



7

Ways to build a high performing workforce in your organization

The Learning and Performance Platform

Case Studies: Intermountain Healthcare and a Leading Call Center

Learning that leads to exceptional results

amplifire

I. The New Learning Paradigm

- Why Learning Matters
- RISK: Misinformation in the workplace is universal
- A new approach to learning

II. 7 Triggers that Cause Lasting Learning & High Performance

Adaptivity
Confidence
Feedback with delay
Gamification
Priming
Retrieval
Spacing

III. Learning & Performance Best Practices


Intermountain
Healthcare
A Large Call Center

I.

High Performance:

The New Learning Paradigm





Why learning is vitally important in organizations

You are wealthy in ways that would dumbfound your prehistoric relatives. How did this happen? We've converted the world's matter and energy into useful products and services, but most researchers believe that knowledge is the essential ingredient that allows homo sapiens (the wise hominid) to create civilizations.¹ Furthermore, while it has become clear that many "smart" animals can use rudimentary tools, none are like us. The characteristics that allowed humans to dominate the Earth are our ability to learn, remember, and put knowledge into practice.² We didn't get lucky. We learned.

A glance at your surroundings reveals that truth. Knowledge constructs roads and buildings, grows food, fashions clothes and furniture, cures ailing bodies, and designs smart phones and satellites. Every component of our culture is a knowledge product.

1. Kenneth Boulding, *The Economics of Knowledge and the Knowledge of Economics*, 1966
2. Kevin Laland, *An Evolved Uniqueness*, Scientific American, Sept. 2018

Organizations who understand that they compete by using the knowledge in the minds of their workers have a large advantage over less enlightened rivals. Even organizations the size of countries compete with knowledge. Take South Korea in the 1960s. Impoverished, Korea made education its key priority. Since then, Korea's economy has grown by 40,000 percent and is now the 11th largest economy in the world.³

Not only does knowledge lead to prosperity, according to the American founding father Thomas Jefferson, "...knowledge is power, knowledge is safety, and knowledge is happiness."⁴

The science of learning has given us new techniques that can elevate workforce performance to levels not possible using previous training regimens. This paper gives you seven of those science-based techniques, along with two case studies to show you how well they work in practice.

One thing has not changed since Jefferson: knowledge remains crucial. Every organization that collectively constitutes the global economy carries the risk that their workforce is not performing at the highest possible level. Misinformation, uncertainty, and ignorance damage effectiveness and the bottom line, and, as you'll see in a few minutes, more of these dangerous states of knowledge exist in every organization than previously imagined. That fact, of course, also represents an opportunity.

3. ABC News <https://abcnews.go.com/Business/story>
4. Thomas Jefferson, 1817 letter to George Ticknor

A NEW ERA OF WINNERS & LOSERS

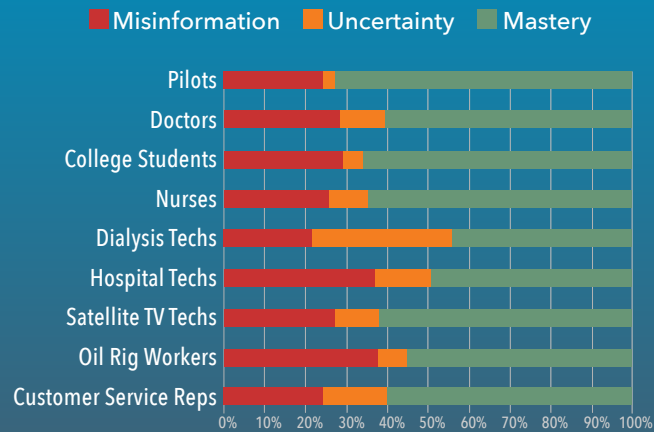
52% of companies in the Fortune 500 have either gone bankrupt, been acquired, or ceased to exist since 2000.

LIFE EXPECTANCY ON S&P 500

1958: 61 years
2011: 25 years
2018: 12 years

RISK: Misinformation in the workplace is universal

KNOWLEDGE IN NINE INDUSTRIES



Confidently Held Misinformation (CHM) exists when a person is sure they are right but they are actually wrong. CHM is perilous because confidence drives behavior and performance. When people know that they don't know, they do nothing. When they are uncertain, they hesitate. When they are confident, they take action. When they are confident and wrong, they make mistakes.

CHM lives in the minds of all workers, employees, managers, and executives. It persists for a few reasons. First, knowledge has grown exponentially in the 21st century and employees can easily fall behind. Until recently, there has not been a way to see how that information is organized in the minds of individual workers, much less do anything about it at large scale and inexpensively.

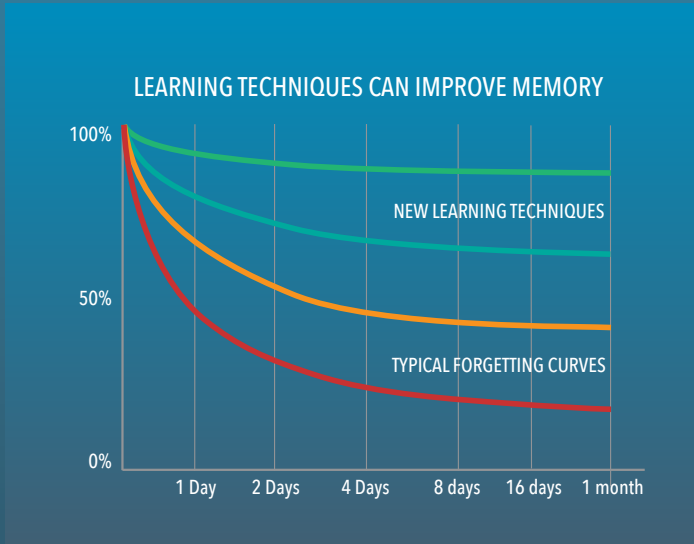
Second, misplaced confidence arises because people want to be confident. Confident people possess assurance, courage, daring, determination, fortitude, poise, spirit, spunk, and tenacity. These traits are attractive to members of every society. We are programmed to display confidence even when it's not justified.⁵

A new approach to workforce learning

The end product of learning is information stored in the brain as memory. Yet most of us, including trainers and educators, are unaware of the mental mechanisms involved or the best learning practices. The accepted learning paradigm is composed mostly of hearsay and intuition. After a career spent researching this problem, the former Dean of Psychology at UCLA and chairman of Amplifire's Science Board, Robert Bjork, expressed the dilemma succinctly...

Current customs and standard practices in instruction, training, and schooling do not seem to be informed by an understanding of the complex and unintuitive dynamics that characterize human learning and memory. Nor do we, as individuals, seem to understand how to engage fully our remarkable capacity to learn. Instead, we seem guided by a faulty mental model of ourselves as learners that leads us to manage our own learning activities in far from optimal ways. –Robert Bjork, On the Symbiosis of Remembering, Forgetting, and Learning





People can forget up to half of what they learned in the first 24 hours. Techniques now exist that greatly strengthen the durability of long-term memory.

Four processes are involved in learning: encoding, storage, retrieval, and forgetting. Information we are trying to learn first comes in through our senses and is **encoded** into the language of neurons. The information is **stored** in hierarchical and highly associated memory patterns formed of neurons connected by their synapses, of which there are trillions. We **retrieve** the “trace” of a memory by using cues in the present moment of perception to reconstruct details of the original input. The trace fades and we **forget** if it is not strengthened by recalling, testing, or re-studying the information.⁶ While science has revealed much about the optimal conditions for learning and creating durable memories, most of the insights have not been readily adopted by educators or trainers.

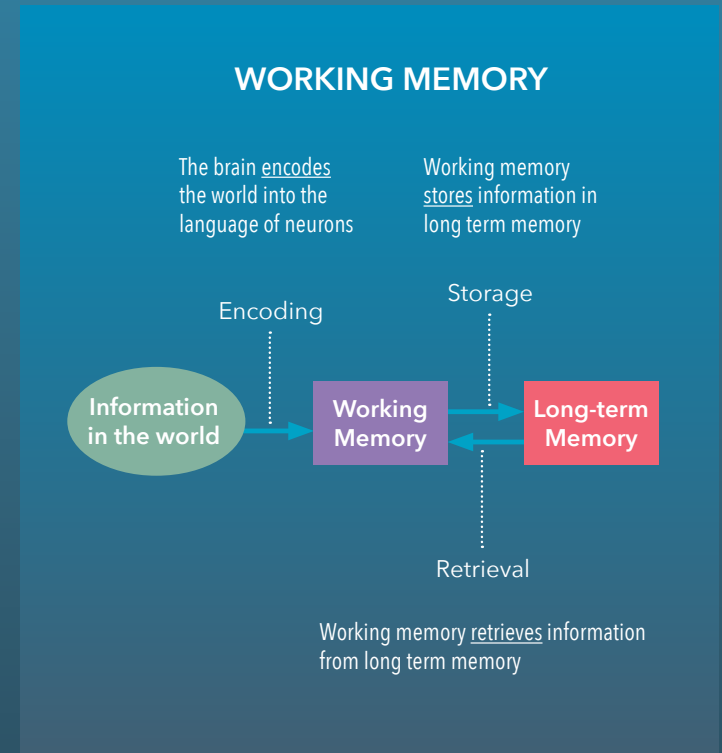
Traditional methods deliver abysmal results. After learning various ideas and concepts, most people will remember only 50% to 60% of the material after 24 hours and only 30% to 40% after a week.⁷ This is bleak, especially when all higher order thinking is built on a solid foundation of easily recalled facts and concepts.

Why is memory fragile? As Bjork and his colleagues have shown, brains are designed by evolution to forget.⁸ For ancient reasons, learning that isn’t associated strongly with related information or that lacks emotional content is the first to become inaccessible to retrieval. Without employing certain strategies, everyone forgets. And of course, the most insidious aspect of forgetting is that you can’t remember what you’ve forgotten.

6. Alan Baddeley, Michael Eysenck, and Michael Anderson, *Memory* (Psychology Press, 2015)
 7. Roediger and Karpicke, *The Power of Testing Memory* (Perspectives on Psychological Science)
 8. Robert Bjork and Elizabeth Bjork, *A New Theory of Disuse*, (1992)

The kind of memory that people use to perform their jobs is called semantic memory. It stores facts and ideas about the world. When a learner acquires new information (a book, lecture, or conversation), the information gets encoded in the language of neurons and enters working memory⁹ (conceivable as consciousness). Information that is associated with the new information is also pulled into working memory from long-term memory. Some new information crosses the threshold to be stored in long-term memory. The rest is forgotten in minutes or hours as working memory turns to other tasks of perception.

The contents of long-term memory range from tiny kernels of meaning—a shape, a color, a word—to grand schemas such as how an employee’s workplace is ordered and where their responsibilities lie. This high-level information exists as extremely complex neural patterns that formed through learning and experience. Any new learning must be integrated within pre-existing patterns to persist as memory of the sort that can be retrieved later under job pressures and deadlines.¹⁰



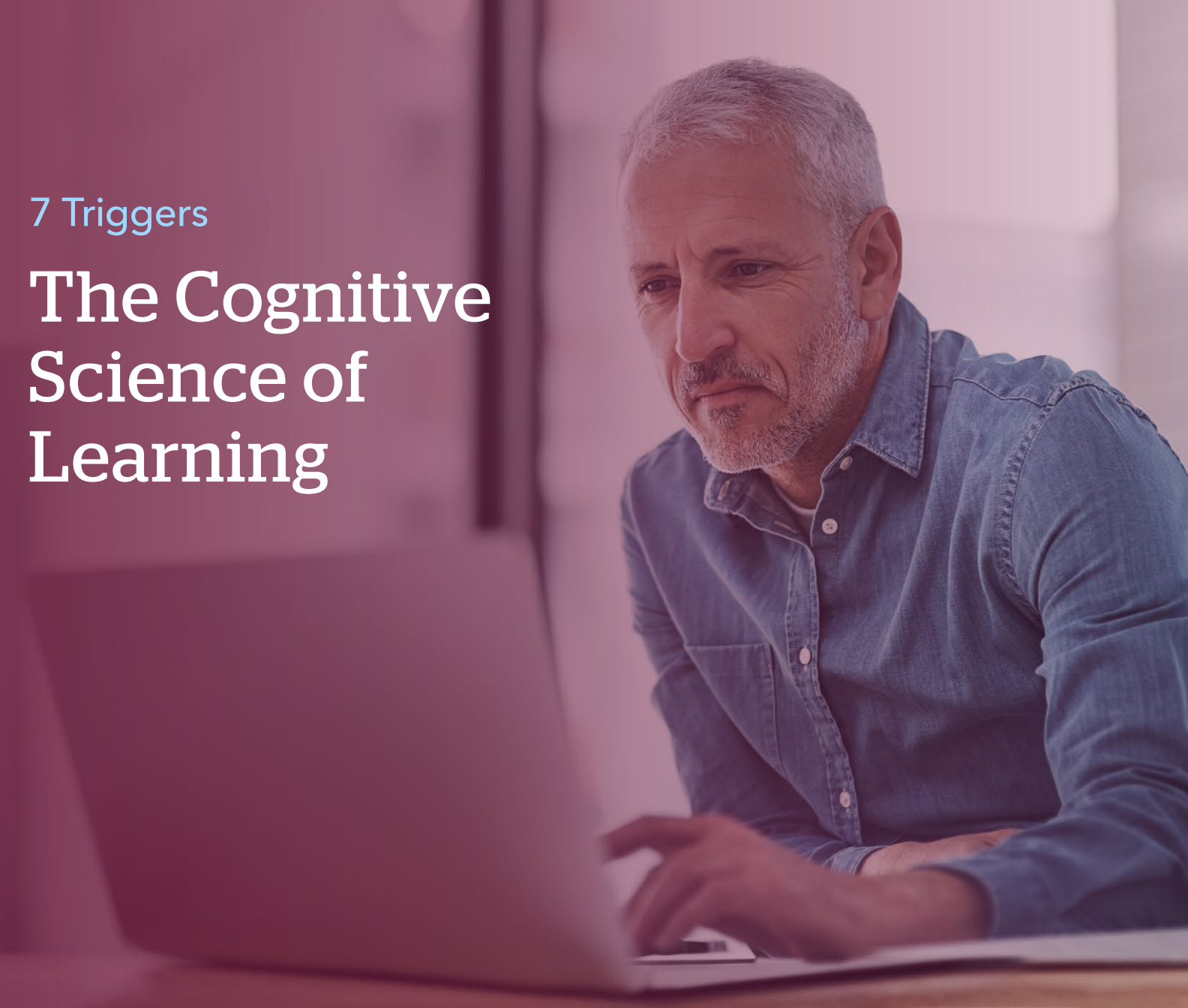
9. Alan Baddeley, Michael Eysenck, and Michael Anderson, *Memory* (Psychology Press, 2015)

10. Allan Collins, Elizabeth Loftus, *A Spreading-Activation Theory of Semantic Processing*, 1976

II.

7 Triggers

The Cognitive Science of Learning



7

triggers that cause lasting learning & high performance

Can your employees learn faster, retain more, and perform better than ever?

Yes. Cognitive science holds the key. Cognitive science has uncovered the triggers that switch on learning and memory in the brain. Triggers are the cause, and learning is the effect.

Here are 7 triggers that cause learning to stick in long-term memory and drive superior performance.

1

Adaptivity

2

Confidence

3

Delayed feedback

4

Gamification

5

Priming

6


Retrieval

7


Spaced Repetition



1



Adaptivity provides each employee exactly what they need when they need it.



Adaptive learning systems combine software engineering, educational theory, cognitive psychology, and neuroscience. Adaptive systems allow learning to be personalized for each individual, recognizing their unique combination of knowledge, ignorance, and uncertainty. With the power of analytics, an adaptive system can discover more about an individual learner than any teacher or trainer. It sends each learner down a different path, depending on their skill level. It discovers what they know and focuses on what they don't know.

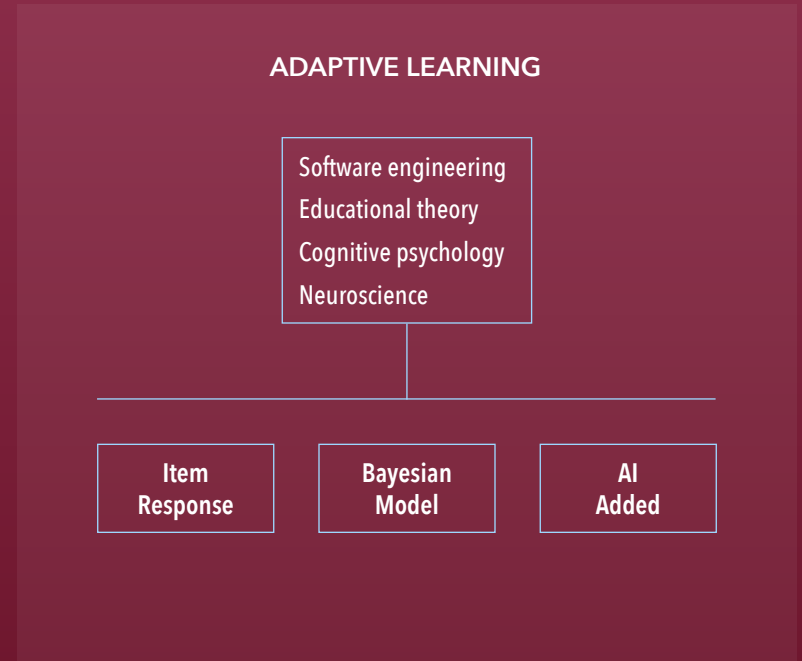
The alternative is one-size-fits-none learning. Imagine a room full of learners watching a video; some are bored, some are confused, and very few are getting exactly what they need.

Adaptivity provides each employee exactly what they need when they need it.

Some platforms take a simple item-response approach to adaptivity. If a learner gets a question wrong, the system asks them an easier one; if they get a question right, the system asks a harder one. One problem with this approach is that it's difficult to cover the range of any topic when the algorithm only cares about difficulty. Knowledge gaps can persist even after learners complete the training.

Other platforms use more advanced algorithms (e.g., Bayesian models) to estimate what students know versus don't, and what they should see sooner, later, or never. These systems ask learners questions to determine the state of their knowledge, and direct them to more basic or more advanced content to fill in knowledge gaps. These algorithms pay attention to more than just difficulty; they can track time spent, which answer was chosen, etc...which lets them adapt to learner needs.

When AI is added to an adaptive system, it can discern both good and bad learning patterns and communicate with the learner in real time, guiding them with praise, a nudge, or advice on best practices that the AI senses are being ignored.





2

Evaluating **confidence** keeps employees focused and improves their memory.

Every moment we make astonishingly rich mental calculations of our confidence, uncertainty, and ignorance about every topic we encounter, sometimes called the “feeling of knowing.”

The feeling of knowing is a core emotion, as fundamental as love, fear, sadness, and anger.¹¹ In everyday experience, it shows up in phrases like: “I’m totally positive,” “I’m not sure,” or “I haven’t a clue” —expressions of certainty, doubt, or ignorance.

The feeling of knowing is of utmost importance because it drives behavior. It is a critical feature for creatures that receive sensory input from the environment and then must respond correctly to survive. They first make a prediction of the likely outcome through a feeling about it—their confidence in their information. If you are

11. Robert A. Burton, *On Being Certain*, (St. Martin’s Press)

Evaluating your confidence keeps you focused and improves your memory.

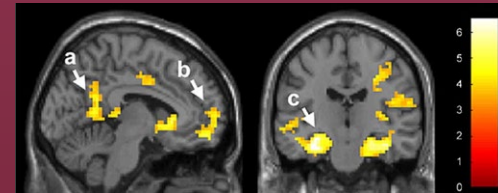
confident, you act. If you have doubt, you hesitate. If you don't know, you go no further. This is the link between knowledge—encoded and stored as memory—and behavior. An organism must gauge the likelihood that knowledge is correct before acting on it. Confidence is the measure one uses.

The feeling of knowing and its kindred feelings should be considered as primary as the states of fear and anger... it is time for an examination of the role of the feeling of knowing in shaping our thoughts. —Robert Burton, On Being Certain

Where does the feeling come from? Let's say someone asks you how protons and electrons interact. The question contains cues that cause a search of memory. Words like *proton* first cause a rapid assessment for familiarity. If the feeling of familiarity is present, or if the memory comes easily into consciousness, we experience the memory as confidently held.¹² Next, the brain reports just how much information can be recalled into consciousness. The amount of information that can be accessed gives rise to a more refined sense of confidence in the recollection.

CONFIDENCE IN THE BRAIN

This research is ongoing, but the subjective feeling of confidence seems to derive from a complex network of modules in an area called the limbic system. Regions in this network are involved in the subjective experience of high or low confidence, including the hippocampus, parahippocampus, amygdala, thalamus, anterior and posterior cingulate, and medial prefrontal cortex.



a) anterior and posterior cingulate b) medial prefrontal cortex
c) medial temporal lobe (Chua, Schacter, et al)

One would assume that the sensation of doubt would come from an absence of activation in the confidence network, but imaging studies suggest that the right posterior superior parietal cortex actually becomes active when doubt is experienced.



right posterior superior parietal cortex (Moritz, et al)



3

Waiting for **feedback** to correct an error makes the correction more powerful.

In a 2005 experiment Pashler, et al., demonstrated the profoundly positive effect that feedback has on retention. Feedback was the only variable in their experiment.

In this research, a few hundred test subjects were asked to learn new words from the Lugandan language. Lugandan was chosen because the subjects would have no previous knowledge of the words or their meaning. Teaching was deliberately incomplete so that some errors would surely creep into memory and show up in the test results.

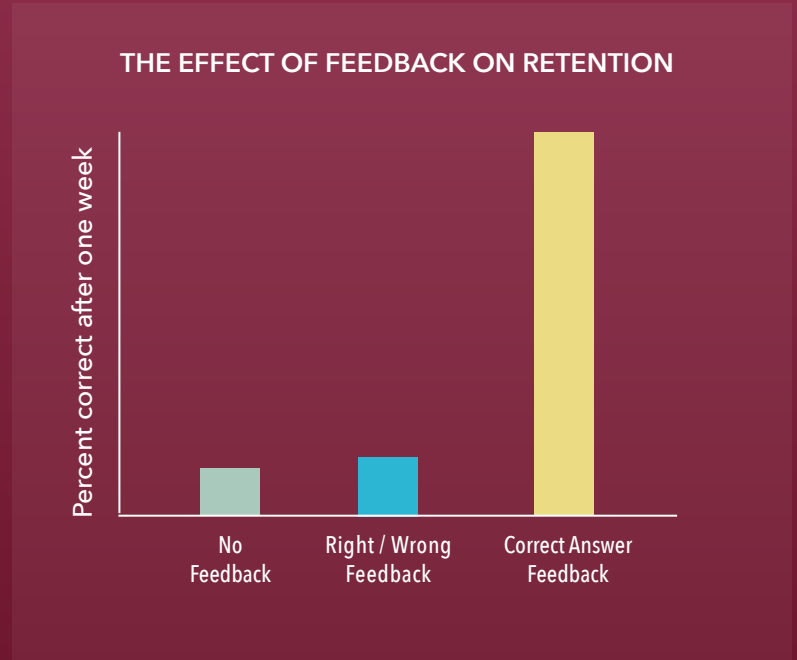
The subjects were taught the new words and were then immediately tested on their recall. Some received immediate feedback in the form of the correct answer. Others received feedback indicating only

Waiting for feedback to correct an error makes the correction more powerful.

that their answer was “correct” or “incorrect.” A third group received no feedback at all. The subjects were then tested again one week later to see what effect the variations had on long term memory.

Studies show that feedback strengthens retention more than testing alone does, and, interestingly, that briefly delaying the feedback produces better long-term learning than immediate feedback. –Henry Roediger, Make It Stick–2014

The results were breathtaking. As shown here, subjects who answered the question incorrectly but then received the correct answer as feedback retained almost 500% more information than subjects who were either presented the words “correct” or “incorrect,” or received no feedback.





4

Gamification keeps dopamine levels optimal so employees keep learning.

All games use powerful triggers that cause learning, long term memory, and motivation. This is true of board games, video games (which now generate more revenue than movies), and sports.

Active Engagement is one of the hallmarks of games—they are not passive. To “play” means participation. You aren’t merely viewing a Powerpoint or listening to a lecture. You are required to think—an activity that causes learning and memory.

Uncertainty is another signature trait of games. Uncertainty propels gamers forward because they want to know what happens next. Uncertainty triggers curiosity, a mental state seen below in a set of fascinating experimental results. Attention producing levels of the neurotransmitter dopamine skyrocket when the probability of a

Gamification keeps dopamine levels optimal so employees keep learning.

reward reaches 50% (top curve). As Robert Sapolsky notes, “You have introduced the word *maybe* into the equation and that is reinforcing like nothing else on earth.” Dopamine and attention levels fall from this peak when the reward becomes predictable.

The fact that curiosity increases with uncertainty... suggests that a small amount of knowledge can pique curiosity and prime the hunger for knowledge.... This observation might suggest ways for educators to ignite the wick in the candle of learning. –Min Kang, Psychological Science

Progress motivates future learning through the buoyant feeling that comes from reaching goals. This means content must be appropriately difficult, but not so hard that motivation suffers. Progress ensures a learning experience in a gratifying emotional state that the learner is more likely to want to repeat, and repetition is a key trigger for durable memory.

A Note on Leaderboards: They are motivating in many games, but create a dangerous, dispiriting risk in an organizational setting because people can feel their core intelligence being judged and ranked. We believe that all people can learn enormous amounts of useful information. For some, it merely takes more time.

UNCERTAIN REWARDS BOOST DOPAMINE



Neurotransmitters of Emotion & Motivation

Three neurotransmitters appear to be most responsible for human emotions and motivations.

- Norepinephrine (related to adrenaline) controls the kind of arousal that is associated with fight, flight, and fear—rather unpleasant emotions.
- Dopamine, on the other hand, is associated with reward, anticipation, and positive feelings.
- Serotonin is associated with impulse control and dreaming. Low levels can cause sadness, and anxiety.

At right, we see their pathways in the brain. Notice that all three neurotransmitters are linked to the hippocampus (long-term memory), the amygdala (emotion), and the prefrontal cortex (cognition and working memory). These molecules have the capacity to profoundly affect our emotional states and our ability to pay attention, learn, and remember.

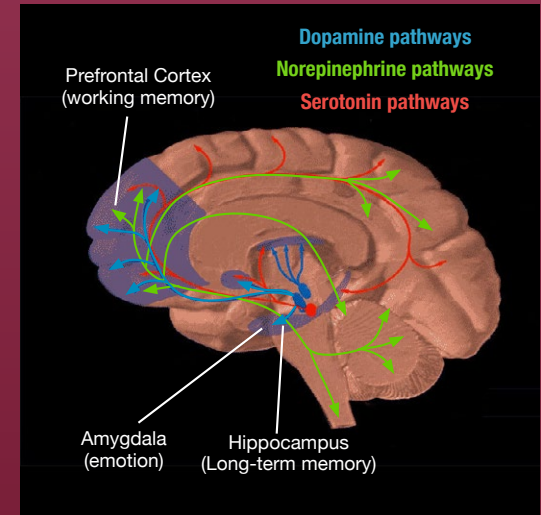
The action of these molecules relates directly to the chart of human emotion below. For example, diminished serotonin levels are implicated in the

negative, low-intensity section of the quadrant (lower left). Here we find folks who are sad, depressed, and fatigued. Learning is nearly impossible in this dispirited state.

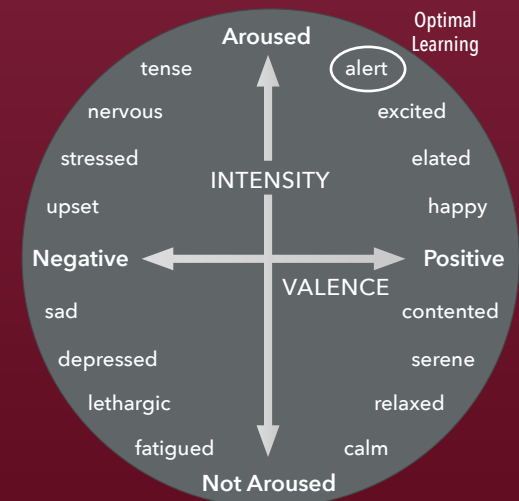
Norepinephrine is responsible for high intensity and arousal, but valence (the sensation of good or bad) is negative and feelings here are unpleasant. This emotional state is necessary, however, when fight or flight responses are needed for survival. If stress levels remain elevated for long periods of time, bodily organs are damaged, including long-term memory in the hippocampus.

Dopamine is a major player in the conditions that are most apt to foster alertness, learning, and strong memory. Its function in reward and anticipation is double-edged: it promotes beneficial traits like curiosity, but the same neural pathways are hijacked in drug addiction.

NEUROTRANSMITTER PATHWAYS



THE CHART OF HUMAN EMOTION





5

Asking questions **primes** the brain to learn—even if the material is brand new.

It's not intuitive, but trying to answer a question before studying the material leads to better learning and longer retention of the correct answer, as long as corrective feedback is given. This is called *priming*.

Psychologists discovered that pre-testing prior to study primes the mind for new information in dramatic fashion. When learners try to answer a question, even without any prior exposure to the information, they experience a significant boost to their ability to learn and remember the information.

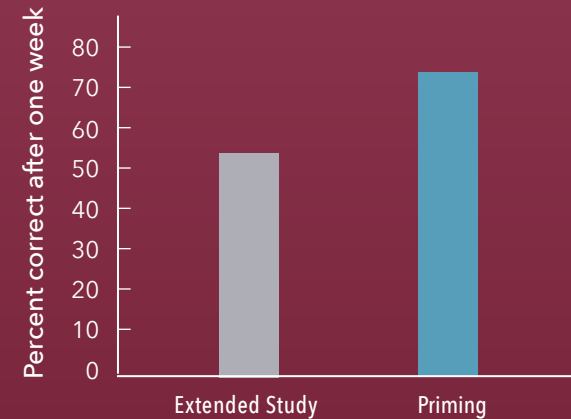
Asking questions first primes the brain to learn—even if the material is new.

In this example, one group of students was pre-tested on unfamiliar information about the biology of vision. Because the material was unknown to them, they had to guess at the answers. Another group of students learned the material in the traditional manner—they studied extensively.

When recall was tested three days later, the students who had pre-tested greatly outperformed the students who had only studied.

Pupils actually learn better if conditions are arranged so that they have to make errors. Specifically, people remember things better and longer if they are given tests so challenging that they are bound to fail.” –Roediger and Finn, Scientific American Mind

THE EFFECT OF PRIMING ON RETENTION





6

Retrieving information from memory is the best way to strengthen knowledge.

When we forget, the stored memory doesn't fade. The retrieval pathway to the memory fades.

When a person learns, information is encoded in the language of neurons, then stored in long-term memory. The act of retrieving a memory profoundly and positively affects its later retrieval—a virtuous cycle of learning.

Retrieving information from memory is the best way to strengthen knowledge.

Researchers found that practicing retrieval had a profound effect on memory formation.

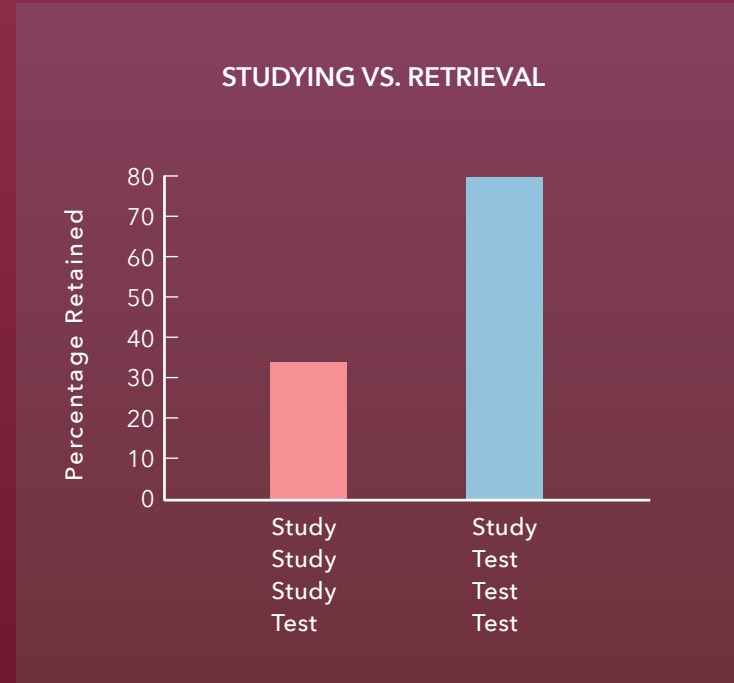
In this experiment, learners were given a passage containing scientific words and concepts and asked to memorize the information in one of three ways:

- 1) Study: The passage was read four times.
- 2) Single test: The passage was read three times and memory was tested once.
- 3) Repeated test: The passage was read just once and memory was tested on three occasions.

All three methods proved fairly effective when the final test of memory was performed five minutes after completion.

The results were radically different when memory was tested a week later. The repeated test method was far more effective at 62% retention, while learners who used the repeated study method retained only 39% on the information.

Retrieval not only makes memories more durable but produces knowledge that can be retrieved more readily, in more varied settings, and applied to a wider variety of problems.” –Brown, Roediger, McDaniel in Make It Stick





7

Spacing between learning sessions makes the learning far more durable.

Many experiments have demonstrated that long-term memory is greatly enhanced by distributing the learning sessions over time. In psychology this is called *distributed practice* or the *spacing effect*.

Spacing allows forgetting to take place between study sessions. Once some forgetting has occurred, re-study or re-testing greatly strengthens the retrieval pathways of the memory trace and causes improved retention, in some cases by 200%.

The spacing effect shows that “cramming” information in one mass effort is about the worst of all possible ways to learn anything for the long term. Studies show the existence of an optimal gap between study sessions. The size of the gap depends on the interval until the information needs to be recalled.

Spacing the time between learning sessions makes the learning more durable.

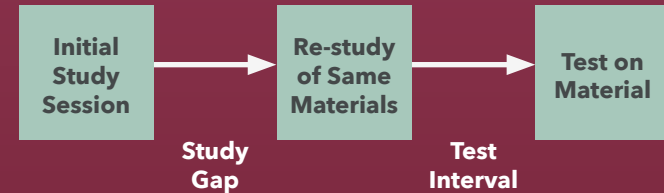
A recent experiment of this design conducted by Pashler, Rohrer, et al., showed that, in general, the effect of spacing on memory is significant. The research reveals that the optimal study gap to test interval is 10% to 20%. That breaks down in the following practical manner:

If the time to the test is 1 week, the optimal study gap between initial study and re-study is 1 day. If the time to the test is 1 year, the optimal study gap is 3 weeks.

One thing has become clear from this research—when re-study takes place too closely following the initial study session, there is little effect on memory. If the proper study gap to test interval is utilized, an astonishing 300% gain in memory can be achieved.

The benefits of spacing on long-term retention have been demonstrated for all manner of materials and tasks, types of learners, and time scales; it is one of the most general and robust effects from across the entire history of experimental research on learning and memory.” –Robert A. Bjork

THE STRUCTURE OF A SPACING EXPERIMENT



III.

Case Studies

Learning & Performance Best Practices



Intermountain
Healthcare

A Leading Call Center Operation





47% reduction in CLABSI incidents

Intermountain is a major US healthcare system with 23 hospitals in Utah. They have a global reputation for innovations that have kept their rates of adverse events and hospital-acquired infections much lower than the national average.

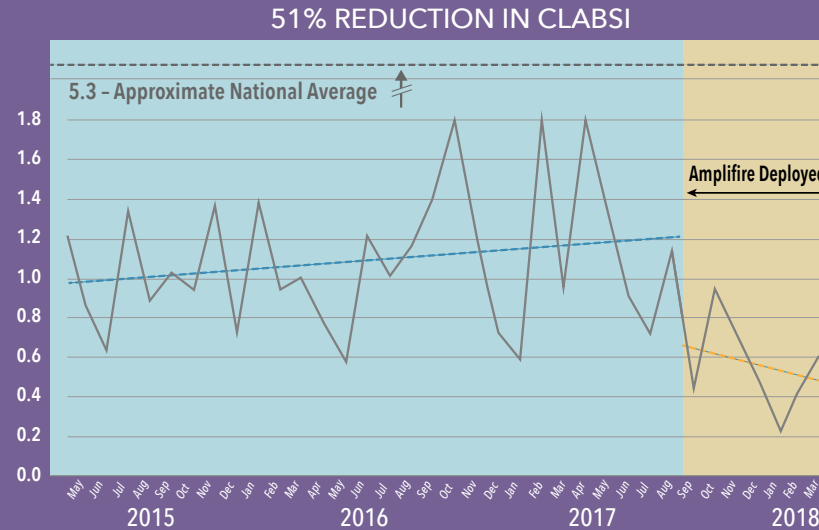
In this study, 3,707 participating nurses were trained on placing and maintaining central venous catheters (CVCs) using the Amplifire learning platform, which finds and fixes misinformation that impacts performance.

Central venous catheters, also called central lines, are used for the administration of intravenous fluids, blood products, medications, and parenteral nutrition. They also provide access for hemodialysis and other forms of long-term treatment, such as chemotherapy.

**Every year, 33,000
Americans die from a
Central Line Infection.¹³**

Widely used and essential, central lines are also a frequent cause of healthcare-associated bloodstream infections. It is estimated that 250,000 cases of central line-associated bloodstream infections (CLABSIs) occur in the US every year.¹⁴ According to the CDC, CLABSIs are associated with a mortality rate of 12–25%. Each CLABSI episode costs approximately \$32,000, which includes the economic burdens of additional diagnosis and treatment, and prolonged hospital stays.

As seen here, training in Amplifire resulted in a 47% drop in CLABSI rates over seven months when compared with the prior three years.



4 Stages from Start to Results

A planned sequence leads to great outcomes

Know the Starting Point

Starting knowledge for the 3,707 nurses was measured in the Amplifire platform. This revealed patterns that varied widely from nurse to nurse consisting of mastery, misinformation, uncertainty, and ignorance

Historic CLABSI rates (measured in incidents per thousand line hours) were available going back for three years.

Manage the Outliers Who Struggle

The vast majority improved their mastery of CLABSI procedures by eliminating misinformation and uncertainty. A small fraction struggled to learn. Struggle can occur because of personal issues or disengagement from the values and goals of the organization. Amplifire revealed the few cases that needed intervention.

Measure Real-world Outcomes and Value

Intermountain is a national leader in confronting problems of care delivery. They continued to monitor their CLABSI rate for seven months following the Amplifire intervention, then compared before and after rates.

Share Results Across the Organization

Executives shared the results across the organization to demonstrate how leaning can affect patient outcomes. Nurses were informed of the topic areas where extra vigilance is required.

Know the Starting Point

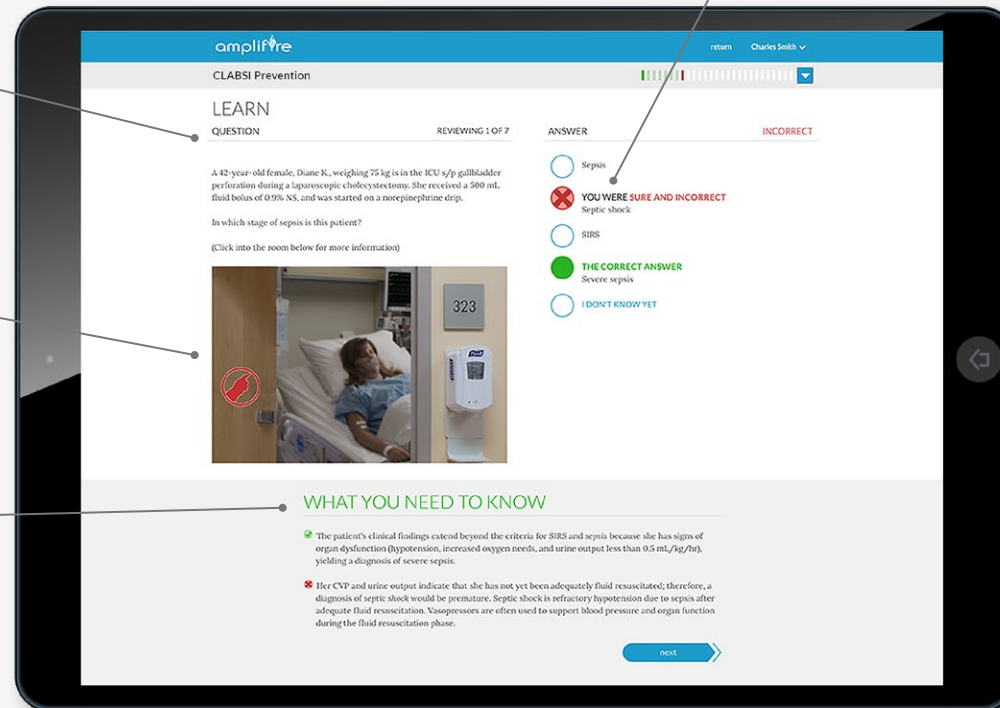
The Amplifire platform adapts to the starting knowledge and confidence of each learner and records the information. It then uses cognitive learning triggers that dispel any misinformation while constructing a durable memory of the correct information.

Assessing confidence causes uncertainty and metacognition (thinking about one's thinking), which drive long-term memory.

Questions are triggers that cause retrieval, curiosity, and attention; which are drivers of durable memory.

Interactive scenarios are simulations of real-life situations. In this case, a learner can enter the room and read the patient monitor before answering the question.

Feedback comes after a delay that maximizes memory formation.



Amplifire Question, Answer, and Explanation format

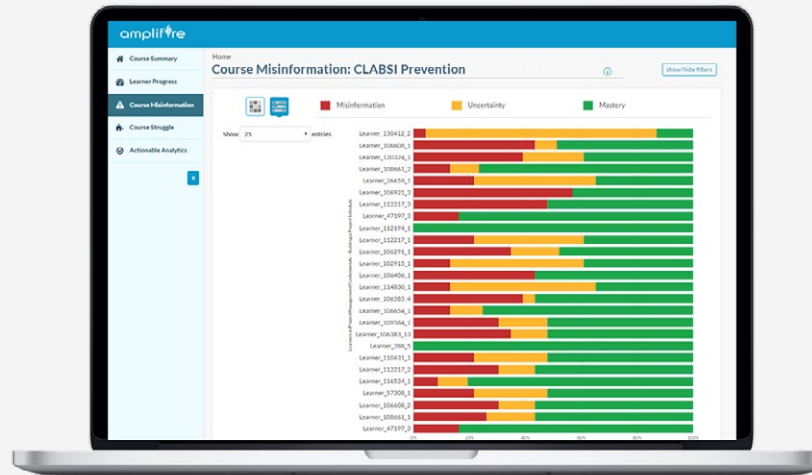
Starting knowledge about CLABSI for 3,707 nurses

The Reporting Dashboard shows nurse mastery, misinformation, and uncertainty.

- 27% Confidently Held Misinformation (CHM)
- 32% Uncertainty
- 41% Confident and Correct

Observations

- 25,129 instances of CHM were found and fixed.
- 29,838 instances of uncertainty were found and fixed.
- Knowledge variation was high, with some nurses quite misinformed and others showing confident mastery of the topic. The most knowledgeable were 100% confident and correct about CLABSI (green bars). The least knowledgeable showed 60% misinformation (red bars).
- Those with the most misinformation or uncertainty spent half an hour in the module, while nurses who were most knowledgeable about CLABSI spent only 12 minutes.
- By the end of the course, 100% of the nurses who completed were confident and correct on all the information.



Misinformation & Uncertainty Report for 3,707 Nurses in the Reporting Dashboard

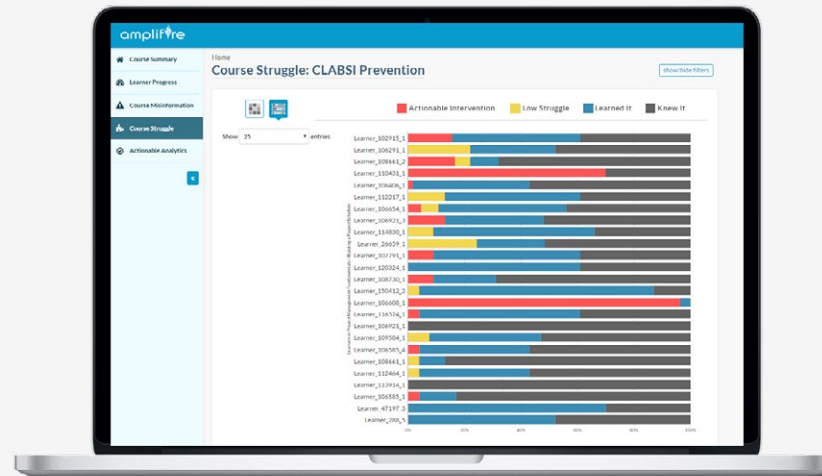
Manage the Outliers Who Struggle

The Reporting Dashboard shows the nurses who struggled to learn about CLABSI. Struggle is a key metric that may indicate disengagement or need for further training. When struggle is severe over an entire module, a supervisor or nurse educator should engage the learner.

- 4% Actionable Intervention
- 9% Low Struggle
- 46% Learned It Rapidly
- 41% Knew It Already

Observations

- The 4% of learners who displayed serious struggle were a potential risk to patients. They were all candidates for actionable intervention (shown next page), where a supervisor or nurse educator counsels them on areas of struggle.
- 9% of the material showed modest struggle. In this case they failed to make progress on a question just once before successfully learning the material. This moderate rate of struggle is generally not a cause for alarm.

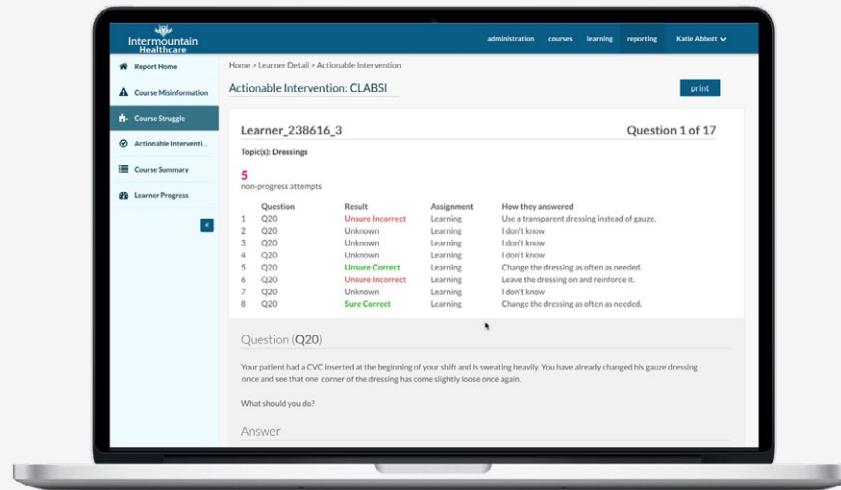


Struggle Report for 3,707 nurses in the Reporting Dashboard

Managing outliers with the Actionable Intervention Report

For each nurse who exhibited severe struggle, a custom report was generated in the reporting dashboard that showed precisely the topics they struggled with. A manager, supervisor, or nurse educator counseled each nurse on the correct procedures and processes for dealing with central lines.

A counseling session is a good opportunity to inquire into reasons that an employee might be struggling. Healthcare organizations need to know if a nurse is unable to fulfill their responsibilities to their patients.



Actionable Intervention for one nurse in the Reporting Dashboard

Measure Real World Outcomes and Value

If learning doesn't lead to workplace improvements, then it's a waste of employee time and organization money. Positive results at Intermountain were in three domains: 1) shorter training time, 2) higher human performance, and 3) substantial ROI.



17 min.

AVERAGE TIME TO COMPLETE

The nurses with the most misinformation and uncertainty averaged 31 minutes to complete the CLABSI module. Nurses who were masters of CLABSI took only 12 minutes. And nurses with average amounts of misinformation and doubt took 17 minutes.



47%

REDUCTION IN CLABSI EVENTS

Intermountain had comparatively excellent historic CLABSI rates going back three years. After training, data was collected for seven months before concluding that the results were highly favorable.

Behind the 47% reduction are stories of human suffering and loss of life that were averted. This step forward in the delivery of quality care supports the aspirations of people dedicated to the healing arts.



8X

RETURN ON INVESTMENT

The cost of training 3,707 nurses was insubstantial compared to the financial return. Hospitals are not reimbursed for adverse events like CLABSI that take place on their watch, and each infection costs about \$28,000 with no offsetting income. A 47% drop in CLABSI generated an annual savings of \$1.4 million, which far outweighed the initial investment. As nurses continue with refreshers and actionable interventions, the infection rate may drop further.

Share Results Across the Organization

Guidance for trainers and nurse educators

The Reporting Dashboard was used to determine which topics nurses were proficient in, and where they were most misinformed when they started in Amplifire. This guidance was given to nurse educators so they could concentrate their attention on making sure that nurses focused on improving in these specific areas as they attended to patients with central lines.

AREAS OF LOW CONFIDENTLY HELD MISINFORMATION

Central Line Bundle Practices

Contamination Introduced by the Hands of Healthcare Workers

AREAS OF HIGH CONFIDENTLY HELD MISINFORMATION

Blood Draws from Central Lines

CLABSI Incidence and Catheter Type

CLABSI Prevention and Antimicrobial Stewardship

Routes of Infection

Catheter Site Selection

Catheter and/or Administration Set Replacement

A Leading US Call Center

Masters of measuring the metrics

This call center is one of the largest operators in the US, servicing over 50 million customers. They prioritize customer service and have been ranked the #1 in Customer Service Satisfaction by Nielsen.¹⁵

Amplifire was deployed at two customer call centers where agents take customer calls to handle questions about features, options, bandwidth, billing, and so on.

Employee turnover in call centers is generally high, running at rates from 30% to 50% per year.¹⁶ New hires need rapid, effective training to efficiently solve customers' problems, cultivate customer loyalty, and position customers with the optimal set of features for their needs (which may mean upselling). Extra minutes per call add up to enormous annual costs for large call centers. Unsuccessful resolutions over the phone add to the cost. In response, call centers measure everything measurable about their operations to fine-tune the results.

In 2018, they measured the effectiveness of Amplifire on new hire performance.

15. Sources: CNN Business and Nielsen

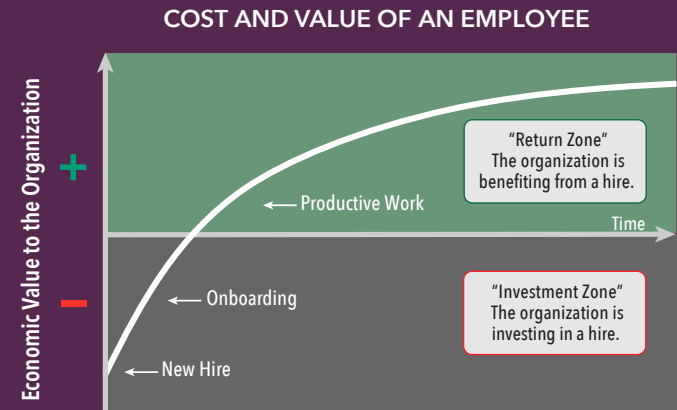
16. QACT— <http://qatc.org/winter-2015-connection/exploring-call-center-turnover-numbers/>

Onboarding takes time and is expensive

Two of the biggest challenges organizations face are employee turnover and subsequent poor performance of new employees. High turnover not only impacts the bottom line, it affects customer satisfaction and team morale.

Hiring and on-boarding new employees is surprisingly costly. According to Bersin by Deloitte, turnover costs range from tens of thousands of dollars to 2X an employee's annual salary. Those astonishing figures include sourcing, interviewing, reviewing, reference checking, hiring, training, and unproductive time (4 weeks to 6 months).

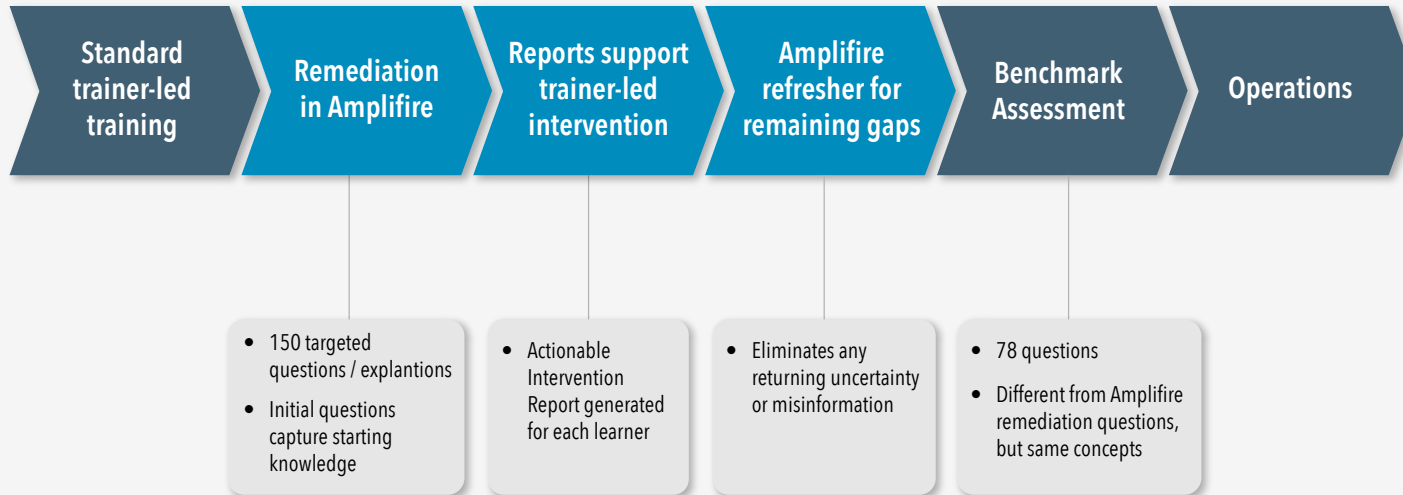
The prescriptions are clear: First, reduce turnover by implementing practices that lead to employee retention. Second, institute training methods that on-board hires as quickly as possible. And third, use principles from cognitive science to make training stick in the minds of new hires so they rapidly become beneficial and satisfied in their work.



The set-up at this call center operation

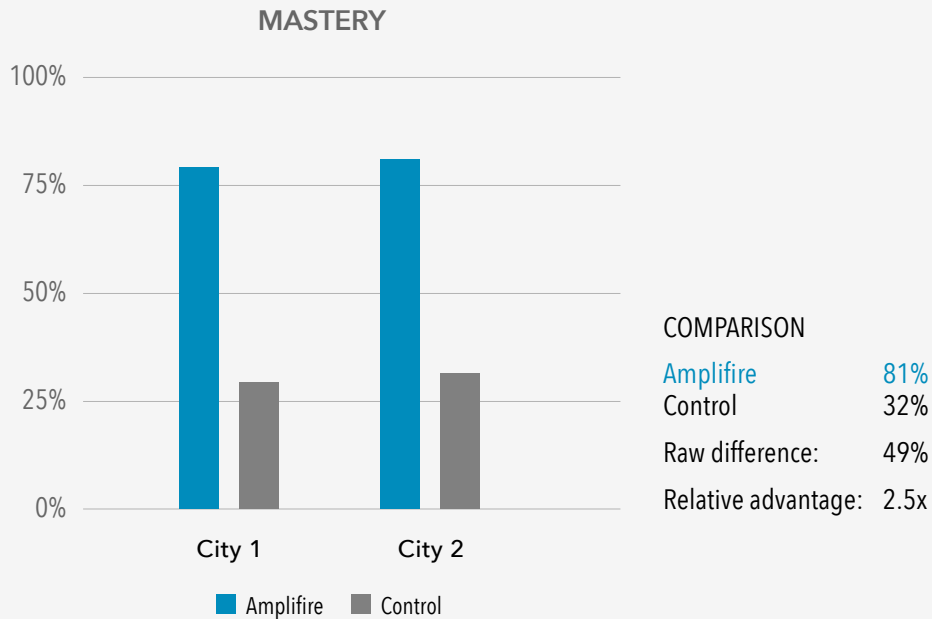
New hires pass through three stages: Standard training, knowledge assessment, then deployment into operations. The sequence below was designed to test the efficacy of Amplifire. A control group went through the usual three stages, whereas an Amplifire group also got training in Amplifire.

- Amplifire
- Control



Benchmark: Mastery

The Amplifire agents demonstrated greater than two and a half times the mastery of the material compared to the control group. Managers noted, "The fact that there was this much room for improvement clearly demonstrates the significant gaps left by the current technology solution."

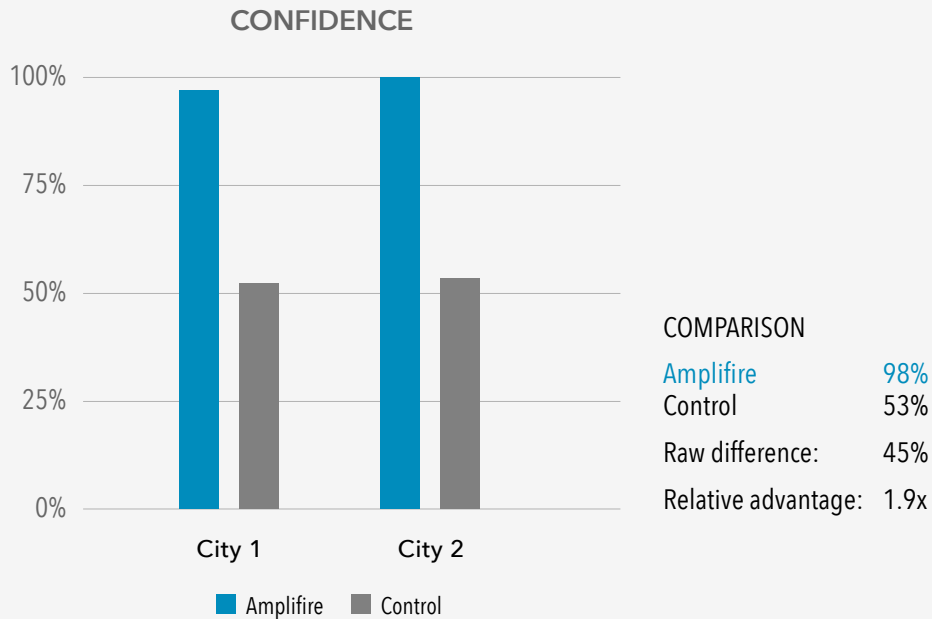


Call Center

Case Study

Benchmark: Confidence

Another measure in the benchmark assessment was the agents' confidence. The Amplifire agents had almost twice the confidence level of the control group. Managers concluded that, "This confidence led to fewer transfers and more customer satisfaction, because the Amplifire agents have the confidence to handle customers' issues. Amplifire is making the reps able to operate more independently."

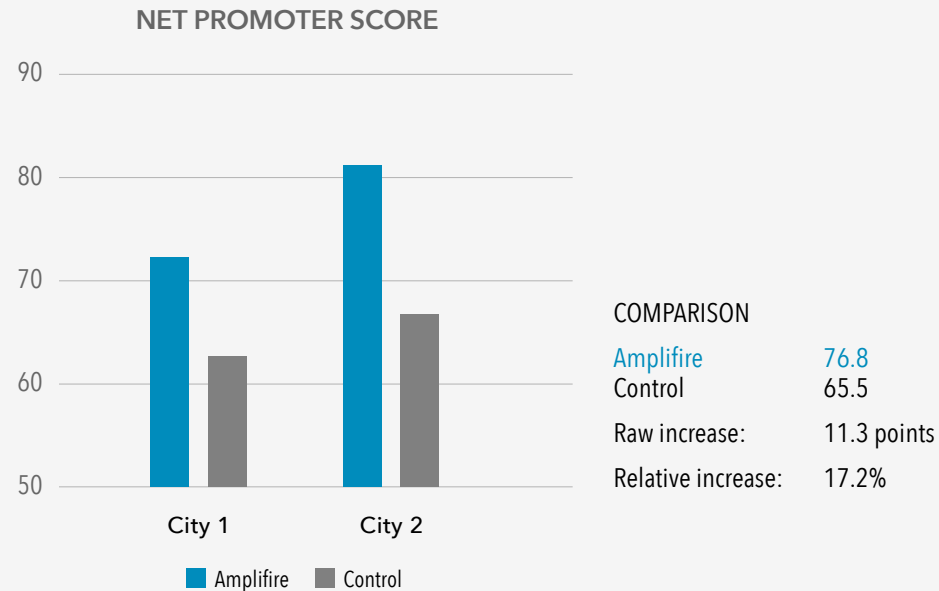


Call Center

Case Study

Operations Results: Customer Satisfaction–NPS

One method managers use to measure customer satisfaction is surveys about overall satisfaction, which yield a net promoter score, or NPS. Amplifire remediation improved NPS with a raw increase of 11.3 points and relative increase of 17.2%. Managers noted that, “These results are holding through evaluations 30 and 60 days following training.”

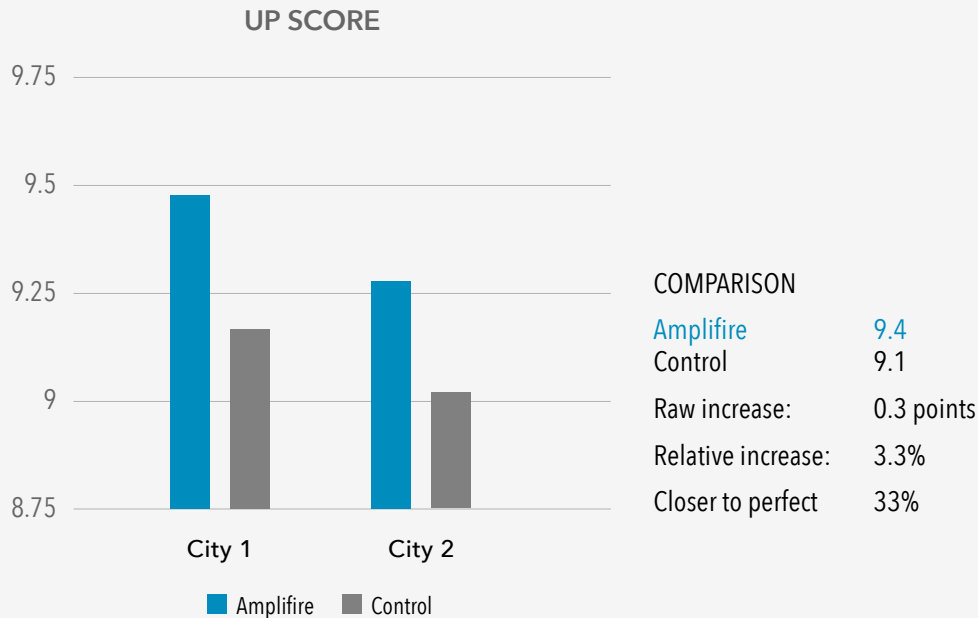


Call Center

Case Study

Operations Results: Customer Satisfaction–Up Score

The Up Score measures customer satisfaction for each agent. The chart shows that the control group was already at 9.1. Nevertheless, Amplifire brought the reps up to 9.4. As managers mentioned, “Another way to think about this improvement is how much Amplifire closed the distance to 10. Amplifire is getting reps 33% closer to a perfect score.”

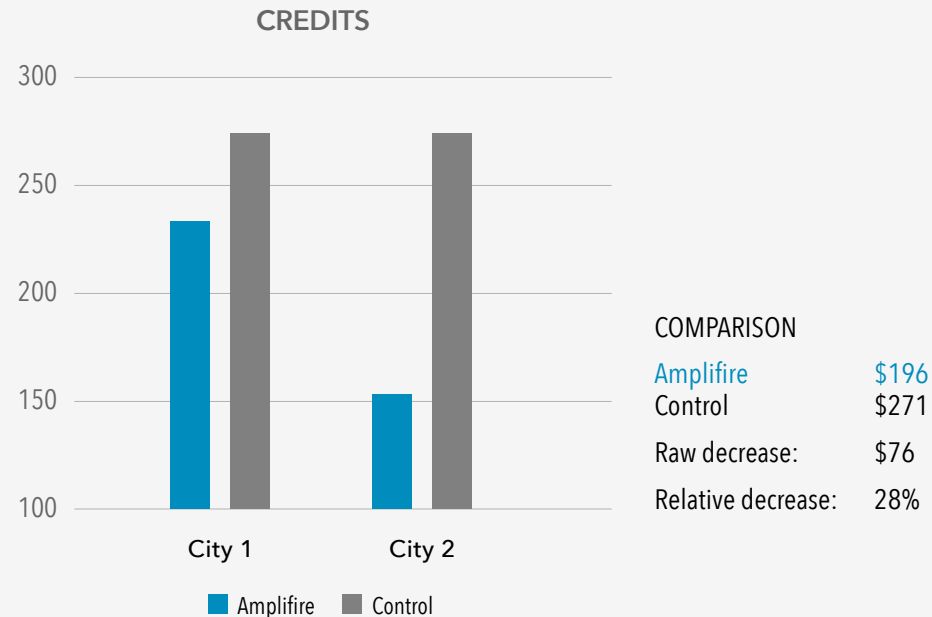


Call Center

Case Study

Operations Results: Credits

Credits are often used to appease unhappy customers, but they are an expensive remedy. For every 100 calls, Amplifire agents give out \$76 dollars less than the control group. As managers of the call center noted, "The higher customer satisfaction scores aren't because the agents are giving out credits. The opposite is happening. Amplifire helps agents give out less money in credits."

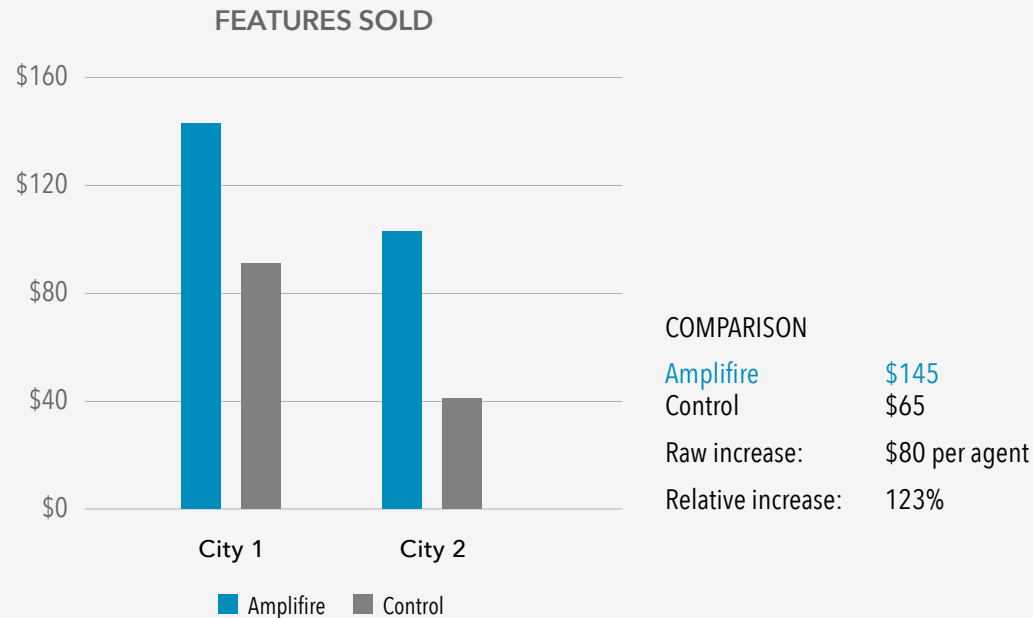


Call Center

Case Study

Operations Results: Features Sold

A customer call is an opportunity to offer additional services. Amplifire boosted revenue by helping agents sell more plan features to customers. Compared to the control group, Amplifire agents sold \$80 more in features per month, an increase of 123%.

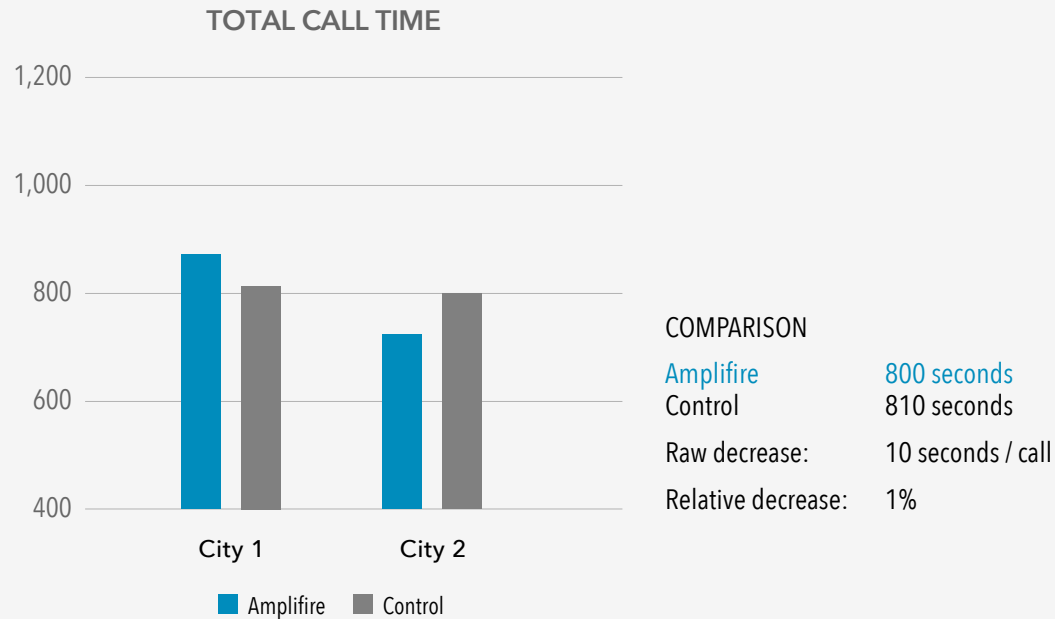


Call Center

Case Study

Operations Results: Call Duration

Total call response time did not change meaningfully—a flat metric countered by the reduction in credits authorized and the increase in features sold.

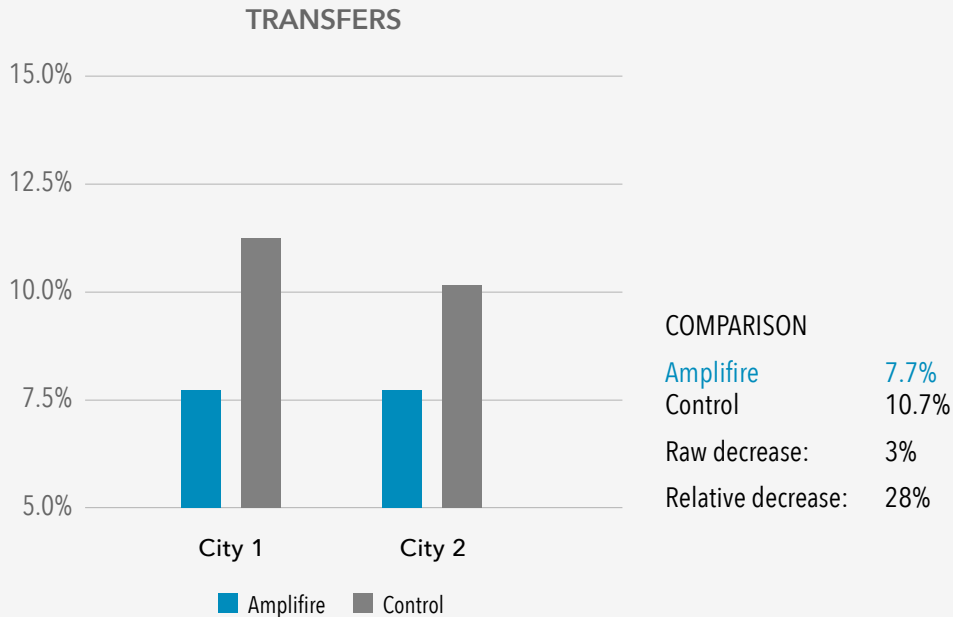


Call Center

Case Study

Operations Results: Transfers

Amplifire agents transferred customers upstream 28% less often compared to the control group. Operation managers noted that, "This is contributing mightily to customer satisfaction, and is a reflection of how Amplifire increases agents' ability to solve customers' problems, but also their confidence to solve those problems. Again, because Amplifire is built to make things stick in memory, these patterns are holding up through 60 days after training."



Call Center

Case Study

After Amplifire, agents...

- **Have higher customer satisfaction**
- **Sell more features**
- **Authorize fewer credits**
- **Transfer fewer calls**

About Amplifire

With more than 1.7 billion learner interactions, Amplifire helps organizations prosper by improving on-the-job performance. Patented algorithms detect and correct the knowledge gaps, doubts, and misconceptions that exist in the minds of all employees in every organization. The platform intelligently adapts to individual learners taking Amplifire courses until they achieve mastery of each topic.

Organizations have adopted Amplifire as a core operating asset that transforms training from a rote activity, where managers can only hope for results, into a strategic tool that delivers a workforce aligned with best practices and procedures. Advanced reporting helps managers pinpoint where learners struggled at every level, from organization to department to work group to the individual learner.

Learn more: amplifire.com



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