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1 Introduction

This chapter introduces the construct of metacognition and discusses the major issues surrounding it.

Metacognition: The first operational definition

‘Meta’ is a Greek word meaning after, behind or beyond (Zechmeister and Nyberg, 1982). Why is ‘meta’ added to terms such as metamemory, metacomprehension and metacognition? This has been done to signify a change in emphasis to ‘knowledge about one’s own cognition rather than the cognitions themselves’ (Brown, 1978, p. 79). Nelson and Narens (1990) cite Carnap (1934), who used the term ‘metalanguage’, and Hilbert (1927), who used ‘metamathematics’, as examples of the early use of this term ‘meta’. It also occurs in metacomprehension, metaattention, metalearning, metacommunication, metacomponents and metamemory to name a few (Biggs, 1985; Flavell, 1976; Flavell, Miller and Miller, 1993; Schraw, 2009; Sternberg, 1979). In relation to the term metamemory, Zechmeister and Nyberg (1982) explain that Flavell ‘wanted to draw attention to an aspect of memory not directly related to the specific process of encoding, storage and retrieval’ (p. 229).

The problem with the term is that it is difficult to distinguish clearly between what is meta and what is cognition (Baker, 1991; Brown et al., 1983; Cheng, 1999). Generally, the main distinction between the two is that cognition is a ‘constant flow of information’ (Langford, 1986) and metacognition is knowledge and awareness of processes and the monitoring and control of such knowledge and processes (Butterfield, 1994; Efklides, 2001; Flavell, 1977; Flavell et al., 1993; Langford, 1986; Schraw, 2001; Schwebel, 1986; Slife, Weiss and Bell, 1985). The main distinction between cognition and metacognition is that metacognition is considered to be ‘second-order cognitions’ (Kuhn, 2000a; Weinert, 1987). It is not the focus of this book, however, to delve deeply into this distinction.

The first definition of metacognition can be found in Flavell (1976). He identifies what metacognition means and then provides an example of a metacognitive process.
‘Metacognition’ refers to one’s knowledge concerning one’s own cognitive processes and products or anything related to them, e.g. the learning-relevant properties of information or data. . . . Metacognition refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service of some concrete goal or objective.

For example, I am engaging in metacognition (metamemory, metalearning, metattention, metalanguage, or whatever) if I notice that I am having more trouble learning A than B; if it strikes me that I should double-check C before accepting it as a fact; if it occurs to me that I had better scrutinize each and every alternative in any multiple-choice type task situation before deciding which is the best one; if I become aware that I had better make a note of D because I may forget it; if I think to ask someone about E to see if I have it right. Such examples could be multiplied endlessly. In any kind of cognitive transaction with the human or nonhuman environment, a variety of information processing activities may go on.

(Flavell, 1976, p. 232)

In Flavell’s subsequent publications (1978, 1979, 1981a, 1987), he defines and refines his definition of metacognition and supports his discussion with a model of cognitive monitoring (Flavell, 1979, 1981a). This model builds upon Flavell and Wellman’s (1977) metamemory taxonomy.

Brown (1987) defines metacognition and identifies the main problems with the term:

Metacognition refers loosely to one’s knowledge and control of one’s own cognitive system. Two primary problems with the term are: it is difficult to distinguish between what is meta and what is cognitive; and there are many different historical roots from which this area of inquiry developed. The confusion that follows the use of a single term for a multifaceted problem is the inevitable outcome of mixing metaphors.

(p. 66)

Both Flavell’s and Brown’s definitions provide a foundation for identifying knowledge of cognition and regulation of cognition as the two main categories of the construct. Although there is some disagreement and confusion as to whether executive functioning and control processes should be considered to be metacognition (see Cavanaugh and Perlmutter, 1982), this categorisation is accepted and supported by other theorists (e.g. Efklides, 2008; Kluwe and Friedrichsen, 1985; Schraw, 1998; Schraw and Moshman, 1995; Tobias and Everson, 2009). This is mainly related to the difficulty in clearly distinguishing between the two components (Brown,
In addition, there have been concerns that it would be difficult to distinguish clearly between the two components and that it would lead to an oversimplification of their differences. Even so there is agreement that this categorisation is necessary for clarity of the construct and for future research (Brown, 1981, 1987; Brown and Palincsar, 1982; Weinert, 1987).

The intricate web of metacognition: Obscurity, fuzziness and frustration

Metacognition is considered in the literature as a somewhat perplexing, mystifying and complex construct, one that has intrigued cognitive psychologists and educational researchers for decades (e.g. Brown, 1987; Brown et al., 1983; Efklides, 2008; Flavell et al., 1993; Flavell, Miller and Miller, 2002; Schraw and Moshman, 1995; Veenman et al., 2006; Wellman, 1983; Yussen, 1985). The difficulty of the construct lies in its many facets and its rich conceptual history (Brown, 1987; Brown et al., 1983). Brown (1987) explains that ‘metacognitive-like concepts are fraught with some of the most difficult and enduring epistemological problems of psychology’ (p. 66). Metacognition has been labelled as ‘a buzzword’, ‘ill-defined’, ‘obscure’, ‘fuzzy’, ‘vague’, ‘faddish’, ‘messy’, ‘a many headed monster’ and an ‘epiphenomenon’ but also a conceptually significant phenomenon in cognitive psychology and educational research (Baker and Brown, 1984b; Brown, 1978, 1987; Brown et al., 1983; Brown and Campione, 1981; Efklides, 2008; Flavell, 1981a; Flavell et al., 1993; Kitchener, 1983; Schoenfeld, 1987; Wellman, 1983). Its fuzziness is due to the multiplicity of influences and connections that constitute the construct. Wellman likens metacognition to a ‘family of conceptual bedfellows’ comprising ‘partially synonymous constructs’ (Wellman, 1983, p. 35). There is also a fuzziness and blurring of the terms metacognition and metamemory as occasionally they are used interchangeably for metamemory is used to describe aspects of metacognition and vice versa (e.g. Flavell, 1981a; Hacker, 1998; Nelson and Narens, 1990; Schneider and Lockl, 2002; Weinert, 1988; Wellman, 1983). Issues of obscurity and fuzziness surrounding metacognition have filtered through from metamemory theory. This is because the development of the construct of metacognition is based upon metamemory theory. These problems include the question of whether executive memory processes are part of metamemory, as well as knowledge of memory and secondly what roles these executive processes play in memory performance, how they interact with knowledge of memory (Cavanaugh and Perlmutter, 1982; Schneider, 1985) and whether these processes are implicit or explicit or a combination (Flavell, 1977; Kelley and Jacoby, 1996).

Researchers have commented on metacognition’s multiple perspectives and understandings resulting in its complexity and variability in theory and research outcomes (Brown, 1987; Brown et al., 1983; Dinsmore et al., 2008; Schraw and Moshman, 1995; Schunk, 2008; Yussen, 1985). Although there
have been significant attempts to clarify it and its historical roots (see Brown, 1987; Cavanaugh and Perlmutter, 1982; Flavell, 1987; Fox and Riconscente, 2008; Hacker, 1998; Langrehr and Palmer, 1998; Metcalfe, 2008; Wellman, 1983; Wellman, 1985b), the academic community continues to call for further clarification of the construct (e.g. Borkowski et al., 2000; Efklides, 2001; Schraw, 2000; Schunk, 2008). This is not to say that metacognitive theory is so underdeveloped that it does not have a strong and well developed conceptual foundation. The problem lies in its different theoretical contributions, its complexity, multifacetedness and lack of a clear definition (Borkowski et al., 2000; Dunlosky, 1998; Efklides, 2008; Nelson, 1998; Schraw, 2000; Tobias and Everson, 2009; Veenman et al., 2006).

Defining metacognition is a ‘thorny issue’ and that any cognition related to knowledge and thinking could be identified as metacognition makes it difficult to provide an inclusive definition of the construct and to identify, define and isolate adequately all the specific constructs that relate and contribute to it (Flavell, 1977, 1993; Garner, 1987; Paris and Winograd, 1990). Many researchers ‘eschew [the] rigid or operational definitions’ that are available and prefer to refer to metacognition as ‘thinking-about-thinking’ and ‘cognitive judgments about . . . cognitive states and abilities’ (Paris and Winograd, 1990, p. 16). Other simplistic descriptions include ‘mental mirroring’ (Antaki and Lewis, 1986; Langford, 1986); ‘thoughts about cognition’ (Yussen, 1985); ‘thinking your own thinking’; ‘reflections on cognition’ (Schoenfeld, 1987); ‘thinking about thinking’ (Babbs and Moe, 1983; Yussen, 1985) and ‘cognition about cognition’ (Georghiades, 2004; Kluwe, 1982; Wellman, 1985a). Its attractiveness and its obscurity have led to colloquial, hackneyed and often misuse of the term, resulting in studies that fail to identify clearly specific elements of metacognition, or which theoretical position they are based upon (Brown et al., 1983; Cavanaugh and Perlmutter, 1982; Dinsmore et al., 2008; Efklides, 2001; Schraw, 2000; Schunk, 2008). This continues to occur because researchers are not clear as to which ‘head of the beast they are attacking or defending’ (Brown, 1987, p. 106) and ‘researchers bemoan the imprecision of the term and attribute to it those things that they feel are important about thinking and learning’ (Paris and Winograd, 1990, p. 19). Examples of studies and discussion papers such as Babkie and Provost (2002), Boylor (2002), Maule (2001), Samuels and Betts (2007), and Abell (2009) do not provide the reader with any clear definition or theoretical position, such as that espoused by Flavell or Brown, in their discussion of metacognition. Many authors, such as Phillips (2003), assume that the reader has a good and shared understanding of the construct including the element(s) researched. Some authors, such as Grimes (2002), assume without thorough theoretical research that a particular element or category they have identified can easily be squeezed into the fuzzy boundaries of metacognition.

The importance of a clear theoretical framework as a foundation for research on the construct of metacognition is emphasised in the papers

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by Dinsmore et al. (2008) and Schunk (2008). Dinsmore et al. (2008) conducted an extensive investigation of the use of the terms metacognition, self-regulation and self-regulated learning in empirical papers and they stress how important it is for researchers to ‘monitor their choice of terminology [and] control the manner in which their constructs are conceptually and operationally defined’ (p. 407). Similarly, Schunk (2008) emphasises that one of the major consequences of a lack of a clear theoretical foundation is that the research is disconnected from the specific theory and from other research in the field and therefore contributes little to educational outcomes.

The fuzziness and generalisation of the construct is fuelled by the lack of theoretical models which make connections between metacognitive categories and processes. This lack is related to problems of different theoretical stances and terminology for similar metacognitive processes. Both these issues affect the identification of research categories of metacognition and the consistency between metacognitive theory and methodologies to measure and investigate metacognition (Borkowski, 1996; Efklides, 2008; Schraw, 2000, 2009). On a positive note, its fuzziness has some advantages as it still allows for and may even spur the formation of derivative theoretical constructs of increased precision.

Considering these problems, the literature and research community called for ‘an integrated conceptualization’ (Efklides, 2001, p. 298) of metacognition, and emphasised ‘the need for a comprehensive, unified theory of metacognition’ (Schraw, 2000, p. 298). Years earlier Flavell (1987) was also calling for ‘deeply insightful, detailed proposals about what metacognition is, how it operates and how it develops’ (p. 28). Wellman (1985b) also asked, ‘What, exactly, is metacognition?’ (p. 1). This book addresses this call for an illumination and in-depth discussion of the construct by providing a significant conceptual step towards the demystification and reconceptualisation of metacognition.

Klausmeier (1990) contends that ‘fuzzy concepts’, in this case metacognition, have multiple attributes, an ill-constructed category system and limited widespread shared knowledge of their attributes. He explains that to ‘defuzz’ these concepts they must go through a process of theory conceptualisation.

Brown et al. (1983) identified a three-stage process of scientific theorising which outlines the stages of a construct’s development. They discuss this specifically in terms of metacognition. Stage one involves applying and operationalising the new theory and stage two develops and refines the elements, categories and subcategories for efficient functioning. Stage three involves ‘the theorist step[ping] back and consider[ing] the entire problem space and systemiz[ing] it or reorganiz[ing] it into a cohesive whole’ (p. 125). They considered that metacognition had passed the initial stage and at that time was progressing through the second stage of ‘theory building’ (Brown et al., 1983, p. 125; Miles and Huberman, 1994, p. 18; Ryle, 1949, p. 286) or
‘theory construction’ (Richards and Richards, 1994). Importantly, and especially in terms of this book, referring to the third stage, Brown et al. (1983) believed that once the ‘main subsystems were better understood, metaprocedural reorganization may be possible and a full understanding of the domain of metacognition will be attained’ (p. 125). Brown et al. had doubts whether metacognition, because of its complexity and multifaceted nature, could be fully understood or proceed through stage three (Brown, 1987; Brown et al., 1983).

Metacognition is at the third stage of theorisation as it has been through a process of rich conceptual development having moved through the first and second stages. However, there are doubts as to the tractability of the construct and the tackling of stage three (Brown et al., 1983). The aim of this book has been to move metacognition into the third stage. As suggested by Brown et al. (1983), and later by Brown (1987), the process of metaprocedural reorganisation is a process which has been applied and has facilitated this third stage of theory building. The outcomes of the third stage of theory building include the conceptual framework of metacognition, and the taxonomy of metacognition.

The conceptual framework of metacognition

Concept maps assist us in transforming linear material into more holistic visual imagery and therefore help us to evaluate, synthesize, and perceive in new ways.

(Deshler, 1990, p. 338)

A conceptual framework is defined as ‘the main things to be studied – the key factors, constructs or variables – and the presumed relationships among them’ (Miles and Huberman, 1994, p. 18). The conceptual framework of metacognition is a depiction of the relationship between the elements of metacognition based upon an in-depth critical analysis and critical reflection of the literature (Brookfield, 1990; Deshler, 1990). Derived from theoretical contributions to metacognitive theory, the conceptual framework of metacognition builds a picture and a nexus of metacognition through visual links to the related concepts that contribute to what is known as metacognition. The conceptual framework of metacognition is informed by the related amplification diagrams. These diagrams use a combination of symbols such as pointed arrows and rectangles to present a picture of the interrelationship between concepts. The amplification diagrams provide an intricate depiction of some of the concepts which form part of the taxonomy of metacognition. The conceptual framework of metacognition informs and is informed by the taxonomy of metacognition and is therefore reflective of the taxonomy (Huberman and Miles, 1998; Miles and Huberman, 1994). The development of the conceptual framework of metacognition is based upon research and
theoretical discussion of the use of concept maps as a metacognitive tool (Novak, 1990). Figure 1.1 presents the foundation of the conceptual framework of metacognition.

![Diagram of metacognition, reflection, and epistemic cognition]

Figure 1.1 Foundation of the conceptual framework of metacognition

The scope of this book does not allow for an in-depth analysis of epistemic cognition theory; the intention is, however, to provide an overview of the links between metacognition, reflection, and epistemic cognition. Moshman (2009b, 2011) provides a detailed theoretical review of epistemic cognition, epistemic development and their relationship to metacognition. The conceptual framework of metacognition provides a solid foundation for future research into the relationship(s) between epistemic cognition and reflection.

The taxonomy of metacognition

Taxonomy is the theoretical study of classification, including its bases, principles, procedures, and rules.

(Simpson, 1961, p. 11)

The taxonomy of metacognition provides a detailed and comprehensive representation and categorisation of all of the terms, concepts, categories, supercategories, subcategories and elements of metacognition. It is developed from the assertions made throughout each chapter which are analysed to identify the elements, subcategories and categories of metacognition reflected in the taxonomy of metacognition.

Taxonomy is a Greek word meaning classification or arrangement (taxis) and law (nomos). Taxonomies usually comprise groups or units which are also labelled as taxa (singular = taxon), frequently but not necessarily hierarchical in structure. The taxonomy of metacognition is not intended to be a hierarchical framework of the construct, but represents a classification or nomenclature of metacognition. Classifications can be subdivided into ‘subtypes or subtaxa or subclasses’ (Bailey, 1994, p. 9; Moseley et al., 2005).

The focus of many educational taxonomies and the taxonomy of metacognition are different. Educational taxonomies such as Bloom’s (1956) taxonomy of educational objectives and its revision by Anderson and Krathwohl (2001), Gagné’s (1977) taxonomy of learning outcomes, and Jonassen and Tessmer’s (1996/1997) outcomes-based taxonomy, to name a few, have traditionally had a strong teaching, learning and instructional
design focus. The *taxonomy of metacognition* intends to meet the needs of the academic research community by providing a comprehensive view of metacognition, reflective of the literature. Jonassen and Tessmer (1996/1997) contend that ‘a taxonomy should be a comprehensive research and development system’ (p. 23). This is reflected in the process and outcome of categorising, organising and identifying the characteristics of each specific category, supercategory, subcategory and element of metacognition into a ‘special kind of framework’ and ‘continuum’ which are considered to be characteristics of a taxonomy (Anderson and Krathwohl, 2001). It is intended that the *taxonomy of metacognition* will be used as a guide for future metacognitive research and provide the academic research community with a complex and inclusive, but not prescriptive, view of metacognition. Metacognition, like many other theoretical constructs, is evolving and the future may bring new and exciting contributions to the theory and therefore to the taxonomy. Its detail is necessary to reflect the breadth and depth of the considerable theoretical and conceptual literature on metacognition. Congruence, complexity, inclusivity and depth are essential characteristics of any educational taxonomy (Martin and Briggs, 1986), but at the forefront of this book is useability and practicality, and therefore the former characteristics do not detract from this taxonomy. It is envisaged that the academic research community will find this taxonomy an understandable, readable and applicable framework that will be used to conceptualise future metacognitive research studies. It may also provide teachers with a foundation for understanding what metacognition is and what processes they could integrate into learning and problem solving situations.

The book presents a coalescing of the different theoretical stances of metacognition into categories, supercategories, subcategories and elements of the construct represented in a *taxonomy of metacognition*, supported by a conceptual framework of metacognition which depicts the interrelationships between metacognition and related concepts. It does not answer complex questions regarding the measurement of metacognition, but contributes by clarifying metacognitive theory to enable better research to be conducted on the specific categories, supercategories, subcategories and elements of metacognition. It does not aim to provide a distinct, precise definition of metacognition as this could diminish and trivialise the construct and would possibly be a fruitless exercise (Flavell *et al.*, 1993, 2002). It is, however, a comprehensive representation of the state of metacognition as it stands today, increasing the construct’s clarity and future availability to researchers and ensuring its continued integrity, status and importance in what Flavell describes as metacognition’s ‘psychological space’ (Flavell, 1987). Its contribution enhances the applicability of the construct, supporting researchers and teachers in their understanding of it, lessening its generalisation and therefore contributing to improving the reliability and validity of future empirical studies.
Conclusion

This book is not only a dialectic and a focus on the multiplicity of metacognition’s perspectives, but also an investigation into the interrelationship between the categories which contribute to its complexity. This illumination process entailed the identification of the key conceptual contributors to the construct through an extensive critical analysis of the literature, delving deeply into the theoretical core of the development of metacognition, as a theory, including interrelationships with other concepts.