pennington, B. (2006). From single to multiple deficit models of developmental disorders. *Cognition,* 101: 385–413.

Perkins, D. (2006). Constructivism and troublesome knowledge. In Meyer, J. and Land, R. (Eds). *Overcoming Barriers of Student Understanding: Threshold concepts and Troublesome Knowledge,* pp 32 – 47, Abingdon, Oxon: Routledge.

Pham, Andy. And Riviere, Alexandra. (2015). Specific Learning Disorders and ADHD: Current issues in diagnosis across clinical and educational settings. *Current Psychiatry Reports*, 17(6): 1 – 7.

Pino, M. and Mortari, L. (2014). The Inclusion of Students with Dyslexia in Higher Education: A Systematic Review Using Narrative Synthesis. *Dyslexia,* 20(4): 346–369.

Pintrich, P. and De Groot, E. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82:* 33–40.

Pintrich, P. (2000). The role of goal orientation in self-regulated learning, in: Boekaert, M., Pintrich, P., Zeidner M. (Eds). *Handbook of self-regulation*, pp 451–502, San Diego, CA: Academic Press.

Pintrich, P. and Zusho, A. (2002). The development of academic self-regulation: The role of cognitive and motivational factors. In Wigfield, A. and. Eccles, J. (Eds). *Development of achievement motivation,* pp. 249–284, San Diego, CA: Academic.

Pollack, D. (2005). *Dyslexia, the self and higher education: Learning life histories of students identified as dyslexia,* Stoke on Trent: Trenton Books.

Pressley, M. and Ghatala, E. (1990). Self regulated learning: monitoring learning from text. *Educational Psychologist*, 25: 19 – 33.

Pritchett, L. and Beatty, A. (2015). Slow down, you're going too fast: matching curricula to student skills level. *International Journal of Educational Development, 40: 276 – 288.*

Pringle, J., Hendry, C. and McLafferty, E. (2011). Phenomenological approaches: challenges and choices. *Nurse Researcher*, 18 (2): 7 – 18.

Puntambekar, S. and Hubscher, R. (2005). Tools for scaffolding students in a complex learning environment: what have we gained and what have we missed? *Educational Psychologist,* 40(1): 1 – 12.

Purvis, K. and Tannock, R. (2000). Phonological processing, not inhibitory control, differentiates ADHD and reading disability. *Journal of the American Academy of Child and Adolescent Psychiatry,* 39(4): 485 – 494.

Rack, J., Snowling, M. And Olson, R. (1992). The nonword reading deficit in developmental dyslexia: a review. *Reading Research Quarterly*, 27: 29 – 53.

Ramus, F., Rosen, S., Dakin, S., Day, B., Castellote, J., White, S. and Frith, U. (2003a). Theories of developmental dyslexia: insights from a multiple case study of dyslexic adults. *Brain,* 126: 841 – 865.

Ramus, F., Pidgeon, E. and Frith, U. (2003b). The relationship between motor control and phonology in dyslexic children. *Journal of Child Psychology and Psychiatry*, 44(5): 712 – 722.

Ramus, F. and Szenkovits, G. (2008). What phonological deficit? *Quarterly Journal of Experimental Psychology,* 61(1): 129–141.

Raoufi, S., Farhadi, A. and Sheikhian. (2014). Impact of the team effectiveness design of teaching on critical thinking skills, self-confidence and learning of nursing students. *The Journal of Medical Education and Development,* 9(2): 23 – 32.

Re, A. and Cornoldi, C. (2010). ADHD expressive writing difficulties of ADHD children: when good declarative knowledge is not sufficient. *European Journal of Psychological Education*, 25: 315 – 323.

Reid, D. and Valle, J. (2004). Learning dis/ability as the intersection of competing discourses: implications for classrooms, parents and research. In Wong, B. (Ed.). *Learning about Learning Disabilities*, (3rd Ed). pp 513 – 534, San Diego, CA: Elsevier Academic Press.

Reid, G. and Kirk, J. (2005). *Dyslexia in Adults: Education and Employment*, Chichester: Wiley.

Reid, G. (2002). Definitions of Dyslexia. In Johnson, M. and Peer, L. (Eds). *The Dyslexia Handbook,* pp 68 – 74, Reading: the Dyslexia Association.

Reid, G. (2005). Dyslexia. In Lewis, A. and Norwich B. (Eds). *Special Teaching for Special Children?* pp 138 – 149, Berkshire, England: Open University Press.

Reid, R. and Harris, K. (1993). Self-monitoring of attention versus self-monitoring of performance: Effects on attention and academic performance. *Exceptional Children,* 60: 29 – 40.

Riddell, S., Wilson, A. and Tinklin, T. (2002). Disability and the wider access agenda: supporting disabled students in different institutional contexts, *Widening Participation and Lifelong Learning*, 4: 12–26.

Riddick, B. (2000). An examination of the relationship between labelling and stigmatisation with special reference to dyslexia. *Disability and Society,* 15 (4): 653 – 667.

Riley, J., Corkhill, B. and Morris, C. (2013). The benefits of knitting for personal and social wellbeing in adulthood: findings from an international survey. *British Journal of Occupational Therapy,* 76(2): 50 -57.

Rodger, J., Wilson, P., Roberts, H., Roulstone, A., and Campbell. (2015). *Support for Higher Education Students with Specific Learning Difficulties,* HEFCE Review available at: http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/Independentresearch/2015/SupportforStudentswithSpLD/HEFCE2015_spld.pdf.

Rose, P. (2014). Three lessons for educational quality in post-2015 goals and targets: clarity, measurability and equity. *International Journal of Educational Development,* 40: 289 – 296.

Rourke, B. P. (1989). *Non-verbal learning disabilities: The syndrome and model*, New York: Guildford Press.

Rowan, L. (2014). University transition experiences of four students with dyslexia in New Zealand. *Australian Journal of Leaning Difficulties,* 19(2): 129 – 136.

Ryan, R. and Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist,* 55: 68–78.

Sadi, O. (2015). High School student epistemological beliefs, conceptions of learning and self-efficacy for learning biology: A study of their structural models. *Eurasia Journal of Mathematics, Science and Technology Education,* 11(5): 1061 – 1079.

Sadler, I. (2013). The role of self-confidence in learning to teach in higher education. *Innovations in Education and Teaching International,* 50(2): 157 – 166.

Sandelowski, M. (1995). Focus on qualitative methods: sample size in qualitative research. *Research in Nursing,* 18:179-183.

Sandelowski, M. (1993). Rigor or rigor mortis: The problem of rigor in qualitative research revisited. *Advances in Nursing Science, 16:* 1-8.

Sarantakos, S. (1998) *Social Research,* (2nd Ed). Basingstoke, Macmillan

Sawyer, D. and Bernstein, S. (2008). Students with phonological dyslexia in school-based programs: insights from Tennessee. In Reid, G. Fawcett, A. Manis, F. and Siegel, L. (Eds). *The Sage Handbook of Dyslexia,* pp 312 – 336, London: Sage.

Sawyer, R., Graham, S and Harris, K. (1992). Direct teaching, strategy instruction and strategy instruction with explicit self-regulation: Effects on learning disabled students' composition skills and self-efficacy. *Journal of Educational Psychology,* 84: 340 – 352

Sayer, A. (1997). Essentialism, Social Constructionism, and Beyond. The Sociological Review, *45(3): 453-487.*

Scanlon, D. (2013). Specific learning disability and it's newest definition: which is comprehensive? and which is insufficient? *Journal of Learning Disabilities,* 46(1): 26 – 33.

Schneider, M. and Stern, E. (2010). The developmental relations between conceptual and procedural knowledge: a multimethod approach. *Developmental Psychology,* 46(1): 178 – 192.

Schraw, G. and Dennison, R. S. (1994). Assessing Metacognitive Awareness. *Contemporary Educational Psychology,* 19: 460 – 475.

Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science*, 26: 113 – 125.

Schulz, E., Maurer, U., van der Mark, S., Bucher, K., Brem, S., Martin, E. And Brandeis, D. (2008).). Impaired semantic processing during sentence reading in children with dyslexia: combined fMRI and ERP evidence. *Neuroimage,* 41(1): 153-168.

Schunk, D. and Zimmerman, B. (1997). Social Origins of Self-Regulatory Competence. *Educational Psychologist,* 32(4): 195-208.

Schunk, D. (1990). Goal setting and self efficacy during self-regulated learning. *Educational Psychologist,* 25: 71 -86.

Schwabe, L., Wolf, O. And Oitzl, M. (2010). Memory formation under stress: quantity and quality. *Neuroscience and Biobehavioral Reviews,* 34: 584 – 591.

Schwandt, T. (2000). Interpretivism, hermeneutics and Social Constructionism. In Denzin, N and Lincoln, Y (Eds). *Handbook of Qualitative Research,* (2nd Ed). pp 189 – 214, Thousand Oaks; Sage.

Schwartz, B., Son, L., Kornell, N. and Finn, B. (2011). Four principles of memory improvement: a guide to improving learning efficiency. *The International Journal of Creativity and Problem Solving,* 21(1): 7 – 15.

Scott, D (2007). Resolving the Quantitative-Qualitative Dilemma: a critical realist approach. *International Journal of Research and Method in Education*, 30 (1): 3-17.

Scott, D. (2005) Critical Realism and Empirical Research Methods in Education. Journal of Philosophy of Education, 39(4): 633-646.

Scruggs, T. and Mastropieri, M. (1990). The case for mneumonic instruction. *Journal of Special Education*, 24: 7 – 29.

Seidman, L. (2006). Neuropsychological functioning in people with ADHD across the lifespan. *Clinical Psychology Review,* 26: 466 – 485.

Seligman M. and Maier S. (1967). Failure to escape traumatic shock. *Journal of Experimental Psychology,* 74: 1–9

Semerari, A, Cucchi, M, Dimaggio G, Cavadini D, Carcione A, Battelli V, Niolo G, Pedone R, Siccardi T, D'Angerio S, Ronchi P, Maffei C and Smeraldi E (2012). The development of the metacognition interview: instrument description, factor structure and reliability in a non-clinical sample. *Psychiatric Research*, Available at: http://dx.doi.org/10.1016/j.psychres.2012.07.015

SENDA (Special Educational Needs and Disability Act). (2001). Availability at: http://www.legislation.gov.uk/ukpga/2001/10 .

Servillo, L. and Schreurs, J. (2013). Pragmatism and Research by Design: Epistemological Virtues and Methodological Challenges. *International Planning Studies,* 18(3 -4): 358 – 371.

Sexton, T. (1997). Constructivist thinking within the history of ideas: The challenge of a new paradigm. In Sexton T. and Griffin B. (Eds). *Constructivist thinking in counselling practice, research, and training,* pp. 3-18, New York: Teachers College Press.

Sha, L., Looi, C.-K., Chen, W. and Zhang, B. (2012). Understanding mobile learning from the perspective of self-regulated learning. *Journal of Computer Assisted Learning,* 28: 366 – 378.

Shaywitz, S., Fletcher, J. and Shaywitz, B. (1994). Issues in the definition and classification of attention deficit disorder. *Topics in Language Disorders,* 14(4): 1 – 25.

Shaywitz, S. (1998). Current concepts: Dyslexia. *New England Journal of Medicine,* 338: 307–312.

Shaywitz, S., Morris, R. and Shaywitz, B. (2008). The education of dyslexic children from childhood to young adulthood. *Annual Review of Psychology*, *59*: 451–475.

Shaywitz, B., Shaywitz, S., Pugh, K., Mencl, E., Fullbright, R., Skudlarski, P., Todd, R., Constable, T., Marchione, K., Fletcher, J., Lyon, G. and Gore, J. (2002). Disruption of posterior brain systems for reading in children with developmental dyslexia. *Society of Biological Psychiatry,* 52: 101–110.

Shevlin, M., Kenny, M. and McNeela, E. (2010). Participation in higher education for students with disabilities: an Irish perspective. *Journal of Disability and Society,* 19(1): 15 – 30.

Siegel, L. (2006). Perspectives on dyslexia. *Paediatrics and Child Health,* 11(9): 581 587.

Siegel, L. and Lipka, O. (2008). The definition of learning disabilities: who is the individual with learning disabilities? In Reid, G. Fawcett, A. Manis, F. and Siegel, L. (Eds). *The Sage Handbook of Dyslexia,* pp 290 – 311, London: Sage.

Siegel, L. (1992). An evaluation of the discrepancy definition of dyslexia. *Journal of Learning Disabilities*, 25(10): 618 – 629.

Siegel, L. (1989). Why we do not need intelligence test scores in the definition and analyses of learning disabilities. *Journal of Learning Disabilities,* 22(8): 514 – 518.

Siegel, L. (1999). Issues in the definition and diagnosis of learning disabilities. *Journal of Learning Disabilities*, 32(4): 304 – 319.

Sikora, D., Haley, P., Edwards, J., and Butler, R. (2002). Tower of London test performance in children with poor arithmetic skills. Developmental Neuropsychology, 21(3): 243–254.

Skirry, J. (2006). *Rene Descartes: The mind-body distinction*. Available at: http://www.iep.utm.edu/descmind/

Smart, J. (2009). The power of models of disabilities. *Journal of Rehabilitation,* 75(2): 3 – 11.

Smith, J. and Shinebourne, P. (2012).Interpretative Phenomenological Analysis. In Cooper, H., Camic, P., Long, D., Panter, A., Rindskopf, D., and Sher, K. (Eds). *APA handbook of research methods in psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological.* pp. 73-82. Washington, DC, US: American Psychological Association

Smythe, E. A., Ironside, P. M., Sims, S. L., Swenson, M. M., Spence, D. G. (2008). Doing Heidggerian hermeneutic research: A discussion paper. *International Journal of Nursing Studies*, 45: 1389 – 1397.

Smyth, M. and Pendleton, L. (1990). Space and movement in working memory. *Quarterly Journal of Experimental Psychology*, 42(2): 291 – 304.

Snow, J. (1992). Mental flexibility and planning skills in children and adolescents with learning difficulties. *Journal of Learning Disabilities,* 25(4): 265 – 270.

Snowling, M. (2006). *Dyslexia.* (2nd Ed). Oxford: Blackwell Publishers.

Snowling, M., Bishop, D. and Stothard, S. (2000). Is preschool language impairment a risk factor for dyslexia in adolescence? *Journal of Child Psychology and Psychiatry, 4*(5): 587–600.

Snowling, M. and Griffiths, Y. (2003). Individual differences in dyslexia. In Nunes, T and Bryant, P. (Eds*). Handbook of Children's Literacy*, pp. 383–402, Dordrecht: Kluwer Academic Publishers.

Snowling, M. (1995). "Phonological Processing and Developmental Dyslexia." *Journal of Research in Reading,* 18(2): 132–138.

Son, L. and Kornell, N. (2010). The virtues of ignorance. *Behavioral Processes, 83*: 207-212.

Special Educational Needs and Disability Act 2001, Chapter 10. Available at: http://www.legislation.gov.uk/ukpga/2001/10/pdfs/ukpga_20010010_en.pdf

Spinelli, D., De Luca, M., Judica, A., Zoccolotti, P. (2002). Crowding effects on word identification in developmental dyslexia. *Cortex,* 38: 179 – 200.

SpLD (2005). Working Group DfES Guidelines. Available at: http://www.sasc.org.uk/(S(2j2fuq45af3c3qafusymmw45))/SASCDocuments/SpLD_Working_Group_2005-DfES_Guidelines.pdf

Sprenger-Charolles, L.., Siegel, L., Jiménez, J. and Ziegler, J. (2011). Prevalence and Reliability of Phonological, Surface, and Mixed Profiles in Dyslexia: A Review of Studies Conducted in Languages Varying in Orthographic Depth. *Scientific Studies of Reading*, 15(6): 498-521.

Staels, E. and Van den Broeck, W. (2014). Order and short tem memory is not impaired in dyslexia and does not affect orthographic learning. Frontiers in Human Neuroscience, 8:732.

Stanovich, K. and Stanovich, P. (1997). Further thoughts on aptitude/achievement discrepancy. *Educational Psychology in Practice,* 13(1): 3 – 8.

Stanovich, K. (1991) 'Discrepancy definitions of reading disability: has intelligence led us astray?' *Reading Research Quarterly,* 26: 7-29.

Stanovich, K. (1986). Matthew Effects in reading: some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly,* 21(4): 360 – 407.

Stanovich, K. and Siegel, L. (1994). Phenotypic performance profile of children with reading disabilities: a regression-based test of the phonological- core variable-difference model. *Journal of Educational Psychology,* 86: 24–53.

Starks, H. and Brown Trinidad, S. (2007). Choose your method: a comparison of phenomenology, discourse analysis, and grounded theory. *Qualitative Health Research*, 17(10): 1372 – 1380.

Stein, J. (2008). The neurobiological basis of dyslexia. In Reid, G. Fawcett, A. Manis, F. and Siegel, L. (Eds). *The Sage Handbook of Dyslexia,* pp 53 – 76, London: Sage.

Stein, J. and Kapoula, Z. (Eds.). (2012). *Visual aspects of dyslexia*. Oxford: Oxford University Press.

Stein. J. and Fowler, M. (1993). Unstable binocular control in children with specific reading retardation. *Journal of Research in Reading,* 16: 30 - 45.

Struss, D. (2011). Functions of the frontal lobe: relation to executive functions. *Journal of the International Neuropsychological Society,* 17: 759 – 765.

Swanson, H. L. (1990). Influence of metacognitive knowledge and aptitude on problem solving. *Journal of Educational Psychology*, 82: 306 – 314.

Swanson, H. L., Cooney, J. B. and Mc Namara, J. K. (2004). Learning Disabilities and Memory. In Wong, B. (Ed.). *Learning about Learning Disabilities*, (3rd Ed). pp 41 – 92, San Diego, CA: Elsevier Academic Press.

Tannock , R. (2015). Rethinking ADHD and LD in DSM-5: Proposed changes in diagnostic criteria. *Journal of Learning Disabilities,* 46(1): 5 – 25.

Tashakkori, A and Teddlie, C. (1998). *Mixed Methodology: Combining qualitative and quantitative approaches,* (Applied Social Research Methods series, No. 46) Thousand Oaks, CA: Sage.

Tashakkori, A. and Creswell, J. (2007). The new era of mixed methods. *Journal of Mixed Methods Research*, 1(1): 3 – 7.

Tashakkori, A. and Teddlie, C. (Eds) (2010). *SAGE Handbook of Mixed Methods in Social and Behavioral Research,* (2nd Ed). Thousand Oaks, CA: Sage.

Teddlie, C. and Tashakkori, A. (2006). A general typology of research designs featuring mixed methods. *Research in the Schools,* 13(1): 12 – 28.

Teodorescu, K. and Erev, I. (2014). Learned helplessness and learned prevalence: exploring the causal relations among perceived controllability, reward, prevalence, and exploration. *Psychological Sciences,* 25(10): 1861 – 1869.

Thomas, C. and Gadbois, S. (2007). Academic self-handicapping: the role of self-concept clarity and students' learning strategies. *British Journal of Educational Psychology,* 77: 101 – 119.

Thurston, A. (2014). Disability, Power and Equality in the School. *International Journal of Disability, Development and Education,* 61(2): 105 – 107.

Tijms, J. (2004). Verbal memory and phonological processing in dyslexia. *Journal of Research in Reading*, 27(3): 300–310.

Todres, L. and Wheeler, S. (2001). The complementarity of phenomenology, hermeneutics and existentialism as a philosophical perspective for nursing research. *International Journal of Nursing Studies,* 38: 1 – 8.

Tong, X., Deacon, S., and Cain, K. (2013). Morphological and syntactic awareness in poor comprehenders: another piece of the puzzle. *Journal of learning Disabilities,* 47(1): 22 – 33.

Tops, W., Callens, M., Van Cauwenberghe, E., Adriaens, J. and Brysbaert, M. (2013). Beyond spelling: the writing skills of students with dyslexia in higher education. *Reading and Writing,* 26: 705 – 720.

Torgesen, J., Morgan, S. and Davis, C. (1992). The effect of two types of phonological awareness training on word learning in kindergarten children. *Journal of Educational Psychology*, 84: 364 – 370.

Torgesen, J. (2002). The prevention of reading difficulties. *Journal of School Psychology*, 40: 7 - 26.

Torgeson, J. (1989). Why IQ is relevant to the definition of learning disability. *Journal of Learning Disabilities,* 22 (8): 484 – 486.

Torgesen, J. (2004). Learning disabilities: An historical and conceptual overview. In Wong, B. (Ed). *Learning about learning Disabilities, (*3rd Ed). pp 3 – 40, California, USA: Elsevier.

Trowler, V. (2010). *Student engagement literature review,* York: Higher Education Academy.

Tsai, C-C., Ho, H., Liang, J-C., and Lin, H-M. (2011). Scientific epistemic beliefs, conceptions of learning science and self-efficacy of learning science among high school students. *Learning and Instruction,* 21(6): 757 – 769.

Turner, M. and Nicholas, A. (2000). From assessment to teaching: Building a teaching program from a psychological assessment. In Townend, J. and Turner M. (Eds). Dyslexia in Practice, pp67 – 91, New York: Kluwer Academic Publishers.

Van der Sluis, S., de Jong, P. and van der Leij, A. (2007). Executive functioning in children, and its relations with reasoning, reading, and arithmetic. *Intelligence,* 35, 427–449.

Van Manen, M. (1990). *Research lived experience: human science for an action sensitive pedagogy*, Albany: State University of New York Press.

Van Someren, M., Barnard, Y. and Sandberg, J. (1994). *The Thinking Aloud Method. A practical guide to modelling cognitive processes,* London: Academic Press.

Van Viersen, S., de Bree, E., Kroesbergen, E., Slot, E., and de Jong, P. (2015). Risk and protective factors in gifted children with dyslexia. *Annals of Dyslexia,* 65 (3): 178 – 198.

Vellutino, F., Fletcher, J., Snowling, M. and Scanlon, D. (2004).Specific reading disability (dyslexia): what have we learned in the past four decades. *Journal of Child Psychology and Psychiatry,* 45: 2–40.

Vickerman, P. and Blundell, M. (2010). Hearing the voices of disabled students in higher education. *Journal of Disability and Society,* 25(1): 21 – 32.

Voelkle, M., Wittman, W. and Ackerman, P. (2006). Abilities and skill acquisition: A latent growth curve approach. *Learning and Individual Differences,* 16: 303 – 319.

Wardrop, A., Hutchings, M., Collins, B., Eccles, S., Heaslip, V., Hunt, C. and Pritchard, C. (2016). Widening Participation and Lifelong Learning, *Open University* 18(2): 84 – 110.

Weinfield, R., Barnes-Robinson, L., Jeweler, J. and Roffman, S. (2006). *Smart kinds with learning difficulties: overcoming obstacles and realizing potential,* Waco, TX: Prufrock Press.

Weisberg, R. and Balajthy, E. (1989). Improving disabled readers' summarization and recognition of expository text structure. In Padak, N., Rasinski, T. and Logan, J. (Eds). *Challenges in Reading,* pp141 – 151, Provo, UT: College Reading Assoc.

Westerman, M. (2006). What counts as “good” quantitative research and what can we say about when to use quantitative and/or qualitative methods? *New Ideas in Psychology,* 24: 263 – 274.

Whittemore, R., Chase, S. and Mandle, C. (2001). Pearls, Pith and Provocation. Validity in Qualitative Research. *Qualitative Health Research,* 11(4): 522-537.

Wigfield, A. and Eccles, J. (2000). Expectancy-Value theory of Achievement. *Contemporary Educational Psychology,* 25(1): 68 – 81.

Wilbur, G. and Scott, R. (2013). Inside out, outside in: power and culture in a learning community. *Multicultural Perspectives,* 15(3): 158 – 164.

Willcutt, E. and Pennington, B. (2000). Comorbidity of reading disability and attention-deficit/hyperactivity disorder: Differences by gender and subtype. *Journal of Learning Disabilities,* 33:179–191.

Wilkins, A. (2004). *Reading through colour,* Chichester: Wiley.

Wimmer, H., Mayringer, H. and Raberger, T. (1999). Reading and dual-task balancing: Evidence against the automatization deficit explanation of developmental dyslexia. *Journal of Learning Disabilities,* 32:473 – 478.

Winne, P. (1996). A metacognitive view of individual differences in self-regulated learning. *Learning and Individual Differences,* 8(4): 327 – 353.

Winograd, P. (1984). Strategic difficulties in summarizing texts. *Reading Research Quarterly*, 19(4):404-425**.**

Whitelegg, L. 2013. Supporting STEM Students with Dyslexia. Available at: https://www.iop.org/publications/iop/2013/file_61190.docx.

Wolf, M. and Bowers, P. (1999). The double-deficit hypothesis for developmental dyslexia. *Journal of Educational Psychology,* 91: 415 – 438.

Wolters, C. and Rosenthal, H. (2000). The relation between students' motivational beliefs and their use of motivational regulation strategies. *International Journal of Educational Research*, 33(7/8): 801–820.

Wolters, C. (2003). Understanding procrastination from a self-regulated learning perspective. *Journal of Educational Psychology*, 95(1): 179–187.

Wong, B. (1987). How do the results of metacognitive research impact on the learning disabled individual? *Learning Disability Quarterly,* 10(3): 189 – 195.

Wong, B., Wong, R. and Blenkinsop, J. (1989). Cognitive and metacognitive aspects of learning disabled adolescents' composing problems. *Learning Disability Quarterly,* 12(4): 300 – 322.

Wong, L. and Nunan, D. (2011). The learning styles and strategies of effective language learners. *System,* 39: 144 – 163.

Wright, B. (2005). Accommodating disability in higher education: a closer look at the evidence for a mainstream framework of learning support. *Research in post-Compulsory Education,* 10(1): 121 – 144.

Young, A. and Fry, J. D. (2008). Metacognitive awareness and academic achievement in college students. *Journal of the Scholarship of Teaching and Learning*, 8(2): 1 – 10.

Yue, C., Storm, B., Kornell, N. and Bjork, E. (2015). Highlighting and its relation to distributed study and students' metacognitive beliefs. *Educational Psychology Review*, 27: 69 – 78.

Zimmerman, B. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, 21: 3–18.

Zimmerman, B. (2000). Attaining self-regulation: A social cognitive perspective. In Boekaert, M., Pintrich, P., Zeidner M. (Eds). *Handbook of self-regulation*, pp 13 – 39, San Diego, CA: Academic Press.

Zusho, A. and Edwards, K (2011). Self-regulation and achievement goals in the college classroom. *New Direction for Teaching and Learning,* 26:21 – 31.

APPENDIX A. Extracts of Thematic coding			
Extracts	**Coding**		
	1st level	**2nd level**	**Overarching theme**
I know I know it - I just can't put it across	difficulty in verbalising thoughts	feeling of knowing but can't verbalise it	Accessing information
… it [information] just won't come, it's like the words get stuck but it's sitting there	difficulty in unlocking information in the mind	words getting stuck and won't come out	Accessing information
I tend to write it out, use pictures, sticky notes, colours …	uses many different visual and active appraoches to learnining	knows what works	strategy choices
I get frustrated that I'm not learning fast enough	feels learning progression should be more notable	learning is not efficient	control of learning
there's not one way that always works well	learning approaches used don't always work	needs to seek different ways of learning in learning tasks	strategy choices
I've always been very good practically, so having lectures that have more practical helps a lot. If its just lectures, that's when it becomes less tangible and that's when I need more input, and when I get more input I can do ok	finds it easier to learn from hands on work than sitting in lectures	learns better by doing than listening	control of learning
my organisation skills are not good	not good at organising work and time	identifies weaknesses	learning strengths and weaknesses

writing is not my strength - I can demonstrate it more easily than I can write it	feels able to show what she knows rather than doing this through writing it	understands strengths & weaknesses	learning strengths and weaknesses
I don't focus on specific bits, I just cover the lot	feels need to learn everything	concerned about missing out important information	strategy choices
If I can't understand something, I can't learn it	new information has to make sense before it can be remembered	feels need to build connections with information before further learning can occur	control of learning
I can just memorise facts if I need to, even if I don't understand it.	good at remembering facts in the absence of meaning	focussing on passing rather than learning	strategy choices