

Research Summary: Misconceptions and Learning Strategies

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Learning how to learn is one of the most important skills and understandings we can provide our students beginning at an early age. Leading their own learning in independent ways is essential for developing life-long learners, something we want all our students to be. Unfortunately, there is ample evidence that most students use inefficient strategies for studying and creating durable learning, even at the collegiate level (Bjork et al, 2013; Dunlosky, 2013; Willingham, 2014). What makes this state of affairs perplexing is that up to 80% of surveyed students indicate that they have received very little instruction about how to learn effectively during their schooling (Hartwig & Dunlosky, 2012; Kornell & Bjork, 2007).

Ineffective Learning Strategies: Reading, Highlighting, Reviewing

The typical student often studies using the following sequence of actions: they read their assigned book chapters, they highlight important parts, and they review those important sections the day or hours before the test. Willingham (2014) points out several flaws in this approach that lead to fragile or incomplete learning. First, students often lack the self-regulation skills to recognize whether they fully understand what they read. This leads to problems with the second step, highlighting: as Willingham points out, "How can you know what's important enough to highlight if you don't understand everything you read?" pointing to the extensive research that students don't highlight what experts agree are the most important parts of texts. Finally, empirical evidence shows that while re-reading might give you a quick memory boost right before the exam, it rarely results in long-term and last understanding. Instead it can give students the "illusion of knowing" (Bjork et al, 2013; Brown et al 2014), which often reinforces the use of ineffective learning strategies.

This is compounded by other misconceptions students have about learning. For example, Bjork et al (2013) report that many students think mistakes and errors are detrimental to learning (whereas research findings suggest that making errors is often an essential element of effective learning), that learning can and should be easy (yet it's the mental struggle that frequently creates deep learning), and that innate ability and talent mostly determines academic success (rather than effective and persistent effort). Helping our students rethink these misconceptions and assumptions will be important as they become more sophisticated at learning how to learn.

In recent years a number of cognitive science research summaries about how people learn have been published with an eye toward exploring practical educational applications (e.g., Benassi et al, 2014; Brown et al, 2014; Carey, 2014; Willingham, 2009). Several highly effective learning strategies emerging from this research have been discussed in the edX MOOC, Science of Learning MOOC (e.g., retrieval practice, spaced practice, interleaving). In the next section, we'd like to

discuss two more learning strategies of value to students — self-explanation and elaboration.

Learning Strategies That Work: Elaboration and Self-Explanation

Elaboration: This learning strategy, also known as elaborative rehearsal or interrogation, requires students to actively think about the meaning of what they are studying and how it relates to their prior knowledge in long-term memory. The learner explicitly works to create meaningful connections to previously learned understandings. The most common question a student doing elaboration would ask is, “How does this new information connect to what I already know?” A related question would be, “What are different ways I can view or think about this new information in deeper ways?” This could be through visual representations, developing relevant analogies or metaphors, creating stories, and other ways to cognitively process the new information, creating an active dialogue between working memory and long-term memory. This will enhance comprehension, facilitate meaningful connections to already existing knowledge, and create more durable and lasting memories.

Self-Explanation: This learning strategy requires students to pause periodically and ask “why” and “how?” questions. Why is this assertion true? How are the authors justifying their claim? Why is this information important to know? How can I explain this in my own words? As students engage new material they ask critical questions about the concepts or premises put forth. For example, after reading a passage on a historical event, they might generate explanations for why that event occurred the way it did, and make inferences or draw possible conclusions from the content covered. By thinking critically about the content and generating possible answers to their questions, students deepen their understanding and call attention to gaps in their comprehension. As a consequence, they more fully cognitively process the new information and are therefore more likely to make meaningful and lasting connections in their long-term memory.

Both of these strategies — elaboration and self-explanation — aid comprehension and deepen memory by encouraging students to actively engage, re-represent, and process new information in meaningful ways. Furthermore, these research-based strategies are easy to learn, can be effective for both novice and experienced learners, and for a wide variety of subject content, as long as teachers provide the appropriate guidance and examples for students to follow.

The result of students learning to use elaboration and self-explanation as study strategies — more enduring and deeper understanding — is well worth taking class time to teach.

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