

## List of “working” self-regulation mechanisms adapted from Sitzman and Ely (2011)

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Sitzmann, T., & Ely, K. (2011). A meta-analysis of self-regulated learning in work-related training and educational attainment: What we know and where we need to go. *Psychological Bulletin*, 137(3), 421.

**Abstract:** Researchers have been applying their knowledge of goal-oriented behavior to the self-regulated learning domain for more than 30 years. This review examines the current state of research on self-regulated learning and gaps in the field’s understanding of how adults regulate their learning of work-related knowledge and skills. Self-regulation theory was used as a conceptual lens for deriving a heuristic framework of 16 fundamental constructs that constitute self-regulated learning. Meta-analytic findings ( $k=430$ ,  $N=90,380$ ) support theoretical propositions that self-regulation constructs are interrelated—30% of the corrected correlations among constructs were .50 or greater. Goal level, persistence, effort, and self-efficacy were the self-regulation constructs with the strongest effects on learning. Together these constructs accounted for 17% of the variance in learning, after controlling for cognitive ability and pretraining knowledge. However, 4 self-regulatory processes—planning, monitoring, help seeking, and emotion control—did not exhibit significant relationships with learning. Thus, a parsimonious framework of the self-regulated learning domain is presented that focuses on a subset of self-regulatory processes that have both limited overlap with other core processes and meaningful effects on learning. Research is needed to advance the field’s understanding of how adults regulate their learning in an increasingly complex and knowledge-centric work environment. Such investigations should capture the dynamic nature of self-regulated learning, address the role of self-regulation in informal learning, and investigate how trainees regulate their transfer of training.

*Keywords:* self-regulation, self-regulated learning, training, meta-analysis

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**Description of procedures for developing SRL mechanism framework** (presented in footnote #2 on page 423). To develop the heuristic framework, we identified the most frequently cited and influential theories in the adult self-regulated learning domain. First, we identified 15 self-regulation theories that were included in previous self-regulation review articles (e.g., Diefendorff & Lord, 2008; Kanfer, 1990; Puustinen & Pulkkinen, 2001; Vancouver, 2000). From this list we eliminated content theories, which do not focus on the components of self-regulation (i.e., Deci & Ryan, 2000; Dweck, 1986; Higgins, 1997). Then the seven aforementioned theories as well as Boekaerts and Niemivirta (2000), Borkowski (1996), Corno (1993), Kuhl (1992), and Winne and Hadwin (1998) were compared in terms of their number of citations in Web of Science and Google Scholar. There was a clear cutoff in the number of hits per theory such that those included in our review received more than 100 citations in Web of Science and more than 200 citations in Google Scholar and those not included in the review fell below both of these criteria. After choosing the theories, each theory was reviewed by two independent raters to establish which constructs

constitute the self-regulated learning domain. The raters independently developed a list of the core constructs in each of the theories (interrater agreement was .89) and then reached a consensus on the construct lists. There is a range of constructs included in self-regulation theories, and many theories include constructs that do not have analogous components in other theories (e.g., orientation in Frese & Zapf, 1994, and context evaluation in Pintrich, 2000). Thus, each of the constructs included in the heuristic framework was a component of at least two of the reviewed theories. The next step in the rating process involved classifying the constructs as regulatory agents, mechanisms, and appraisals. Interrater agreement was .93, and once again a consensus was reached regarding all coding discrepancies

### **Regulatory agents:**

“Regulatory agents are instrumental for initiating self-regulated learning. Goals are regulatory agents....Goals reflect the standard for successfully accomplishing a task, and self-regulation theories agree that goals provide a criterion for monitoring, evaluating, and guiding self-regulatory activity” (p. 423)

- *Goal level:* Setting an initial standard for the successful accomplishment of goals.

### **Regulatory mechanisms**

“Regulatory mechanisms are the crux of self-regulated learning because they are largely under the control of trainees and have an instrumental role in determining whether trainees make progress toward their goals in an efficient and organized manner. Furthermore, the majority of these constructs have been subjected to extensive empirical investigations” (p. 424).

- *Planning:* Thinking through, often at a formative or preliminary level, what needs to be learned and the specific steps or strategies needed to reach learning goals.
- *Monitoring:* Paying attention to one’s performance, including feedback of what is being learned, that leads to changes in strategies, affect or behavior.
- *Metacognition:* Depending on theory, a construct that subsumes all, or just a handful of, self-regulation constructs
- *Attentional control:* The ability to maintain cognitive focus, concentration, and attention during learning. The ability to divide cognitive resources between on- and off-task relevant and irrelevant information.
- *Learning strategies:* Includes a variety of strategies for enhancing learning such as elaboration, integrating new knowledge into existing stores of acquired knowledge, breaking tasks into smaller subtasks, reorganization, etc.

- *Persistence*: The ability to maintain effort and concentration during learning despite boredom, frustration, or failure.
- *Time management*: Allocating, monitoring, or scheduling time to different tasks during learning activities.
- *Environmental structuring*: Selecting or designing a location or environment conducive to learning (e.g., free from distractions). Monitoring and modifying the environment as needed.
- *Help seeking*: Seeking assistance when experiencing difficulty during learning. Knowing when, why, and whom to approach for help.
- *Motivation*: Willingness to engage in learning based on a person's beliefs about the incentives or value for learning a task.
- *Emotion control*: Monitoring and controlling the intrusion of negative affective states (e.g., anxiety, frustration) which impact attentional control, during task performance, via engagement in appropriate strategies (e.g., relaxation exercises, self-encouragement, and self-talk, etc.).
- *Effort*: Self-control of the amount of effort and concentration to devote to learning based on self-monitoring (feedback) during performance, particularly when detecting a goal-performance discrepancy.

## Regulatory appraisals

“Regulatory appraisals are instrumental in assessing goal progress as well as determining whether trainees will either begin or continue striving to make progress toward their goals. A scarcity of empirical evidence exists regarding the role of two regulatory appraisal constructs—self-evaluation and attributions—in self-regulated learning, but extensive research has focused on the third regulatory appraisal: self-efficacy.

- *Self-evaluation*: Evaluating one’s progress during learning via the comparison of current learning efficiency or success and final desired goal state.
- *Attributions*: The process of attributing causation (e.g., ability, effort) to failure or success in attaining the desired goal outcome.
- *Self-efficacy*: Appraisal or evaluation, during or after performance, that contributes to an individual’s confidence in the ability to solve problems or accomplish tasks.