AVIATION STUDY

Can Aviation Operation Safety Improve While Reducing Training Time and Cost?

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A Challenge

One of the biggest challenges for aviation companies is keeping pilots, ground crew, maintenance personnel, agents, and attendants up-to-date on myriad FAA rules and regulations. A top priority is reducing costly human error and adverse incidents. Lives are at stake.

Aviation companies have developed some of the best training programs in the world, enhancing quality and compliance while reducing operational risks. But training takes time and budget away from the main job. How can you guarantee a return on training investment?

Eliminate Confidently Held Misinformation

One of the best ways to reduce risk is to eliminate the Confidently Held Misinformation (CHM) that exists in the minds of crew members, ground personnel, agents, and support staff. CHM exists at alarming rates in every industry. It leads to poor decisions, human error, and adverse incidents. The problem is compounded when supervisors and instructors pass CHM along to subordinates and new hires during training.

The Study

This study looks at the impact of Amplifire training when it was deployed at scale in large aviation organizations:

- Training time
- Amount of confidently held misinformation
- Knowledge variation among employees and locations
- Incident data
- Return on training investment

Did Amplifire make training faster? Did people gain better understanding of their responsibilities? Were employees more satisfied with their training experience? How much variation existed among employees? Most importantly, did training have a measurable effect on error and adverse incidents?

Aviation Study: Findings & Takeaways

Aviation Stats

- The aviation industry transports 900 million passengers every year
- \$1.5 trillion in total economic activity
- Nearly 12 million jobs
- Represents 5.4% of U.S. gross domestic product

The Study

- Data from major US aviation companies
- Conducted in Amplifire, an outcomes-based training platform with more than a billion learner interactions to date

The Results

- 84% decrease in training time
- Adverse incidents reduced by 60%
- 1,051% Return on Investment
- 24,308 instances of CHM found and fixed
- High starting variation in pilot knowledge



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84% reduction in mandated FAA training time

Amplifire's personalized algorithms adapt training to each individual so that employees focus only on their own particular knowledge gaps, misinformation, and uncertainty. This saves time (and money) as demonstrated in the graphic to the right.

This data is for the total time spent in mandated FAA training for one year.

- Amplifire reduced training time from 31 hours to 5 hours
- Pilots, ground crew, and other employees spent 84% less time training in Amplifire than in the previous legacy system



SOURCE CONTENT FAA / Customer	NO. OF USERS 11,839		AVG. WAGE \$30 per hour	CUSTOMER International Aviation Company
Time in Legacy Tra	aining:	30.90 h	iours	
Time in Amplifire:		4.87 hours		
Time Savings:		26.03 hours per license		
Dollar Savings:		\$780.94 per license		
Aggregate Savings:		\$9,245,549		
ROI:		1,015%		

1,015% ROI from reduced training time

Organizations succeed when their investments pay off. For this aviation firm, margins are thin, yet FAAmandated training is critical to keep employees and customers safe. Training is necessary, but it takes away from other profitable activity.

As seen in the graphic to the left, Amplifire reduced the annual cost of training by \$780 per license for 11,389 employees and returned over \$9 million in savings.

This return reflects savings from reduced training time–it does not include savings from reduced incidents, reduction in costs of CTS training, or repurposing newly available training hours for revenue producing activities.

Triggers in Amplifire cause rapid learning, long-term retention, and better performance

Amplifire uses a patented algorithm built on fifteen cognitive triggers that switch on learning and memory. These triggers have been discovered through decades of experiment and validation. Some of the discoverers serve on the Amplifire Science Board. Here are eight of these triggers that drive speed, effectiveness, and great outcomes.

- Adaptivity identifies what you need to learn.
- Confidence makes you think deeply about the validity of your information.
- **Uncertainty** drives focus on the gap between what you know and what you need to learn.
- **Delayed Feedback** before correcting an error makes the correction far more powerful.
- **Spacing** out practice with a break in between causes your brain to realize that the material is worth remembering.
- **Games** keep your emotions elevated so you stay engaged and keep learning.
- **Priming** prepares your brain by asking you questions about a topic before you actually study it.
- **Retrieval** occurs when you practice pulling information from memory. It is the most powerful way to strengthen that memory.

Confidently Held Misinformation (CHM)

Confidently held misinformation lives in the minds of all employees. It is one of the largest contributors to mistakes, frustrations, and anxiety, and it leads to employee burnout and turnover.

CHM exists when an employee is sure they are right, but they are wrong. It is perilous for both customers and employees.

Amplifire has the unique power to detect and correct CHM. The platform requires learners to state their certainty when they answer questions. The system then classifies which questions were answered confidently but incorrectly (representing confidently held misinformation) and customizes the training in real time, leading the learner to rapid mastery of the topic and the end of CHM.

Confidently held misinformation in the aviation workforce

Confidently held misinformation (CHM) exists in every organization and individual. The mental state of confidence leads people to make decisions, but the misinformation component leads to adverse events.

The heatmap on the left below represents learner's CHM (in red) about safety practices at a large aviation company at the beginning of their training. Amplifire found and fixed 24,308 instances of CHM, resulting in the heatmap on the right.

The average time spent in this module was 50 minutes. People who were highly misinformed or uncertain spent about twice as much time as those who were already masters of the information.

For the entire company to date, Amplifire has remediated over one million instances of CHM.



2,918 Employees: Understanding Aircraft Safety

Struggle

An employee finishes an Amplifire module by demonstrating confident mastery of every question. Some struggle to finish. Struggle is defined by the number of failed attempts to answer a question correctly before mastering it with confidence.

The interpretation of struggle is difficult because human beings are complex. We are subject to the vagaries of our environment and temporary personal circumstances; hence, explaining struggle with perfect precision is not possible.

Amplifire's predictive risk analytics is a manager's guide to the employees who struggle. It gives them the precise topics of struggle–a predictor of future adverse events that can be fixed before they happen. Historically, only a small fraction of employees need counseling from a supervisor.

Struggle in the aviation workforce

The vast majority of these employees were excellent learners. In the cases where they were misinformed or uncertain when they started in Amplifire, they learned from the explanations quickly and demonstrated that they remembered what they had learned.

Only 70 of the 2,918 employees struggled on more

than a few topics. Seventeen demonstrated a lack of engagement that required supervisor intervention.

The predictive analytics report shows that, overall, these 2,918 employees struggled on only .5% of the material. Historically, that is a laudable rate.

Struggle: Understanding Aircraft Safety



CHM variation by pilot

Amplifire records starting knowledge-the gaps, misinformation, and uncertainty in knowledge that employees bring to their jobs.

For this aviation organization, Amplifire revealed wide variation in starting knowledge among pilots regarding FAA regulations. Some pilots were extremely misinformed, while others began Amplifire as masters of the information.

The most knowledgeable pilots were confident and correct on 100% of the regulatory material, while the least knowledgeable were only 33% confident and correct.



CHM variation across topics

Amplifire analytics highlight variations in starting knowledge. As seen here, misinformation and uncertainty varied somewhat in six key knowledge domains. The range is far more dramatic among individuals (seen above).

Managers and executives receive guidance from Amplifire on where variation exists and can then decide where intervention is most important. For example, Crew Duties may be judged less critical than Equipment Safety in terms of risk associated with misinformation.



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Variation by location (systemic risk)

Amplifire's analytics identify risk at all levels from individuals to teams to facilities.

For this aviation organization, Amplifire revealed wide variation in knowledge about FAA regulations at different locations. Some locations held 500% more CHM than others.

Investigation of risk by location can be immensely productive. For example, we have learned to recognize the data signature of supervisors that pass along their own confidently held misinformation to subordinates, as well as supervisors who are insufficiently attentive to the competence of their staff.

In either case, Amplifire analytics guide executives to the precise location of systemic risk so that knowledge gaps and misinformation can be addressed.

Reduction in adverse incidents from human error

Outcomes are the purpose of training, but managers and executives typically have no way to test the connection between training and outcomes.

Amplifire eliminates CHM. Fixing CHM leads to measurably better outcomes

As seen in the chart, an international aviation company enjoyed a quarterly decline in humancaused incidents year-over-year from 50 to 20 since deploying Amplifire.

The likelihood that this reduction occurred by chance is .03%



- What a difference it has made. We've had a lot of pilots talking about it, and regional safety directors talking about what a great addition and enhancement the Amplifire system has been for them. And the pilots now ask why isn't all our training like Amplifire training. "-Senior Director, Talent Management
- // This course is a significant improvement over past courses. It's straight to the point, accomplishes the goals that our company has set and doesn't waste my time. " -Pilot
- // No wasted time, concepts discussed were specific to user needs." –Supervisor
- " I absolutely loved this course. Very engaging to the learner." -Ground Crew

About Amplifire

These studies were conducted using Amplifire, an e-learning platform built on the latest discoveries in cognitive science. The Amplifire learning algorithm detects and corrects the knowledge gaps, doubts, and misconceptions that exist in the minds of all employees in every organization. The platform adapts to the needs of individual learners as they take an Amplifire course until mastery of each topic is achieved.

Organizations have adopted Amplifire as a core operating asset. They have transformed training from a rote activity, where managers can only hope for results, into a strategic tool with measurable results in delivering a workforce aligned with best practices and procedures.

After the platform finds and fixes misinformation and uncertainty, it delivers advanced analytics to managers that pinpoint where learners struggled, from the organization and department/functional group level down to the individual learner.

With more than a billion learner interactions, Amplifire harnesses research, learner feedback, and artificial intelligence to provide a faster and more engaging path to mastery. This powerful combination has made Amplifire an innovative leader in the aviation industry.

To learn more about the platform, contact us at:

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