Improving Test Scores:

Integrating Traditional Instruction Methods with Research-Based Approaches

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Promoting student achievement is a challenge that teachers face every day. Low scores on standardized tests seem to indicate that students are not retaining what they are taught from year to year. If students receive hours of solid instruction every day from their teachers, why are they forgetting this information? What happens to that knowledge once students are tested on it in class? Is that knowledge actually lost, or is it just beyond retrieval?

Poor student retention is widely acknowledged anecdotally; many classroom teachers must spend a significant portion of the school year reteaching information that was presented in previous lessons or even previous years. This dramatically decreases the amount of time teachers can spend introducing new material. That cycle of learning, forgetting, and relearning lowers the bar for student achievement and can contribute to students' frustration and disenchantment.

Statistics underscore this truth: according to the 2011 National Assessment of Educational Progress, only 40% of fourth grade students and 35% of eight grade students tested at or above proficient levels in math. These low scores aren't limited to math. In reading, only 34% of fourth graders and 34% of eighth graders scored at or above proficient levels on the NAEP. Many of the myriad factors that contribute to low achievement are outside the purview of administrators and classroom teachers. Socioeconomic status, parent education level, and level of parental involvement are among many oft-cited external factors. However, this is only part of the story. This paper will examine some of the factors within the teacher's control

that are at play in these phenomena and discuss how different methods of presenting information in the classroom contribute to student retention, achievement, and confidence.

The method of student practice is an integral but little-examined factor in long-term retention. The vast majority of textbooks use two strategies: blocked practice and massed practice. Blocked practice is a technique in which students are presented with many repetitions of the type of problem they were just taught. Blocked practice is the de facto form of student practice and has been for centuries; it plays an important role in every aspect of education. The worth of this strategy as a mechanism of student understanding cannot be overstated: "Mastering a skill requires a fair amount of focused practice…It's not until students have practiced upwards of about 24 times that they reach 80 percent competency" (Marzano, Pickering, and Pollock 67). This kind of practice is essential to ensuring students' mastery of a topic. Massed practice is a condition where students encounter a block of exercises on one topic only once before moving on to another topic. While this time-worn strategy of having students practice one block of many repetitions *feels* right, as acknowledged by Rohrer and Pashler (409), its limited implications for long-term retention can make its unilateral use a liability in the classroom.

There are three effects that are related to dramatic improvements in memory recall and long-term retention: the interleaving effect, the testing effect, and the spacing effect. All of these effects arise as a positive result of introducing desirable difficulties into students' practice regimens. Desirable difficulties are obstacles placed between the learner and the information he or she is acquiring. Bjork and Bjork report that certain obstacles are considered desirable because "they trigger encoding and retrieval processes that support learning, comprehension, and remembering" (58).

The interleaving effect is attained through interleaved practice, which involves shuffling different types of questions in one practice session. Because

different types of problems commingle in this condition, students must know not only how to follow the steps of a certain strategy; they must also be able to choose which strategy to use. This level of sophistication in practice leads to more meaningful memory creation, which in turn leads to long-term memory. A 2008 experiment by Kornell and Bjork illustrated that interleaving paintings by different artists aided participants' ability to identify the creator of a till-then unseen painting, whereas the massed condition produced less success. The researchers also noted that a "sense of ease or fluency" (591) is not necessarily an indication of effective learning, illustrating that making students work harder to learn material can enhance their memory.

The testing effect is achieved through a mechanism known as retrieval practice, also called test-enhanced learning. This is a condition in which the act of testing a student's knowledge enhances the learning of that knowledge. In a 2006 experiment, Roediger and Karpicke showed that testing participants several times on information they had been exposed to was more effective in terms of long-term retention than allowing the participants to study the information the same number of times. This shows that the success of the participants in the tested group was not merely a factor of repeated exposure to the information. Their findings illustrated that "testing clearly introduced a desirable difficulty in learning" (254). Furthermore, on the benefits of retrieval practice, Roediger and Karpicke noted that "frequent testing leads students to space their study efforts, permits them and their instructors to assess their knowledge on an ongoing basis, and […] serves as a powerful mnemonic aid for future retention" (254).

One way of achieving an elevated level of difficulty in testing is to create a delay between teaching students a topic and testing them on it (Storm, Bjork, and Storm 244). This is known as the spacing effect, which arises from a technique called distributed practice. Distributed practice creates "a memory advantage that occurs when people learn material on several separate occasions, instead of a single massed study episode" (Sobel, Cepeda, and Kapler 763). Empirical evidence of the

benefits of distributed practice has existed since 1885, when Hermann Ebbinghaus first published *Memory: A Contribution to Experimental Psychology*. Indeed, most of these studies during the last century have involved adults, but a handful of experiments have shown that distributed practice is advantageous for child learners as well as adults (Sobel, Cepeda, and Kapler).

An ideal classroom situation would marry the tried-and-true method of blocked practice with the other techniques discussed above: interleaved practice, retrieval practice, and distributed practice. *Simple Solutions* achieves this by supplementing traditional classroom instruction with daily interleaved practice lessons and weekly quizzes that revisit all that material the students have been taught. With this approach, *Simple Solutions* strives to be an agent of change. *Simple Solutions* is committed to shifting the conversation in the education world away from practicing more to practicing *smarter*.

Works Cited

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