Issues related to Defining and Conceptualizing Metacognition: A Concise Review of Perspectives from a Contested Field

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Preamble

The issue of what metacognition is, what it might be, and what it is not, has persisted in the field almost since the day the term was first used. This is the first of two podcasts in which I try to disentangle the literature related to definitions and frameworks for metacognition and propose and defend a framework that is parsimonious, that I use, and that can be used viably for educational research and teaching purposes. The choice to produce two episodes was the result of me coming to realize that there was firstly a need to account for the history of this dilemma within the field of metacognition and pay some respectful attention this history and the people who laid the foundation for the field. This task in itself is worthy of a book so, inevitably, I won't be able to cover all angles and perspectives. In more recent scholarly work on metacognition, especially that published in journals, there is no space for this task to be undertaken and, therefore, the history of the field is not as apparent as it should be. Only when this first task was done, did I think I would have some licence to propose a way forward and explicate a definition and framework for others to consider. Also, I want to explain that in these next episodes, and the whole podcast in general, that I am focusing on metacognition in particular, and not its place in a broader framework like self-regulated learning as some scholars do (e.g., Dignath, 2021; Schraw et al., 2006; Winne, 2018). The work of such scholars is absolutely important. However, I have chosen to limit the content of this podcast to attend to what I have focused my research and scholarship on, and what I have had experience and success with when working with practicing and pre-service teachers and the broader education community. Thank you for understanding my position.

Introduction

In this episode I begin to explore the long-standing issue of defining and conceptualizing metacognition. The way we define and/or conceptualize a construct such as metacognition, or any construct in education for that matter, is important for a number of reasons. Firstly, it facilitates communication between those working in various capacities within a field so that they can share a common language related to the construct. For example, when I teach my graduate course 'Metacognition Across Curriculum,' a course that I have taught for over 12 years to graduate and undergraduate students from all subject areas, it is important for me to establish shared views with my students about what metacognition is, might be, and is not. This is so that we can share similar foundations to be able to discuss metacognition and matters related to it as the course proceeds. I am fairly relaxed about the definitions they propose, as long as they are supported by quality literature. They don't need to agree with me but they do need to make their thinking clear and defend their positions. Secondly, defining a construct is important because it enables research to be conducted in a theoretically defensible, efficient, sustainable, and replicable manner. As I have written (Thomas, 2024) this notion of research studies in metacognition being replicated is increasingly important to me. Makel and Plucker (2014) see replication as "the purposeful repetition of previous research to corroborate or disconfirm the

previous results" (p. 305). I don't note many, if any replication studies published in the field of metacognition research. The thinking seems to be, as is the case with a lot of educational research, "If it has already been done and published already, why would anybody need to do it again?" This view denies the importance of context, ecological validity, and generalizability (Thomas, 2024). Further, for replication studies to be useful, it seems to me that we need to use similar definitions and conceptualizations of what we are studying. Otherwise, are we not comparing apples and oranges? Thirdly, it is important to clearly define and conceptualize a construct such as metacognition because it enables interventions and pedagogies that have as their aim the development and enhancement of metacognition to be conceived, realized, and evaluated in the 'real' worlds of classroom teachers and their students that do not resemble sterile laboratory conditions. I have argued (Thomas, 2023) that the challenges of pedagogically operationalizing the various definitions and conceptual frameworks for metacognition is problematic for my area; that of science education. It is no surprise, therefore, that this matter has drawn my attention.

Accordingly, in this episode, the first of two on this topic, I begin to lay the foundations to answer the following questions, "What is metacognition, what might it be, and what is it not?" and "What might be a defensible and operationalizable framework for, (a) conducting research in the field of metacognition, and (b) informing the structure of interventions and pedagogy that might result in the development and enhancement of individuals' metacognition? I draw from the literature going back to the pioneering work of John Flavell and the thinking and writing of others since. Interestingly, the definition/conceptualization quandary within the metacognition field has not adversely influenced interest in metacognition in higher education or schools or research into it across settings. We are increasingly starting to see 'metacognition' referred to explicitly in policy (e.g., OECD, 2019) and curriculum documents (e.g., ACARA, 2021). My view is that the optimistic outlook that developing and enhancing metacognition can improve individuals' lives through improved cognition and behaviours, coupled with literature that provides evidence of the importance of metacognition for effective learning and the development of expertise, drives a lot of interest in metacognition and deflects, to some extent, attention from the persistent issues in the field. Whatever the reason for the unceasing interest, I suggest that the sustained consideration of metacognition within educational circles will not diminish any time soon.

Before getting further into this episode, I want to reiterate that my key interest in attending to these matters is to inform what might be possible in the education community; particularly for teacher educators and classroom and pre-service teachers to consider. I view metacognition more from a position of a pedagogue than an educational psychologist and this reflects my background as a classroom teacher and teacher educator. I aim, particularly, to inform practical pedagogical perspectives that eventually percolate into classrooms to improve teaching and learning across age groups and subject areas. This is in accord with my view that developing and enhancing students' metacognition should be a core educational aim that runs parallel to and overlaps with developing students' knowledge, understanding, and thinking/cognitive processes within the subject/content areas.

Setting the scene: A history of variation

The concept of metacognition is well established in the educational literature, and this has been so for over 50 years. John Flavell is generally credited with bringing the term into the modern educational vernacular. Flavell (1976) described metacognition as, "one's knowledge concerning

one's own cognitive processes and products and anything related to them," and "among other things…the active monitoring and consequent regulation and orchestration of these processes in relation to cognitive objects or data on which they bear, usually in the service of some concrete goal or objective" (p. 233). In 1979, Flavell defined metacognition as "knowledge and cognition about cognitive phenomena" (p. 3) and proposed a model of cognitive monitoring that was composed of metacognitive knowledge, metacognitive experiences, goals (or tasks), and actions (or strategies) (p. 4). He later noted (Flavell, 1985) that, as with other important concepts in cognitive development, what counts as metacognition is often hard to pin down. By 1987, eleven years after his 1976 paper, Flavell, himself, suggested that his 1979 taxonomy was "not very satisfactory" but was helpful in "thinking about the domain" (p.21).

What is evident to me from Flavell's early work, and I encourage listeners and/or readers to 'go back to the source,' is that his own thinking about metacognition was evolving as he pondered and wrote about metacognition. This is evident when we explore the terminology he used to define and explain metacognition. What, however, was constant in these writings was the importance he afforded metacognitive knowledge. The centrality of metacognitive knowledge, as will be explained in the next episode, is crucial in my view for defining and conceptualizing metacognition. Alongside these terms, several new terms emerged from his papers. These included: person variables that could be intraindividual, interindividual, or universal; task variables; strategy variables; and metacognitive strategies, which Flavell proposed as being "strategies for monitoring the cognitive process" (Flavell, 1987, p. 23). These terms are still used today although they are often interpreted and used differently by different authors. What I draw from these examples of Flavell's work is that his conceptualizations of metacognition even then, for him, were not static. The title of his 1987 paper, "Speculations about the nature and development of metacognition" bears witness to at least some degree of speculatory, might-I-suggest, hesitancy on his part of what metacognition might be, that what metacognition was might not be decided quickly, and that more theoretical and research work was necessary.

The lack of a shared definition and conceptualization persisted through the 1980s and 1990s and still persists today. The synthesis of an exact and unambiguous definition of metacognition presented what came to be characterized in the 1980's and 1990's as a 'thorny' problem (e.g., Kirby, 1984; Garner, 1988; Paris & Winograd, 1990; Winograd & Gaskins, 1992; Yussen, 1985; Adey & Shayer, 1994; White, 1988). Kluwe (1987) suggested that this problem might be because the processes that constitute metacognition are not independent of each other; an issue that persists to this day and I think it relates to the relationship between cognition and metacognition. We will consider this issue later in this and subsequent episodes. The confusion surrounding metacognition's precise identity has continued into the 2000s and it remains a difficult concept to define and conceptualize (e.g., Desoete & Ozsoy, 2009; Dinsmore et al., 2008; Kuhn, 2021; Scott & Levy, 2013; Schunk, 2008; Thomas, 2012a; Veenman, 2012; Zohar & Dori, 2012). 'Fuzzy' is a word often used to describe metacognition. Veenman *et al*., (2006) identified 16 terms, including metacognitive beliefs, metacognitive awareness, feeling of knowing, and metacognitive skills that they identify as a "proliferation" of terms that "unfolded through the years" (p. 4). This almost unfettered growth of terminology around metacognition has brought with it varying degrees of uncertainty and disagreement about metacognition and how to move forward in terms of its definition, conceptualization, and pedagogical operationalization. In some cases, I sense a degree of frustration around in the field around this issue.

Zohar and Dori (2012, p. 19) acknowledged this problem. After going to great lengths to see commonalities in definitions that authors in their edited book (as explained below), they

proposed a solution. They suggested that a collection of experts might collaborate to create "consensus regarding a consistent and complete set of related definitions" and that those definitions "would take into account as many of the varied facets that appear in the literature as possible." The collection of experts would,

> …need to interpret the definitions found in the literature, redefine various metacognitive elements, incorporate new elements generated by current studies into the definitions, show the interrelationships among various elements, and define interrelationships between metacognition and other close concepts (including reflection, critical thinking, and self-regulated learning).

The end outcome of this would be according to Zohar and Dori (2012, p. 19), "the production of a conceptual framework" that would "have consensus among a group of prominent scholars" and "allow future researchers to use it as the foundation for their investigations." Future researchers would "no longer need to explain in detail according to which view they are working" but would "only need to explain which parts of that definition they adopt," and if there were any deviations from the 'accepted definition,' they would "have to explain carefully exactly in which points they diverge from it." They suggest that "such a process will allow more clarity and a more profound integration across various research projects than is currently possible."

To some extent, I agree with Zohar and Dori's (2012) position. More uniformity of definition and conceptualization would be a very good thing. However, even if it were possible for a group of 'experts' to reach a consensus, for such a 'meeting of minds' to lead to a widespread acceptance and adoption of any such unified theory and conceptualization of metacognition would require all reviewers, editors, and anyone associated with teaching, scholarship, or research in the field to agree on 'THE' definition and 'THE' framework or conceptualization even before they expressed their deviations. I don't see this happening as I don't see how we can glue the various perspectives together to form some coherent collage, especially when there are so many more outlets for dissemination of research and scholarship nowadays then there were 20 years ago. How would the variation that might be seen by some as inappropriate be reined in? By whom? People are known to resist changing their views and beliefs on concepts and this is especially when their understanding and views on concepts have 'worked' for them and others in the past. To put it simply, people's ideas on things can be hard to change. This is well known from conceptual change theory. Also, given the propensity for the those working in educational research to devise and propose new terms, sometimes (maybe often) for (re)packaging old ideas, I anticipate seeing more terminology around metacognition before I see less. This could especially be so if, as Dinsmore et al. (2008) suggest, conceptions of constructs such as metacognition "are not stagnant or fixed, rather they continue to move and take shape over time" (p. 409-410). Therefore, as well as some people, like myself, holding firm to a definition and conceptual framework for metacognition that I subscribe to and that 'works' for me and those I teach and advise, others might want to propose new alternatives to those that currently have traction. Either way, the debate about what metacognition is, might be, or is not is likely to continue. One might say that the genie is out of the bottle and it's not going back any time soon. As I suggest in the next episode, we might benefit from less terminology and a simple, parsimonious conceptual framework for metacognition for research, scholarly, and teaching purposes.

The adjective 'metacognitive'

Part of the issue of defining and conceptualizing metacognition is, for me, the varying use/s of the adjective 'metacognitive' in the terminology around metacognition. My view is that it is used loosely and questionably in some cases. I want to acknowledge that I, too, have been guilty of using it in ways that I now consider inappropriate. Scholars and researchers talk and write about 'metacognitive this' and 'metacognitive that.' I started to think about this in a more attentive manner when a student in one of my 'metacognition' classes stated something along the lines of metacognitive knowledge not being that special as it was still 'just knowledge' and that it was only knowledge about one's cognitive functioning. This made me ask myself, "What makes something 'metacognitive'? Is the key criterion for assigning the term that it describes some element/s of a person's knowledge of their cognition that they use to manage their thinking and learning, or is it something different? For example, when we refer to a metacognitive teacher are we referring to the teacher having metacognition related to their own thinking and learning processes that influences their teaching and/or their own thinking and learning (e.g., Duffy et al., 2009; Thomas, 2012b), or are we referring to the teacher being one who seeks to develop and enhance their students' metacognition, or both (e.g., Wall & Hall, 2016)? Is metacognitive instruction a form of pedagogy that aims to develop students' metacognition, or is it pedagogy that is a consequence of a teacher's metacognition, or both? Would the term 'instruction for metacognition' be a better term to use than metacognitive instruction? What makes a belief a 'metacognitive' belief and how does this type of belief differ from other beliefs? When we refer to metacognitive skills (e.g., Veenman, 2012, 2015; Veenman et al., 2006; Zohar & Barzilai, 2013) are these not just cognitive processes or strategies that have as their 'object of attention' one's cognitive functioning and the outcomes of that functioning? And, then, what is the difference between a skill and a strategy and a cognitive process? (I will attend to this issue more in the following podcast.) When I check the meaning of the word 'metacognitive' in the Cambridge dictionary (n.d.) it suggests that 'metacognitive' is "of or relating to metacognition (= knowledge and understanding of your own thinking)." This is how it is clearly used in some cases but not in others. Whatever the reasons are for scholars using the adjective 'metacognitive,' there is a clear need to use it appropriately and to consider carefully the noun it is being used to describe. As Dinsmore et al. (2008) succinctly state, "…there is no doubt that there is a relation between clarity and precision of language and the ideas that take shape in the mind" (p.404)

Current ways of attending to this issue of definition and conceptualization

What has stimulated this episode of the podcast is the many definitions and descriptions of metacognition that have appeared in the literature. If one engages with the material in the reference list in the PDF associated with this podcast this becomes immediately apparent. Let me be honest; I don't agree with at least some of them or parts thereof. This variation, as noted above, has been repeatedly flagged as problematic. Dinsmore et al, (2008) suggested that there were "commonalities in the words and phrases used explicitly and implicitly" (p. 409) to define terms such as metacognition. Even so, they also suggested that those in the educational research community should be even more vigilant in their attributions and delineations. To mean what they say and say what they mean" (p. 409). In other words, we should be clear about what we mean when we speak and write about metacognition. As noted above, authors in the past as well as in more recent times, to their credit, have typically acknowledged the difficulty with defining

and conceptualizing metacognition, and there are suggestions on how this issue might be addressed. For example, Zohar and Barzilai (p. 122) suggest that,

> …the best researchers can do in order to communicate their meanings is to state clearly which of the existing multiple theoretical perspectives they adopt and to explain the meaning they designate to the construct of metacognition and to the metacognitive sub-components they use in their work.

Interestingly, even in this entreaty, I note the use of the adjective 'metacognitive.' Would the term 'sub-components of metacognition' be another way of describing the elements of metacognition that Zohar and Barzilai are referring to?

For an excellent example of how scholars might tangle with the multiple views about metacognition that exist I suggest that people might read Zohar and Dori's introductory chapter in *Metacognition in Science Education: Trends in Current Research* (2012) especially pages 13 to 18 inclusive. In that chapter, it is highly evident that these scholars recognize this problem of varying definitions and conceptual frameworks and have invested considerable time and effort in clarifying, as much as is reasonably possible, the issues that arise when authors within their edited, themed book, even within the same subject area, use varying definitions and constructs for metacognition. Seeking to clearly explain the terminology one uses in educational research and practice has always been important. In the field of metacognition scholarship and research this would seem to a clear and constant requirement.

Progress in the field?

Has progress been made in the field of metacognition research and scholarship towards resolving issues associated with the field, including definitions and conceptualizations? One way of considering this question is to review the writing of Veenman et al., (2006) and Azevedo (2020). Both are past editors of the flagship journal *Metacognition and Learning.* Veenman et al., writing the first article in the first issue of that journal, identified the aspects of metacognition that they considered required further consideration, exploration, and clarification. These included, (a) definitions of metacognition, (b) components of metacognition, (c) the relationship between metacognition and cognition, (d) conscious versus automatic metacognitive processes, (e) general versus domain specificity of metacognition, (f) developmental processes in metacognition, (g) assessment of metacognition, and (h) conditions for the acquisition and instruction of metacognition. In proposing my view of a definition and conceptual framework for metacognition in the next episode I am most interested in attending to issues (a) – (e). My definition and conceptual framework, (a) and (b), should at least partially attend to matters (c) to (e) in a defensible way. In relation to (b) and (c) Veenman et al. wrote, "If metacognition is conceived of as a set of instructions for regulating task performance, then cognition is the vehicle of those self-instructions" (p. 6). In the next episode of this podcast, I examine this statement to assist with my thinking. Veenman et al. also identified the work of Nelson (1996) and in the next episode I draw on the work of Nelson (1996), Nelson and Narens (1994), and others in trying to address (c) and (d). In relation to (d) it is important for any definition and framework for metacognition to take an explicit position on whether metacognition is conscious or sub-/un-conscious. This has pedagogical implications. This is also the case for (e). In the next episode I explore these matters in more depth as I try to reconcile some of them in defence of the definition and conceptual framework that I subscribe to. In summary, Veenman et al., drew attention to

important issues and discussions in the field that were evident at that time that was around 20 years ago (at the time of this episode).

Azevedo (2020) reiterated that there were still issues in the field of metacognition scholarship that were still not resolved despite some advances being made. The issues raised by Azevedo mirrored those of Veenman et al. (2006), including all of (a) to (h). Azevedo was clear in his assessment that some advances, to varying extents, have been made in some of these areas but that a unified definition and conceptual framework for metacognition is still a work in progress. Previously, I (Thomas, 2009, 2012a) have written that the uptake and use of definitions and conceptualizations might reflect regional affiliations that were evident prior to the use the internet and the increased, rapid access to scholarship on a worldwide basis that this technological advance afforded. However, with the advent of the more immediate and widespread literature on metacognition, one might have expected that there would be some increased uniformity of definitions. However, if we concur with Azevedo (2020) and continue to review recent scholarship related to metacognition, this is not yet the situation. Access to information is not the problem.

Summary and Thinking Forward to the Next Episode

In summary, the literature on metacognition indicates that there have been multiple definitions and conceptualizations of metacognition with no consensus to date on which of these is more worthy than any other of 'mass' adoption. My position, as someone who has worked in the field of metacognition as a high school science teacher, a teacher educator at pre-service and in-service levels, and a researcher, and a designer of pedagogical interventions is that, at the moment, the best we can do is be very clear about what the definition and conceptual framework for metacognition we subscribe to is, and how we arrived at that definition. If our views have changed over time, or if we now see the field differently, we should acknowledge such changes. Acknowledging such changes and our thinking behind them presents a human perspective to the work scholars do to our audiences in relation to metacognition.

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