SAFETY TRAINING & THE EBBINGHAUS FORGETTING CURVE

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THE FASTEST PATH TO SAFETY AWESOME

Why Do Employees Forget 70%
Of Their Safety Training Within 24 Hours

In In our report, 3 Keys to Effective Use of Online Safety Training Content, we looked at the reasons behind low employee engagement during safety training; the consequences of low engagement, including lower levels of content retention and an increase in incidents and injuries; and how online training (eLearning) content can be used to boost engagement.

In this report, we're going to take it a step further and look at the **SCIENCE** behind forgetting and retention as explained by the **Forgetting Curve**. Then, we will discuss how to beat the curve, and how spaced repetition is leading the **Retention Revolution** to increase learner retention and decrease forgetting.

The Problem

Why should you be concerned about learner retention? Employees know safety is important. So why do you have to constantly remind them of safety procedures? It can't always be chalked up to poor attention during safety training.

In fact, most of the time what's happening is the employee's memory is being so overwhelmed that their brains aren't holding on to the information you're giving or have given. **In the simplest of terms, employees are forgetting to be safe.**

The human memory is fickle. We can all recite the lyrics to "YMCA" verbatim, but if I asked you to describe a logarithm right now my bet is I'd hear crickets. Simply put, when our brain gets overwhelmed it reacts by dumping new information out (and for many people, math was an overwhelming class).

At its core, it's a survival mechanism. If we tried to remember every piece of information we heard during the day, our brains would constantly be so active that we wouldn't be able to sleep or perform basic survival functions.

But the ability to remember the lyrics to YMCA and NOT the steps to a critical safety procedure can have tragically different outcomes.

The *Real-Life* Consequences

Stan was an experienced heavy equipment mechanic. His co-workers liked him and his supervisors said he always went the extra mile when it came to his work. He attended safety training as required and hadn't had any serious safety incidents. That changed one day when Stan was called out on a service call to work on a large front-end loader.

Stan followed all the steps to de-energize the equipment and make it safe to work on, except two. He forgot to bleed the hydraulic lines to the bucket and failed to properly block and secure the bucket in a safe position. As a result, the hydraulics released and the bucket fell, pinning and crushing Stan. He died while his co-worker, waiting for emergency services, tried to free him.

During the follow-up investigation, the training sign-in sheet for locking and blocking out equipment covering the exact steps Stan went through, and the two he forgot, was found. Stan had been trained in the safe way to service a front-end loader but he forgot two of the most important steps. The two steps that took his life.

The Forgetting Curve

How many times have you conducted training, or assigned training, and automatically concluded that your employees understood exactly what you said or understood the information covered in an online course?

And have you ever given much thought to how much of the information workers were retaining in these training sessions? I would venture to say most of us haven't given a lot of thought to comprehension and retention of safety training, instead focused on the compliance piece of training. But here are two reasons why you should.

Cognitive Load

The Cognitive Load Theory is a theory that suggests our memories go through several steps before they're committed to our brains. Because of this, there are multiple opportunities for memory formation to fail.

More precisely, we gather new information into our "working memory" which then filters it and decides what to commit to our "long-term memory" (the "YMCA" memory). It's like our very own memory filter system and it's strict. Our "working memory"

isn't interested in wasting its resources. This makes it crucial to give learners information in chunks they can easily process.

And every time your training includes unnecessary information (no matter how small), you're taking up more space in your employees' "working memory." And that unnecessary information could be what ends up getting through, instead of the important technical steps you've explained.

Let's assume the training info makes it past the learner's working memory, the question then becomes, will they be able to retain what they learn long enough to use it to safely do their job? Not according to the forgetting curve.
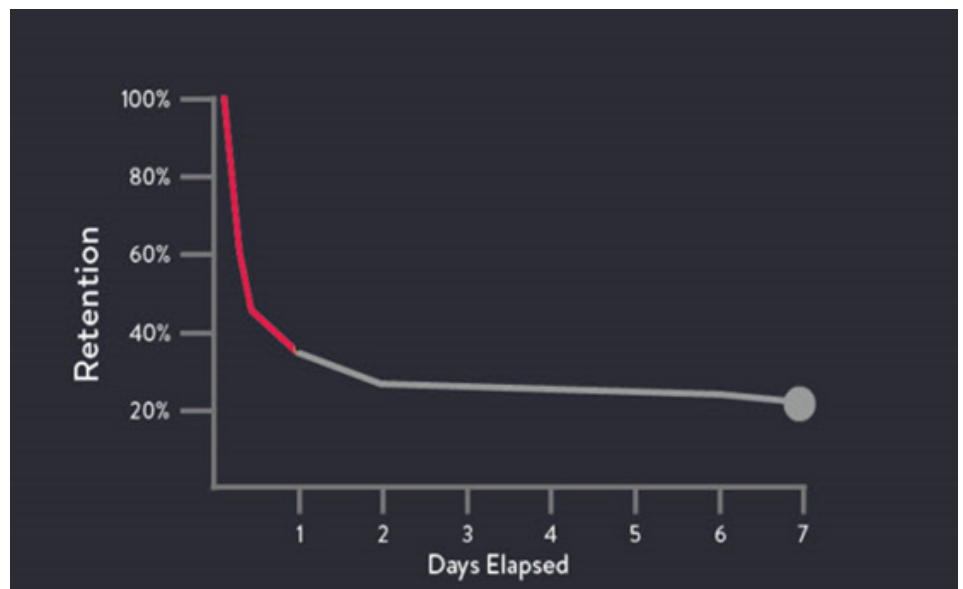
The Forgetting Curve

The forgetting curve describes how the brain's ability to retain information decreases over time. Hermann Ebbinghaus and his research in memory and forgetting, is credited with the creation of the curve in 1885.

He discovered that from the point when you learn a piece of information (100% retention), retention begins to drop exponentially. What that means is, without follow-up, **about 70% of learning is lost and forgotten within 24 hours of learning it**, after which the loss rate slows down some, but studies show that total retention a month later is only around 10-20 %.

That's assuming of course, the learner is starting with 100% retention, which is likely not the case. On a good day, we are lucky if a learner starts at 80% retention. In which case, the curve looks more like this - retention has flatlined by day seven.

Retention Factors

Above: The standard Ebbinghaus forgetting curve that illustrates the exponential relationship between forgetting and time.

Below: An adjusted forgetting curve with the assumption that only 80% of knowledge is retained at the moment of learning
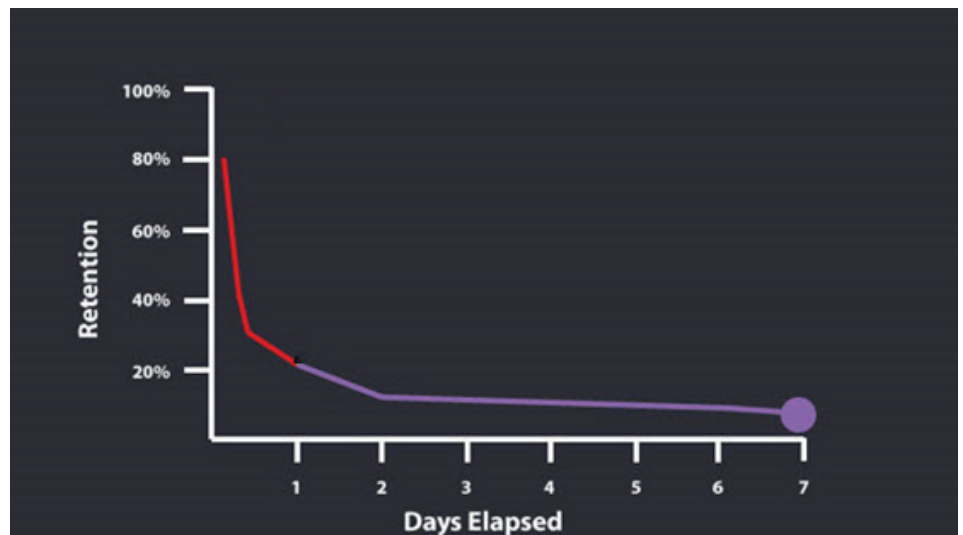
There are various factors that can affect the rate of forgetting and the level of retention, some good, some not so good. Let's look at four of them.

1. **Meaningfulness effect** - the more meaningful the content, the easier it is to remember. If the content doesn't make sense or isn't relevant enough, it's going to be harder for workers to learn the material.

2. **Practice effect** - Active practice or rehearsal enhances retention - that's why actors study their lines, and why you practice before giving a presentation. But there is one type of practice that yields better learning results. It's known as the spacing effect or spaced repetition, and refers to regularly spaced practice exercises. Studies have shown the effect of spaced repetition is significant and is especially beneficial when learning unfamiliar material

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and during fast presentation rates.

3. **Interference effect** - An interference effect is always negative. It happens when a learner tries to remember old material previously learned while learning new material. Old material can slow the learner's speed of learning and memory performance. It can also cause the learner to have problems with distinguishing similar concepts and can cause students to forget items they remembered clearly for years.

4. **Transfer effect** - takes place when prior learning or old material makes new learning easier. When old and new tasks or material have more in common, a transfer effect is likely to happen. The effect is not always positive though. Negative transfer occurs when prior knowledge makes it hard to learn a new skill or new material.

Source: http://info.shiftelearning.com/blog/bid/347682/6-critical-factors-that-affect-how-people-learn

Take a minute to think about how you are currently dealing with the retention problem.

1. **Does your training program take Cognitive Load and the Forgetting Curve into consideration?** Do you schedule training for an entire day or more; cramming information into each session, without follow-up or a plan for follow-up training?

2. **Based on the loss numbers of the forgetting curve, how do you think this rate of knowledge loss (70-90% loss) affects the safety of employees?** How many accidents have been caused by what a worker forgot?

How many accidents will happen because of this knowledge loss?

3. **How much time and how many hours do you spend per worker on training?** Safety training is cost, labor, and time intensive. On average, organizations spend $700 - $1,000 per employee each year on training. The hours of training per employee each year range from about 40-50 hours. That is a significant amount of your budget going in one ear and out the other.

It begs the question, if organizations are spending all this time and money on learning and training, why aren't they focusing on ways to ensure the message is sticking after training is over? Maybe it's because few of us realize how much of a problem it is.

How to Beat the Forgetting Curve

So, now that you have a better understanding of the problem, let's look at how to solve it. There is a lot we can do to help those "working memories" become "long-term "YMCA" type memories."

Culture Club

Start by weaving the importance of safety into your organization's basic fabric   its CULTURE. Culture isn't something that happens overnight, but with a unified message coming from the top and communicated and demonstrated throughout, employees will get the message that safety is important.

Culture sets the expectations for so much of what happens in an organization. If a company's top leaders and front-line supervisors support and encourage safety training, employees are more
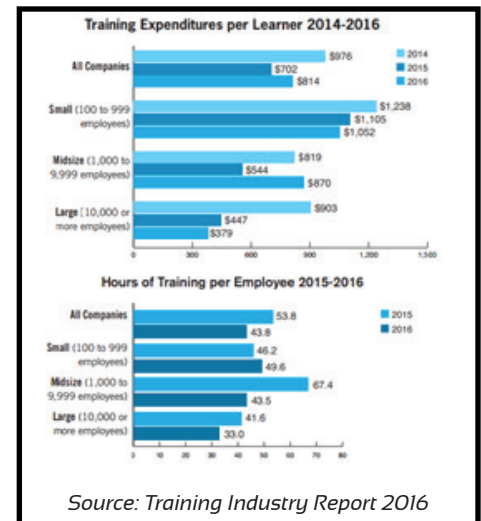
Source: Training Industry Report 2016

likely to participate and take it seriously.

Failing to define and communicate these expectations to employees is as good as saying SAFETY IS NOT IMPORTANT. How attentive do you think workers will be during training when they know safety really isn't a priority to the organization?

Lecture vs. eLearning

Did you know, retention levels from lecture based training are only about five percent? Five percent of a safety message is anything but safe.

However, it has been proven that while we have limited capacity in our "working memory," when we combine visual and auditory cues we can significantly boost how much gets through our memory filter. In the simplest terms: Using media that combines the visual and auditory experience, like online training courses, can be very effective   IF the content you use caters to the limited capacity of our memory.

Refer to our *Three Keys to Effective Use of Online Safety Training Content*, for a closer look at the positive impact online content can have in your safety program.

Clarity and Connections

As discussed in our report *Three Keys to Effective Use of Online Safety Training Content*, if a learner doesn't have a clear understanding how a training course or topic applies to them and affects them, they are not likely to be engaged in receiving the message.

Conversely, the more relevant a training topic is to a learner, the higher the engagement and the higher their retention level will be.

Why? Relevant material helps a learner make meaningful connections between the new information and things they already know. These connections can turn random bits of knowledge into important parts of a learner's existing story in their long-term memory.

This is one reason why it is critical to take the time to determine what training topics are relevant to which employees. Relevant courses offer the learner a much better chance to make meaningful connections and retain the information longer.

Retention Revolution

Even under the best circumstances, the forgetting curve is hard to beat. It's simply hard for our brains to absorb and remember something we are only exposed to once, or even once a year during annual training. This is where the retention revolution begins; increasing recall through spaced repetition.

Overlearning

Overlearning is something else Ebbinghaus discovered during his study on the forgetting curve. The basic idea is that if you practice something more than what is usually required to memorize it,

the effect of overlearning takes place.

Which means the information is now stored much more strongly and the effects of the forgetting curve for overlearned information are shallower   retention doesn't drop as sharply and forgetting isn't as dramatic and immediate.

Here's where it gets really exciting and all comes together. Overlearning leads us to the concept of recall through repetition. Specifically, spaced repetition, or the practice effect.

We can increase retention using spaced repetition events designed to remind learners what they might otherwise have forgotten. At SafetyNow we call it Retain, and we think it will revolutionize the way workers retain the information they learn in training.

Here's how and why it works.

How to Eat an Elephant

Many of you might be familiar with the joke, "How do you eat an elephant?" The answer being, "One bite at a time." The same is true for learning new information. Most of us have likely pulled a few all-night study sessions as we cram for an exam. This approach of essentially eating the elephant in one big bite works in the short-term   you are likely going to remember much of what you crammed into your brain for about a day or two, but not much longer. This example is textbook Forgetting Curve.

This is because the brain limits the information we remember to about five to seven new pieces at a time. With millennials, this number is even smaller because their neurological pathways have changed from their exposure and immersion in technology.

A better way to learn is to start with smaller pieces of information and then follow up those learning events with regularly spaced repetitions. The brain preferentially stores information it deems to be important. It strengthens and consolidates memories of things it encounters regularly and frequently. So spaced repetition revisiting information regularly at set intervals over time   makes a lot of sense.

Spaced repetition is simple, but highly effective because it deliberately hacks the way your brain works. It forces learning to be effortful, and like muscles, the brain responds to that stimulus by strengthening the connections between nerve cells. By spacing the intervals out, you're further exercising these connections each time. It produces long-term, durable retention of knowledge.

Source: https://knowledgeplus.nejm.org/blog/spaced-repetition-the-most-effective-way-to-learn/

Recall Through Repetition

Remember, on average learners forget 70% of what they learn within 24 hours. Obviously, the effectiveness of learning and training decreases dramatically if the original content is forgotten.

But, if a learner can activate the information they learn, post-training, at regular, spaced intervals, their retention of that material increases. **In fact, every time they repeat it, their retention rate goes up.**

Forgetting still sets in just as it did the first time the information was learned, but the difference is, the speed at which the learner forgets is much slower, and the forgetting curve becomes less steep with each interval.

SafetyNow's Retain software empowers safety managers

to increase the retention of their training in the long-term by allowing you to schedule quizzes and refresher courses at precise intervals following the initial training. The net effect is employees with a higher retention rate and a safer workplace.

How Does Retain Work?

These retention events are more than asking a learner to reread the training information. Instead, they are active learning events that require a learner reply to a short series of questions about the new information, spaced out over 28 days. The retain events force the learner's brain to activate the memory, thereby deepening the connections.

Using the same graph of the forgetting curve we used earlier, look at the difference in the Forgetting Curve when retention exercises are used as part of training follow-up. The green magnets show what happens to retention when you follow up training with retention opportunities at 1, 3, and 7 days after a training event. You can see how the retention rates go up dramatically as the information makes its way past the working memory and into the learner's long-term memory.

Over time, safety sticks. Retention rates soar, workers are safer, which leads to a safer workplace with fewer injuries and incidents.

Conclusion

When an accident or incident happens at the workplace, it's too late to discover your safety training didn't stick. Not only has an employee potentially gotten hurt, but so has your company's bottom line. The only way you can ensure you avoid expensive and dangerous accidents and incidents is to make sure your training is grabbing employees' attention, and being committed to memory.

BONUS: RETENTION FEATURES TO LOOK FOR IN ONLINE SAFETY TRAINING CONTENT

The features to look for in online courses aren't a guessing game. Very specific science comes into play when we're talking about memory which makes choosing a safety training content provider very important.

There are 8 basic features to look for when choosing a content provider:

FEATURES IN ACTION

So how does this tie back to our "YMCA" example? First, the song uses signaling. Right before we burst into the chorus it prompts us with a staccato beat and we all know what's coming. Next, it's split into chunks that are separated by repeating chorus lines. These "verses" are easier to remember because they are sung with separation. Additionally, it's short. The song doesn't drag on for 10 minutes. It's been weeded of unnecessary information. And finally, it uses matching modality by combining lyrics with dance moves. We remember the lyrics not only because of the song, but because of the dance moves we do along with it.

1. **SIGNALING** Do the courses use signaling (also known as cueing)? This is the on-screen use of text or symbols to highlight important information. These cues help guide our memory toward the goal of the course.

2. **SEGMENTING** Is all the information on the topic presented in one go, or is it split up into "chunks" of information? This allows learners to engage with small pieces of new information while giving them control over the flow of new information.

3. **WEEDING** Does the course say too much? Weeding is the elimination of interesting but extraneous information from the course that does not contribute to the learning goal. Courses that are well "weeded" will ensure that there isn't anything unnecessary taking up space in learners' "working memory."

4. **MATCHING MODALITY** How does the course present its information? Does it use both visual and auditory channels, or is it, for example, just a video of a person talking directly to the camera? Remember, having a combination of channels is best.

5. **LENGTH** The video should be as short as possible, considering how in-depth the training on the topic needs to be.

6. **NARRATION** It makes it hard to understand the content if learners are having to imagine how it would apply to their workplace. There are two issues to consider when it comes to the narration of online courses:

    •   Narrator Uses a Conversational Style: Using conversational language, as opposed to overly formal or complex language, helps learners understand the training by removing any barriers complex language has for them.

    •   Narrator Speaks Relatively Quickly and with Enthusiasm: Nobody enjoys listening to a monotone speaker. If the course has a narrator, make sure they're enthusiastic in their tone and don't talk too slowly or your learners will be falling asleep. The less time learners have for their minds to wander between topics, the better.

7. **WORKPLACE FIT** It makes it hard to understand the content if learners are having to imagine how it would apply to their workplace. Try to find video content that suits your workplace and jobs.

8. **ADDITIONAL MATERIALS** Bonus points if the video provider can also provide reinforcement materials like quizzes to help learners commit what they were taught to memory.

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