Primer on Spaced Learning and Repetition

By: Steven Boller
Organizational knowledge is a competitive advantage few businesses can ignore. Many employees are faced with a seemingly endless array of information they must know to be effective at their jobs, and training is often part of the solution. The end goal of a valuable learning and development initiative is almost always increased efficiency, which often looks like this:

- Less accidents
- More sales
- Better customer service
- Faster new hire onboarding
- Fewer mistakes

By helping employees increase their knowledge and perform better, we can maximize profitability... if training is treated as a business strategy. ASTD estimates that in 2012, organizations spent approximately $164.2 billion on employee training... but what was the return on that investment?

According to the 2013 ASTD State of the Industry Report, 55% of training content across all responding organizations dealt with basic, foundational content areas such as these:

And while all of this foundational knowledge is essential to on-the-job performance, it is often tedious and difficult to embed in employees’ long-term memories. In fact, most of the learning solutions commonly used in corporate training programs fail to help people remember what they learned.

### Common Corporate Learning Methods

The approaches below are all too familiar to most corporate trainers, yet they miss the mark when it comes to knowledge retention:

- “Click next” eLearning course
- Instructor-led session
- Powerpoint slide deck
- Company handbook
- Reference PDF

### The Forgetting Curve

In 1895, Herman Ebbinghaus was the first to suggest that reinforcement and repetition are critical to memory. He theorized that students forget 90% of classroom instruction within 6 days... and that spaced reinforcements would reduce this forgetting curve significantly. Subsequent research shows that the forgetting curve is actually quite wide and not a set 90%. Forgetting is also not limited to the classroom but applies broadly to our daily lives and the workplace.\(^1\)\(^,\)\(^2\) The fact remains that, depending on prior knowledge and experience, learners can forget up to 90% of what they learned quite rapidly without additional repetitions. Corporate learning programs should be designed to “beat” the forgetting curve.

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\(^2\) John Medina, Brain Rules, Chapters 5 and 6, Pear Press, 2008
To increase efficiency and meet business objectives, we need to help employees remember job-related information and apply it on-demand. And in order to embed memories, information must be reinforced over an extended period of time.

**Spaced Repetition**

You are likely familiar with spaced repetition, even if you have heard it called a different name. The technique is sometimes referred to as “distributed practice,” “spaced learning and repetition” or “interval reinforcement.” Regardless of the name or variation, spaced repetition usually involves these instructional methods:

- Chunking content into “micro spacings” within a single learning event.
- Repeating content over an extended period of time, with “macro spacings” of a few days or weeks between each learning event.
- Presenting the same information in a different format or context for each repetition.

The key to long-term memory formation is not the amount of time spent learning, but the amount of time between learning. We learn best when our brain cells are switched on and off, with short periods of learning and breaks in between. By switching your learner’s brain cells “on” (during learning) and “off” again (during breaks), the learner’s unconscious has time to internalize the knowledge and the repetition results in long-term memories. Research has also shown that longer breaks between teaching sessions can result in longer-lasting memories.

If the goal of a corporate training program is long-term retention of information, you should design the program to reinforce the content over an extended period of time. The basic concept may seem intuitive, but solutions that are specifically designed with spaced repetition principles for both micro and macro spacings will have the greatest impact.

**Feedback Loops**

Beyond simply repeating the same content at pre-defined intervals, it is important to include motivating feedback loops in a learning solution. Dr. Will Thalheimer notes that “the best preparation for later retrieval” of information is “a successful current retrieval.” Many eLearning courses include feedback, but only at the end of a course. Most feedback also only tells learners what they got wrong; they don’t allow the learners to immediately go back and re-try. Providing the correct answer and allowing learners to advance when they answer a question incorrectly is not enough. The best practice is to give feedback immediately and have learners return to the question they missed and answer it correctly to advance.

Games are an example of a tool that can offer multiple modes of feedback on performance. In games, positive feedback can be provided in the form of rewards such as points, badges, and other achievements. Negative feedback can equal lost points and, most importantly, guidance on the misstep and an opportunity to complete the challenge again.

An ideal design would look like this.

It is best to include spaced repetition and feedback loops to maximize the acquisition of long-term memories.
Make Spaced Repetition And Feedback Central To Your Design

An effective learning program designed to embed foundational knowledge and/or skill into long-term memory must include some form of spaced repetition and feedback to be successful. Doing so leads to a more knowledgeable workforce, and gains in efficiency across the organization:

- Employees who know safety procedures can follow them... and have less accidents.
- Sales reps who know all the features and benefits of a product will sell more.
- Support reps who know how your products work will provide better customer service.
- New hires who complete an onboarding program faster will be more efficient in a shorter period of time.
- Employees who know process and procedures “cold” will make fewer mistakes.

About Knowledge Guru

Knowledge Guru® uses an engaging gameplay experience and the latest in brain science to help learners learn facts fast. Its research-based, fully-tested design ensures your people learn and remember. Robust tracking features give you a detailed look at learner progress.

The Guru goes where your people are as a flexible web app. Use it to help people learn new information or to reinforce formal training efforts. With Knowledge Guru, you can build powerful, effective games in as little as a day with the easy-to-use, web-based game creation wizard and deploy them easily to learners.

Knowledge Guru is proven to increase knowledge retention... and drive business results.

CASE IN POINT

ExactTarget, a Salesforce Company, used a Knowledge Guru® game to teach product knowledge for a new mobile marketing product. They were faced with two common business challenges: increasing sales and improving customer service.

Knowledge Guru’s design is based on spaced repetition and feedback. Specifically:

- Players are presented with different iterations of the same basic questions, separated by “micro spacings.”
- Players earn achievements and points for answering questions correctly and are able to advance through the game.
- When questions are answered incorrectly, points are lost and players receive immediate feedback describing their misstep.
- Players must correctly answer each question before advancing in the game.
- When the regular game is completed, a separate game mode is unlocked with the same game content presented in a new format. This provides a final “macro spacing.”

ExactTarget used Knowledge Guru as a reinforcement to existing training materials. By playing Knowledge Guru and utilizing spaced repetition, ExactTarget was able to achieve measurable results:

- The sales team built a faster pipeline for the new product than any other launch in the previous two years.
- Average contract values increased significantly.
- First call support resolution increased significantly, leading to decreased support costs.
Knowledge Guru is imagined by Bottom-Line Performance

**Bottom-Line Performance** is a learning design firm serving a wide range of corporate clients. Since 1995, we’ve helped clients choose the right learning solutions for their learners, while also helping them to design and develop learning tools effectively. Areas of focus include product launches, customer training, internal process training, safety & compliance and more.

Solutions we provide:

- eLearning/mLearning
- Serious games, gamification
- Curriculum design and development
- Blended learning programs
- Performance support
- Mobile apps
- Project management

Bottom-Line Performance is also the creator of Knowledge Guru®, a game-based learning platform linked to the science of learning and remembering. BLP received three 2014 Brandon Hall awards for its learning solutions, including two “Gold” distinctions.

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