

Supplemental Material

CBE—Life Sciences Education

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Supplemental Figure 1

A

MONITORING

*Monitor
Knowledge*

*Monitor
Progress*

*Monitor
Performance*

*Global
Monitoring*

Study Preparation

Studying for a Test

During a Test

After a Test

*Goal Setting
& Planning* *Strategy
Selection*

*Strategy
Implementation*

*Decision to
Continue/
Terminate
Study*

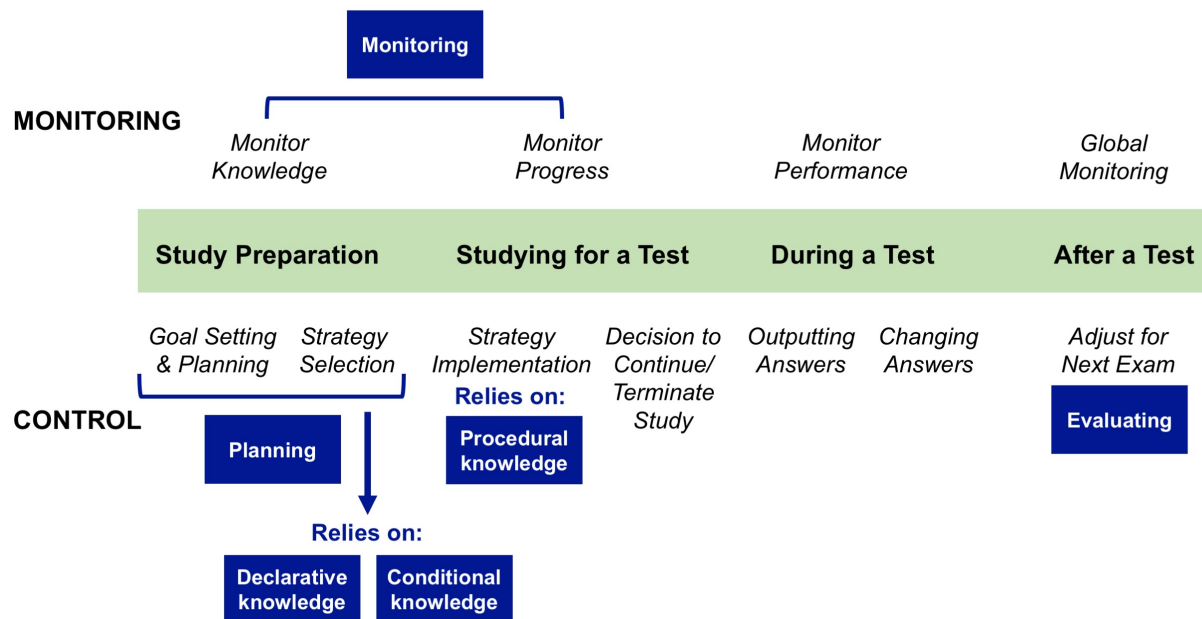
*Outputting
Answers* *Changing
Answers*

*Adjust for
Next Exam*

CONTROL

Metacognition framework commonly used in cognitive science (modified from Nelson and Narens, 1990). This theoretical framework focuses on two facets of metacognition: **monitoring** and **control**. Monitoring involves assessing learning and performance, such as judging whether a test answer is correct. Control processes involve regulating cognitive activity, such as making a decision about whether to change an answer to a test question. An important feature of this framework is that it highlights how monitoring and control can interplay during each stage of exam preparation, beginning when a student prepares to study for a test and ending after the students has taken the test. At each stage, monitoring and control can affect learning behavior.

B



Mapping of Schraw and Moshman framework onto Nelson and Narens framework. Each type of metacognition knowledge (declarative, procedural, and conditional) and each metacognitive regulation skill (planning, monitoring, and evaluating) from the Schraw and Moshman framework (see Figure 1 in the associated paper for definitions) can be linked to specific monitoring judgments and control processes in the Nelson and Narens framework. A major difference is that the Nelson and Narens framework places more emphasis on how monitoring and control inform one another. The Nelson and Narens framework also focuses on the metacognitive processes for regulating learning, whereas the Schraw and Moshman’s framework includes knowledge and skills that involve metacognitive processes. In addition, the Nelson and Narens framework includes monitoring and control during a test, which are not specifically considered in the Schraw and Moshman framework.

References Cited

[Nelson, T. O., and Narens, L. \(1990\). Metamemory: A theoretical framework and new findings. *The Psychology of Learning and Motivation*, 26, 125-141.](#)

[Schraw, G., and Moshman, D. \(1995\). Metacognitive theories. *Educational psychology review*, 7\(4\), 351-371.](#)