THE KNOWLEDGE REINFORCEMENT EBOOK

Scientifically Proven Strategies for Building Long-Term Knowledge Retention

How to Improve Knowledge Transfer and Recall for the Best Learning Outcomes

Qstream®

1 The Situation in Modern Workplace Learning

In workplace learning today, L&D budgets continue to grow more than ever before. For the most part, organizations understand that training is important. But this usually translates to creating more content and courses which causes employees to become overwhelmed with so much information. In the end, people disengage and just go through the motions of completing the training.

But when training is complete, have you considered what happens after? How long before do we realize that even the most well-taught lessons don't achieve desired learning outcomes? What most organizations don't consider is that the way learning is being deployed isn't built for engagement or retention. Focusing on making sure people are remembering the material and helping them improve their proficiency will get you to see the learning outcomes that will have the biggest impact on individual and business performance. In result, you'll be able to have the evidence to prove that your training investments are having a positive effect on business.

After all, training is a significant investment, with $200 billion spent annually on corporate training worldwide, you want to make sure you're getting a higher return.

As companies work to overcome L&D challenges like keeping up with the pace of organizational changes, sustaining engagement with employees, or improving and quantifying learning effectiveness— it is absolutely essential that learning programs are more agile than ever before. That sort of agility makes building knowledge retention through repeatable and reliable reinforcement processes both more imperative and more challenging.

With the rapid pace of innovation and evolving market dynamics, means that what employees need to learn every day can change instantly. And by 2022 everyone will need an extra 101 days of learning, according to the World Economic Forum. Because information is omnipresent and ever-changing, it's harder than ever for employees to know the exact things that matter most to their business to meet changing market demands.

Other factors complicate matters even more with constant changes related to markets, regulations, customers, processes, competitors, and products. Expecting employees to have the agility needed to deliver on ever-changing critical business messages is unrealistic. This is especially true if important information is communicated through often forgettable, one-off training sessions, emails or recurring meetings.

What is the Purpose of Learning?

A

RECORD COMPLETION of Learning Activities

- Traditional learning
- Focus on completing the activities
- Completions stored in an LMS
- Everyone gets the same experience

B

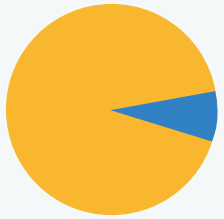
CHANGE BEHAVIOR to Improve Business Outcomes

- Identify who needs what help
- Tiered learning
- Personalize your learning
- Everyone gets their own experience

Cost of the Forgetting Curve for Corporate Training

2018: $366 BILLION

90% Forgotten after 2 months Loss of $329 Billion knowledge investment



10% retained after 2 months due to Forgetting Curve

Source: Training Industry, Inc. Research Data

The Situation in Modern Workplace Learning

That's why employee engagement is so critical and often the biggest challenge for anyone responsible for training. If employees aren't invested in these initiatives they will have no impact to begin with, let alone benefit from any attempts at recalling information.

With all of these hurdles, it's no wonder learning professionals are putting huge amounts of time and money into creating engaging and comprehensive content – only for learners to forget 90% of that content within three months.

Because of all of these factors and more, old school "macrolearning" models or passive online self-serve learning portals like traditional classroom learning and learning management system (LMS) equivalents — built on the assumption that knowledge "accumulates" over time — can no longer keep up. Today, people are exposed to more information than the brain can process at one time. As a result, information overload happens and employees are forgetting things that companies simply can't afford for them to forget.

Building knowledge reinforcement into training plans ensures that at the moment of truth, when learners need to apply what they've learned, not only will they remember their training, but they will be prepared to perform the behaviors they've been taught. In this guide, we'll share why knowledge reinforcement matters and how to achieve the best results within an organization to help businesses like yours make the most of your L&D efforts and investments.

What is the Price of Learning?

Traditional Learning

2	Hours of Instructor Led Training (ILT)
2	Hours of back-filling the position
10,000	Number of workers
40	Average hourly rate per worker

$1,600,000

Spaced Learning

.33	Hours (20 Questions @ 1 min each)
0	Hours of back-filling the position
10,000	Number of workers
40	Average hourly rate per worker

$132,000

Savings of 30-90%

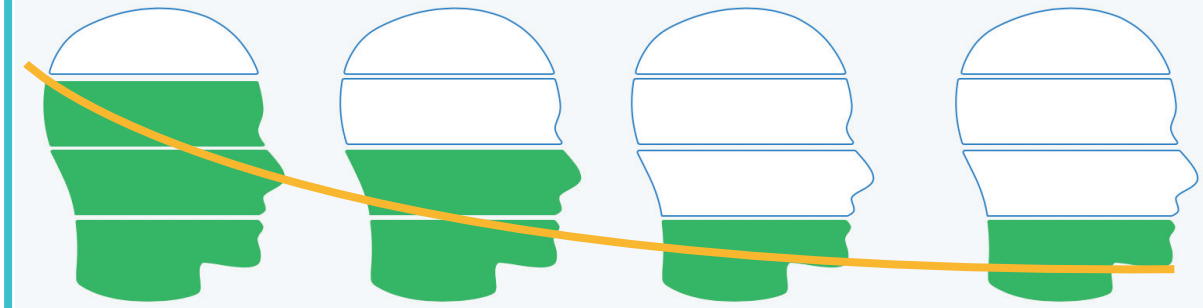
2 Why Do People Forget?

People forget things all the time, whether it's the last item on your grocery list or the password for your work email. Assuming new knowledge can be learned, easily retained, quickly recalled, and put into practice is simply false.

Forgetting is part of human nature and needs to be taken into consideration when building learning programs – it's vital to ensure we don't accidentally learn incorrect information or behaviors. Understanding the why of forgetting can be key to finding ways to minimize it and ensure employees retain the lessons learned.

The forgetting curve, a phenomenon quantified by 19th-century German psychologist, Hermann Ebbinghaus, breaks down how quickly we start losing that learned information.

The Forgetting Curve



AFTER 20 MINUTES	AFTER 24 HOURS	AFTER 31 DAYS	AFTER 60 DAYS
42% of learning is lost	**67%** of learning is lost	**79%** of learning is lost	**90%** of learning is lost

Source: Ebbinghaus, H.Memory: A Contribution to Experimental Psychology

Unfortunately, when it comes to L&D initiatives, this piece of human nature can make an uphill battle even steeper. With such statistics, how can learning objectives translate into learning outcomes or contribute towards organizational goals?

Of course, the reasons for forgetting can vary wildly depending on circumstances, but the rate at which the world around us changes paired with the need to know and remember so much information at work has made learning much more difficult.

To combat these challenges, it's important for businesses to understand not only the importance of knowledge reinforcement but the cognitive science of learning.

3 The Science Behind Knowledge Reinforcement

In the face of unavoidable forgetfulness, L&D leaders need technology that will reliably help them not only effectively communicate key information to employees, but ensure that it's retained perpetually. This is where the proven science of learning is a must, particularly the two effects proven to overcome the forgetting curve and start changing behaviors.

The Spacing Effect

Interval reinforcement is a proven way to combat the forgetting curve. The spacing effect explains how you can significantly increase knowledge retention by presenting new or previously taught information and reinforcing it over spaced intervals of time.

There is a proven neurophysiological basis for the spacing effect. Reinforcement through the application of delivering knowledge over time enhances memory and the survival of new neurons. It increases the efficiency of the uptake of information and encodes it so that the information is preferentially retained.

Typical Forgetting Curve for Newly Learned Information

The Testing Effect

Testing is not meant to simply measure knowledge. Testing, or retrieval practice, is an active learning process that can dramatically improve knowledge retention when combined with immediate feedback. This process is known as the testing effect.

Studies comparing the testing effect to passive learning without testing (reading or watching a video) and conceptual mapping (drawing diagrams to relate concepts) show that testing is the most effective approach.

Improve Retention of Learning

Foundational blocks to retrieve information

Proven in peer-reviewed clinical trials to improve long-term retention up to **170%**

The Science Behind Knowledge Reinforcement

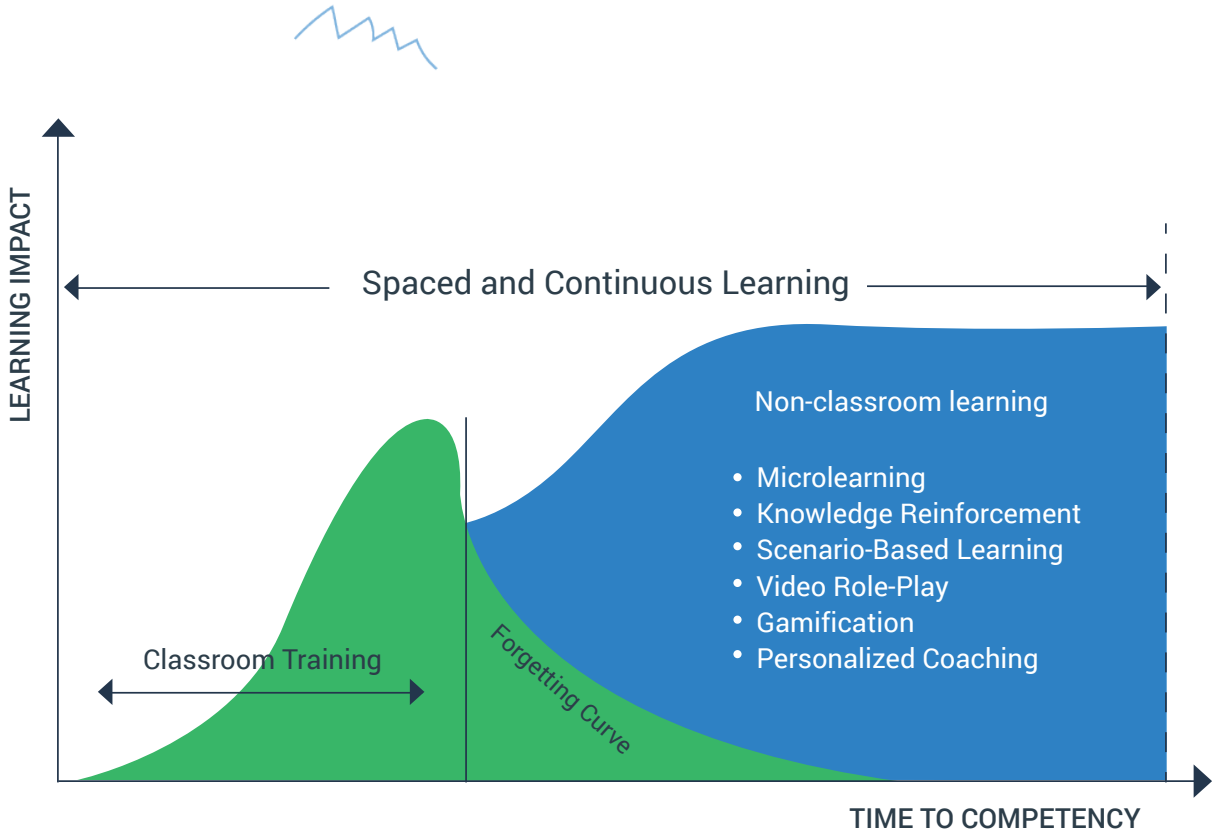
Desirable Difficulty

When using the testing effect, questions in the assessment need to be at the right level of desirable difficulty. When questions (and therefore information retrieval) are too easy, long-term retention isn't as effective. When questions are too hard, retrieval will be entirely unsuccessful, no matter how many times the information is repeated. Creating the right level of effortful retrieval ensures information is retained long after the training is complete.

Proven by Science

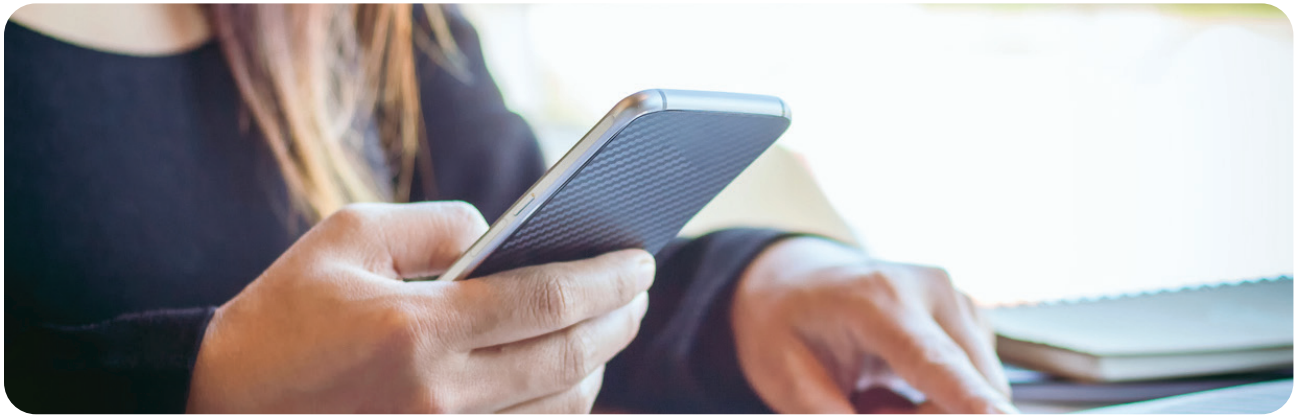
Dr. B Price Kerfoot
An Associate Professor of Surgery at Harvard Medical School and a staff urologist at the VA Boston Healthcare System, Dr. Kerfoot's research over the last decade has focused on utilizing rigorous clinical trial methodologies to assess the efficacy of online educational methods. In addition, he has worked to incorporate cognitive psychology research findings into online education to increase long-term retention of learning.

Through this educational research, Dr. Kerfoot developed a new form of online learning termed "Spaced Education." In more than 22 large randomized trials, spaced education has been shown to improve knowledge acquisition, boost knowledge retention, durably change clinician behavior, and improve patients' health measures. Harvard University submitted a patent on the spaced education methodology and launched Qstream's technology to host this learning methodology outside of its firewalls.



4 Knowledge Reinforcement Best Practices

The problem in the digital world isn't the need for more content, it's engagement, getting learners to pay attention and remember new information. In the ongoing struggle to retain knowledge, there is no greater weapon than engagement. Ultimately, capturing people's attention and keeping them engaged in the learning process is the biggest challenge. These knowledge reinforcement best practices require the solid foundation of a strong engagement strategy to achieve their full impact.



Scenario-Based Micro-Challenges

Scenario-based challenges make learning contextual. By seeking the subset of concepts that matter most, distilled to the right size and focus for impact and engagement, employees are more likely to retain the knowledge down the line, when it matters most.

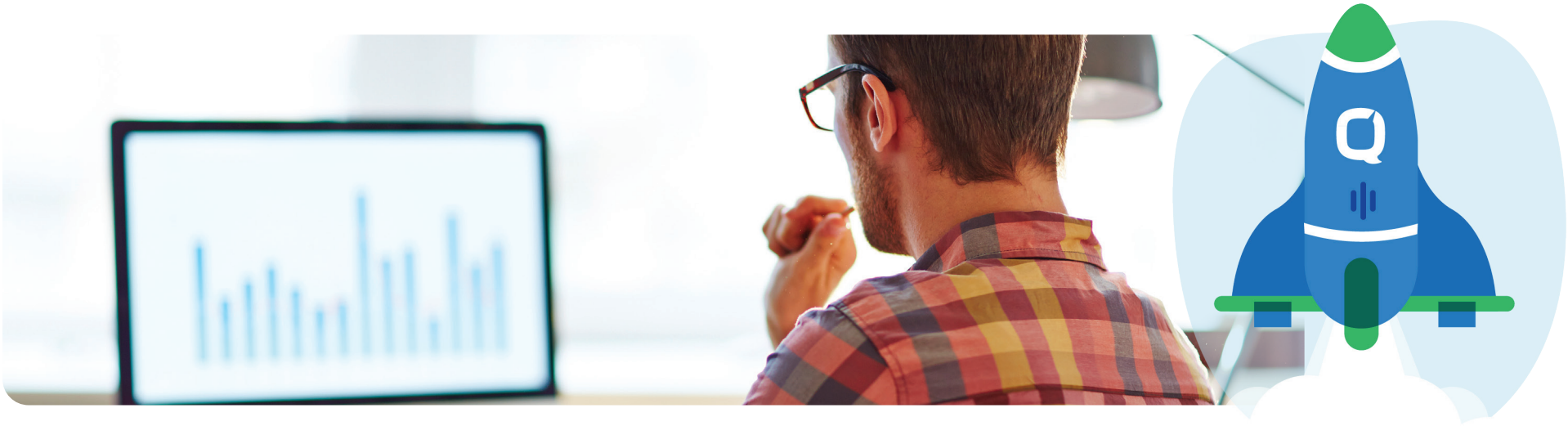
Micro-Explanations

Micro-explanations transform simple assessment on key information into ongoing knowledge and skills reinforcement in those same key areas — all in a way that's accessible and engaging enough to keep your learners attention, and effective enough to turn that attention into demonstrable behavior changes and performance outcomes.

Game Mechanics That Sustain Interest

Keeping employee's attention requires game mechanics that demand attention — making learning a challenge and competition with leaderboards makes people return for more learning which results in continuous engagement and improvement. An over complicated or underdeveloped learning process will cause you to struggle to keep employees motivated.

Knowledge Reinforcement Best Practices



Manager Engagement Tools

Manager engagement is vital not only in ensuring teams fully engage with a learning program, but also in allowing each learner the opportunity to receive the right coaching support in a timely manner to help them master the learning material. Combining simple coaching tools with real-time feedback allows managers to:

- Engage with the learning program.
- Ensure the team can improve proficiency.
- Follow best practices and behaviors.
- Increase performance.

Data & Analytics

When compared to traditional learning management systems (LMS) which report primarily on learner participation and course completion data, the response data collected from knowledge reinforcement supplies targeted data and insights on which specific people, teams or topics need attention. Managers can regularly dive into this data to identify:

- Proficiency gaps for continuous learner feedback.
- Where to invest more time coaching.
- How learning is connected to business goals and where risk occurs.
- Where to invest additional training investments for the future.

Regular Assessments

Without feedback, it's hard for employees to know where they stand, which can adversely affect engagement, causing retention to drop. Regular assessments:

- Boost engagement.
- Improve knowledge retention.
- Help uncover knowledge gaps.
- Highlight areas of proficiency.
- Give learners a sense of achievement and contribution to the business.

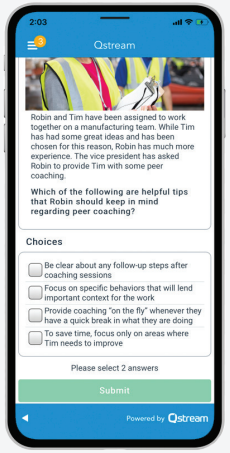
5 The Ultimate Knowledge Reinforcement Technology

Knowledge reinforcement breaks the training process down for employees making it manageable, efficient, and even enjoyable. This is different from the traditional learning that is more focused on accumulating information. A knowledge reinforcement strategy is done by creating small, easy to understand, customized content that is highly relevant to the learners' work. It's geared for people to remember the most important information that is going to have the greatest influence on practicing the right behaviors on the job. How? By keeping learners focused through these key components:

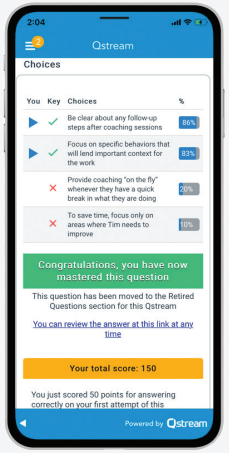
Learning in the Flow of Work

Capture the Learners' Attention

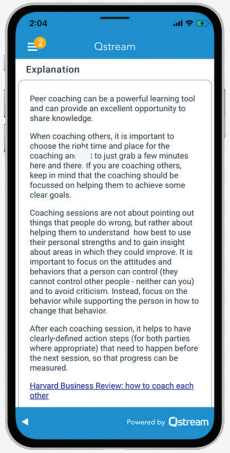
Precision-Learning Challenges



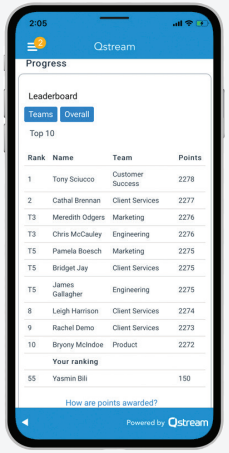
Immediate Feedback



Reinforce Knowledge



Friendly Competition



Capture the Learners' Attention

A push notification (in the form of a learning challenge) is delivered to a person's mobile device.

Precision-Learning Challenges

Frame relatable learning scenarios as a challenge to engage the user.

Immediate Feedback

Let learners know the right answer immediately after they submit their response, even if they were correct or incorrect. Now the learner can see how they responded related to their peers and benchmark their knowledge against them.

Reinforce Knowledge

Provide immediate knowledge reinforcement on the subject. Instantly explain the concepts to help them learn and recall the information. Direct the learner to additional resources to allow them to do more self-learning if needed.

Friendly Competition

Game mechanics engage learners and encourage competition, while leaderboards create transparency on the learners progress compared to their peers, other teams, and the organization as a whole.

6 Learning through Assessment and Reinforcement

Knowledge reinforcement has been clinically proven by Qstream's co-founder, Dr. B. Price Kerfoot, MD EdM, to be effective for educating people with new information through assessment, in a question and answer format. Similar to learning by doing or through trial and error, new content is presented in small, easy to understand, scenario-based challenge questions.

The scenario-based challenge questions are designed to get the learner to use their critical thinking skills for problem solving. After reading the question, the learner responds and receives immediate feedback on if they were right or wrong and is provided with a micro-explanation. A micro-explanation is where the learning takes place. It helps correct any misunderstanding by restructuring the learner's knowledge. Micro-explanations are designed to convey the details or direct the learner to additional resources to make the concepts clear and easy to understand. So now information is embedded into the brain for recollection when that knowledge needs to be applied.

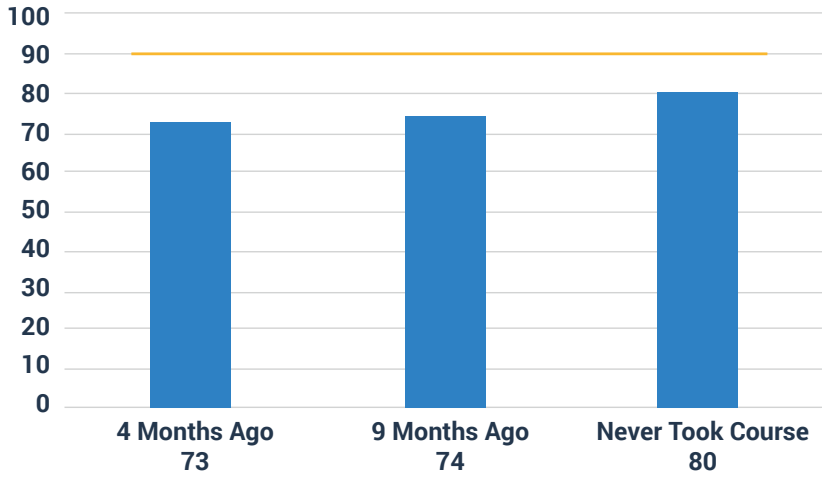
In one particular randomized study, conducted by Dr. Tim Shaw, 371 new doctors-in-training at two of Harvard's teaching hospitals received new content on patient safety behaviors either through traditional web-based teaching modules or through a spaced learning program. The study demonstrated that spaced learning is more effective at teaching new content than web-based teaching modules and generates observable behavior change.

In another analysis, Johnny Hamilton, Senior Design and Innovation Consultant at Providence St. Joseph Health, discovered that its training impact was not correlated to when employees were last trained. He ran a Qstream to three different groups. One group had previously been trained on the materials in an instructor-led course 4 months earlier, another took the formal course 9 months earlier, and the final group was learning the concepts for the first time.

After running a Qstream to all three groups, Providence St. Joseph Health found that all three groups had the same initial proficiency, whether or not they previously took the course. Whether it was 4 months earlier or 9 months, people forgot what they learned through traditional learning methods. This means that the learning process has to be presented and then immediately followed by an ongoing learning activity that is spaced over time to reinforce critical knowledge.

Qstream Pilot Data Summary

Initial Qstream Proficiency by Month of ILT Class Taken



7 Knowledge Reinforcement for a Remote Learning Strategy

The way people work and learn is changing substantially. With so many organizations having massive workforces distributed across the globe, this makes it hard to keep people connected, engaged, and productive when it comes to learning. The need for a scalable learning solution that is integrated into each employee's day is essential for quickly getting them the most important knowledge they need to know and helping them remember it. Knowledge reinforcement is the most efficient and effective learning strategy for delivering your programs. Here's how knowledge reinforcement achieves the best learning outcomes:

1 Engagement

Capturing and holding people's attention is difficult in instructor-led training as it is in distance learning. The key to building an engaged learning culture is by refraining from using passive learning and transitioning to a continuous and active learning process. Pushing learning to the learners through a mobile device permits them to respond to training within the flow of their day. What makes a learning experience extremely engaging is if the content relates to their job, is quick and easy to respond to, and is enjoyable for them to keep participating.

2 Social Learning and Collaboration

Collaboration is an important aspects for making learning effective and maintaining a healthy culture. Distance learning shouldn't be a barrier to people working and learning together. A knowledge reinforcement program gives learners the ability to comment and interact with other peers on a message board discussing specific subjects or skills related to the content. This allows people to learn from the different ideas, skill sets, and experiences of their peers. Not only is this a forum for discussing learning topics and experiences with peers, but it can be used for learners to provide feedback to the instructor on the content and their overall experience of that learning program. Feedback gained from learners on the learning experience helps instructors tweak and make improvements to the content for the next time they are developing content and designing a new program.

3 Performance Support

One of the most important reasons for capturing data related to individuals knowledge and capabilities in a learning program is to help the learner with on-the-job support at the exact moment of need. Informal learning like coaching is valuable because managers improve the stickiness of what was taught in learning and help them translate that knowledge, skills, and behaviors to application on the job. When you're responsible for delivering learning in a large organization that is remote, scaling learning and coaching while keeping a personalized experience is challenging. That is why capturing proficiency data and having access to data on individuals' knowledge gaps is essential for having targeted coaching conversations for reinforcing learning concepts even further through real-time coaching actions.

Knowledge Reinforcement for a Remote Learning Strategy

A knowledge reinforcement program delivers customized learning content for any remote learning program. These are the most common subjects for a knowledge reinforcement program but is not limited to:

Knowledge Reinforcement Use Case Examples:

SALES & MARKETING	LEARNING & DEVELOPMENT	OPERATIONS, COMPLIANCE & RISK	LIFE SCIENCES & HEALTHCARE	BANKING & FINANCE
• Onboarding • Sales kickoff • Sales / service skills • Sales process • Pricing • Product knowledge • Message alignment • Product launch • Channel enablement • Competition	• Training reinforcement • Soft skills • Leadership development • Talent management • Onboarding • Culture and diversity • Organizational development • Manager enablement	• Process change • IT security • Technical support • Software roll-out • Compliance education • Regulatory change • Field operations • Six Sigma • Health & safety	• Pharma and medtech sales and marketing • Medical affairs • HCP education • Site monitor training • Patient safety • Joint commission • Diagnosis & treatment • CME & residency & nursing	• Wealth advisory • Customer service • Retail banking • Insurance agent • Know-Your-Customer • Financial crime Banking systems and software • Financial products and investment vehicles

IMPACT PERFORMANCE | PROTECT TRAINING INVESTMENTS
Job-specific micro-challenges that reinforce and strengthen the most relevant knowledge

8 Qstream — Backed By Science, Proven in Practice

Engage | Reinforce | Analyze

Building knowledge reinforcement into your training plans ensures that at the moment of truth when learners need to apply what they've learned, they can recall knowledge and tap into the behaviors they've been taught.

Established in 2008, Qstream is a knowledge reinforcement pioneer with a commitment to designing and delivering corporate learning programs in the way the brain works. We believe that if learning sticks, the workforce will always be ready to perform and can make a measurable contribution to organizational success.

Qstream's knowledge reinforcement technology:

- Combats the forgetting curve
- Proven by 22 randomized, peer-reviewed clinical trials
- Improves long-term knowledge retention up to 170%
- Boosts learner proficiency by 17% on average

Qstream helps you zero in on the learning outcomes that really matter to your business and ensure that learning is sustained. Your learners will be able to take new information and skills into their day-to-day, retaining it long after the training is over. A proven program of spaced repetition ensures that when learners need to apply what they have been taught, it's easily recalled and instinctively applied.

Qstream in Numbers

17% average proficiency improvement

93% average engagement

600+ customers

50M+ questions answered

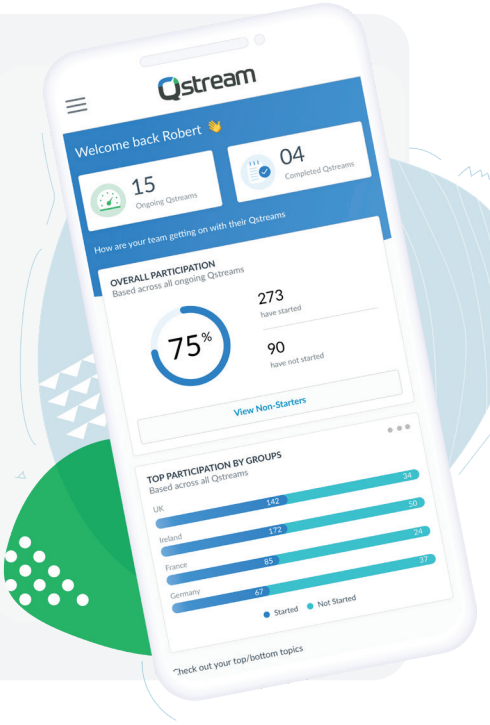
Used By

17 of the top 20 global pharmas

5 of the top 7 medtechs

2 of the top 3 credit card providers

4 of the top 5 US hospitals



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