

## Metacognition, Self-Regulation, and Self-Regulated Learning: Research Recommendations

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**Abstract** Much research has been conducted on metacognition, self-regulation, and self-regulated learning, but the articles in this special issue make it clear that we still have many unanswered questions. Recommendations for research include providing clear definitions of processes, identifying relevant theories, ensuring that assessments clearly reflect processes, linking processes with academic outcomes, conducting more educational developmental research, and tying processes firmly with instructional methods. Collectively, these recommendations will enhance our understanding of metacognition, self-regulation, and self-regulated learning and will lead to solid implications for educational policy and practice.

**Keywords** Metacognition · Self-regulation · Self-regulated learning · Motivation

The shift in psychological theory and research that took hold in the 1960s and moved the field away from conditioning and toward cognition produced major realignments in views of human learning, motivation, and achievement. Cognitive theories shifted the focus of human functioning away from environmental variables and onto learners—specifically, how they encoded, processed, stored, and retrieved information. Rather than being passive recipients of information, learners were active seekers and processors of information.

Although cognitive psychology had immediate impact on psychological theory and research, further effects have been felt in the ensuing years. For example, early models of information processing included such components as sensory registers, short-term memory, long-term memory, and control (executive) processes (Atkinson and Shiffrin 1968). The latter processes regulated the flow of information throughout the system and included such activities as rehearsing information to be learned, forming mental images, organizing information, monitoring level of understanding, and using retrieval strategies.

The notion that control processes directed the flow of information through the system was plausible, but also vague. For example, which control processes operated under which

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conditions? How did they integrate with one another? What controlled the use of control processes? Fortunately, researchers increasingly have addressed these and other issues.

Three influential types of cognitive control processes are metacognition, self-regulation, and self-regulated learning. The five papers in this special issue address aspects of these topics. Fox and Riconscente (2008) discuss how the roots of metacognition and self-regulation are present in the writings of James, Piaget, and Vygotsky. Dinsmore *et al.* (2008) examine the conceptual overlap and distinctiveness of these processes. Loyens *et al.* (2008) illuminate differences between self-directed learning and self-regulated learning and how they are affected by problem-based methods. Winters *et al.* (2008) describe research on the role of self-regulated learning in computer-based learning environments. Maggioni and Parkinson (2008) discuss teachers' beliefs about metacognition, self-regulation, and self-regulated learning.

As in any scientific discipline, once a substantial amount of research testing theoretical predictions is in place, it is important to pause and assess the state of the field. The articles in this special issue have done just that. What these articles show is that although there has been much progress, there remain many issues that must be addressed before we can begin to realize the full explanatory potential and practical benefits of metacognition, self-regulation, and self-regulated learning.

## Recommendations for Research

In the remainder of this article, I comment on some of the issues raised by the authors of the articles in this special issue. These recommendations for research are listed in Table 1.

### Provide clear definitions

A major issue facing researchers is to provide clear definitions of metacognition, self-regulation, and self-regulated learning (Dinsmore *et al.* 2008). As investigators have conducted research and written about these processes, they have not used standard definitions. Multiple definitions are not unusual; educational psychology is an inexact discipline and professionals in our field do not agree on the definition and operation of key processes.

This situation, although understandable, is problematic (Schunk 2000). How we define processes influences the measures we use to assess them and how we interpret our research results. It is little wonder that research results often are inconsistent when investigators have used different definitions and measures.

Although Fox and Riconscente (2008) note the historical precursors of metacognition, self-regulation, and self-regulated learning in the writings of James, Piaget, and Vygotsky, contemporary research has been heavily influenced by Flavell (metacognition), Bandura (self-

**Table 1** Recommendations for Research on Metacognition, Self-Regulation, and Self-Regulated Learning

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#### Recommendations

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- Provide clear definitions
  - Identify relevant theories
  - Ensure that assessments clearly reflect processes
  - Link processes with academic outcomes
  - Conduct more educational developmental research
  - Tie processes firmly with instructional methods
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regulation), and Zimmerman (self-regulated learning). Flavell (1985) defined metacognition “as any knowledge or cognitive activity that takes as its object, or regulates, any aspect of any cognitive enterprise...its core meaning is ‘cognition about cognition’” (p. 104). This is a sufficiently broad definition that encompasses most uses of the term. Bandura (1986), who incorporated self-regulation into his social cognitive theory of human behavior, viewed self-regulation as the process of influencing the external environment by engaging in the functions of self-observation, self-judgment, and self-reaction. Drawing on Bandura’s work, Zimmerman (1986) defined self-regulated learning as the process whereby students activate and sustain cognitions and behaviors systematically oriented toward the attainment of their learning goals.

Dinsmore *et al.* (2008) show that these definitions have become diluted to the point where today we ask such questions as: Is metacognition part of self-regulation? Is self-regulated learning part of self-regulation? Is self-regulation more environmentally sensitive than metacognition, which is more of a personal factor? In their review, Dinsmore *et al.* found that in many studies, the researchers provided no explicit definition of the central processes being studied. Consequently, Dinsmore *et al.* inferred definitions from the measures employed in the studies.

Researchers operating within any particular field have a tendency to use technical terms without defining them, apparently assuming that readers already know the definitions. But common definitions are not the rule in education. In a field where definitions quickly can become muddled, it is unwise to assume that readers will know the meanings and boundaries of terms.

#### Identify relevant theories

A second and related issue is that research on metacognition, self-regulation, and self-regulated learning must be firmly connected with theory. As Winters *et al.* (2008) note, the lack of clear guiding conceptual frameworks in research studies creates confusion in terminology and leads researchers to use terms interchangeably. Thus, rather than asking how metacognition is involved during self-regulation, we end up asking whether metacognition is the same as self-regulation. Such definitional quandaries thwart progress.

Although the frameworks of Flavell, Bandura, and Zimmerman often are used to guide research on metacognition, self-regulation, and self-regulated learning, respectively, they are not the only relevant ones. Fox and Riconscente (2008) and Dinsmore *et al.* (2008) show how other perspectives have influenced these fields. Researchers can choose their theoretical frameworks, and it is critical that they do so. Research that is not well linked with theory will be disconnected to other research and will not offer clear implications for educational policy and practice.

#### Ensure that assessments clearly reflect processes

A third recommendation is that researchers ensure that their assessments of metacognition, self-regulation, and self-regulated learning clearly reflect the processes as they have defined them. It should be made clear to readers how the assessments are operational translations of the processes, but often, this is not the case (Dinsmore *et al.* 2008).

Inferring definitions of processes from the content of the measures used is a dangerous path to follow because the road from measures back to definitions is neither straight nor automatic. Although I applaud the work by Dinsmore *et al.* (2008) for trying to make the connections through reasoned judgments, in fact, only the original researchers know what processes they

were attempting to measure. It is incumbent upon researchers to clearly explain how their measures are reliable and valid indicators of the variables they are attempting to study.

#### Link processes with academic outcomes

The research reviewed in this special issue shows that in many studies, measures of metacognition, self-regulation, and self-regulated learning were not linked with measures of academic performances. This situation causes at least two problems. For one, when metacognition, self-regulation, and self-regulated learning are assessed with self-report measures—as they often are (Winters *et al.* 2008)—people may be unrealistic in their self-assessments of what they actually do. More reliable and valid data are obtained by observing people to determine how they actually are employing metacognitive and self-regulatory strategies as they work at academic tasks.

Second, in many studies, measures of metacognition, self-regulation, and self-regulated learning are not linked with measures of students' learning or achievement. It is tempting to assume that if students who use more self-regulatory strategies demonstrate higher achievement than students who use fewer strategies, then the self-regulation produced the difference in achievement. But these data are correlational, not causal. To make causal statements, researchers must collect behavioral measures of self-regulation and link these to changes in learning, a procedure followed in few research studies.

We have plenty of research studies in which self-report measures of metacognition, self-regulation, or self-regulated learning were collected and correlated with such outcomes as motivation, learning, and achievement without providing data on whether the self-reports accurately reflected actual behaviors. Maggioni and Parkinson (2008) contend that there also exists a disconnect between teachers' beliefs and their pedagogical practices. It is time that researchers engage in more detailed study of how changes in metacognition, self-regulation, and self-regulated learning affect educational outcomes.

#### Conduct more educational developmental research

The capacity for metacognition, self-regulation, and self-regulated learning improves with development (Alexander *et al.* 1995; Kopp 1982). Fox and Riconscente (2008) discuss the role of developmental influences in the writings of Piaget and Vygotsky. What we need is more developmental research on these processes that has direct relevance to education.

There are various educational issues that should be addressed. For example, an important developmental issue concerns the transition from other- to self-regulation. Teaching involves others providing instruction and guidance, but for self-regulation to develop, this external influence must be internalized by learners into their self-regulatory systems. Research that investigates how to facilitate internalization at various developmental levels would have critical implications for educational practice. More generally, Dinsmore *et al.* (2008) and Loyens *et al.* (2008) highlight the need for educational research on effective teaching strategies for metacognitive and self-regulatory strategies given students' developmental levels.

#### Tie processes firmly with instructional methods

The articles in this special issue make it clear that metacognitive and self-regulatory processes need to be linked clearly with methods designed to develop them. For example, goal setting and self-evaluations of progress are important components of self-regulated learning. If a certain instructional method requires students to set goals and evaluate their progress, then we might

predict that students who received such instruction would show gains in self-regulation and achievement. That prediction can be tested in a research study.

The research reviews by Loyens *et al.* (2008) on problem-based learning and by Winters *et al.* (2008) on computer-based learning environments address this recommendation. These two instructional approaches contain elements that, from a theoretical perspective, should develop metacognition and self-regulation; however, the research evidence is not entirely clear and studies have raised numerous questions. Additional reviews are needed to determine the benefits of various instructional approaches on metacognition, self-regulation, and self-regulated learning.

## Conclusion

The emphasis on human cognition changed our thinking on how we view human learning, motivation, and achievement. Although educational research on metacognition, self-regulation, and self-regulated learning has made remarkable progress in the past 40 years, the articles in this special issue point out that we still have questions to address. The research recommendations discussed in this article will help to clarify why these processes are important, how they link with theory and educational outcomes, how they are validly and reliably assessed, and what are effective ways of helping students at different developmental levels improve their metacognition, self-regulation, and self-regulated learning.

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