Find Waste, Improve Quality and Deliver Better Training

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ABSTRACT

Designing, developing and delivering training can be a slow process, taking precious time to produce a learning product and instilling that information in your target audience. Most training organizations follow the ADDIE (Analysis, Design, Develop, Implement, Evaluate) model or some variation, to accomplish their training objectives. It's inevitable that over time these processes pick up extra steps or veer off on sub-tasks, extending the path, bloating, until we are left with an unrecognizable process that is more complicated and much slower, impacting your organization's performance.

That was us a few years ago, before we decided it was time to go on a diet. Looking for ways to help us improve our training we turned to the ideals of Lean process improvement to identify waste, and Six Sigma for process variation reduction. Using the Lean Six Sigma (LSS) processes, we aim to slim down our time to market and improve our training quality and efficiency. It started with a detailed mapping of the as-is process, to get the full scope of the task before us. Using the tools of LSS, the DOWNTIME model to pinpoint wasteful activities, describing the causes using the Fishbone diagram followed by a pen dot vote (80/20 rule), and applying the five whys to determine the root causes. With this data, we brainstormed solutions and used the benefit matrix to prioritize the implementation of solutions that would improve quality and performance. After implementing many of our solutions, we started measuring our successes, seeing increases in certification scores, and a shorter time to deliver our training products.

This paper gives you an overview of how utilizing a LSS process can help successfully improve performance in training organizations and pinpoint wasteful activities where you can immediately improve quality, cost, and time.

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INTRODUCTION

This paper explores how integrating Lean Six Sigma (LSS) principles can streamline workflows, reduce waste, and enhance quality. By applying LSS tools and techniques, we were able to identify key inefficiencies in our own processes and implement targeted solutions that led to faster turnaround times and improved outcomes. Through this experience, we demonstrate how LSS can be leveraged to improve training quality and reduce costs offering valuable insights for other organizations looking to optimize their training programs.

The seasonal work performed by our company requires us to hire and onboard approximately 700 new data verification and call center staff from November through January each year" This annual hiring, onboarding, and training cycle is known internally as the "ramp-up" period and requires a large skill training and onboarding effort.

Like many training organizations, we have historically followed the ADDIE model (Analysis, Design, Develop, Implement, Evaluate) to structure our training efforts. However, over time, the process accumulated extra steps and complexities, leading to inefficiencies potential quality issues, and slower delivery. These bloated processes began to negatively impact organizational performance—particularly during the time-sensitive ramp-up period.

Our new hires attend orientation and skills development training in their initial few weeks of employment. Typically, these new hires are general staff with data entry or customer service backgrounds. They must pass a certification assessment with a score of 80% or higher and have three attempts to do so. If they do not pass the assessment on the first attempt, this can extend the training time to 16 additional hours and delay their progression to full operational status and the ability to work production tasks.

For years this curriculum with an assessment was delivered with an assessment pass rate for first attempt above 75%. Why is having a passing rate for first attempt below 75% considered a problem? A passing rate below 75% on the certification assessment presents a significant operational challenge. When fewer than 75% of new hires pass the assessment on their first attempt, it leads to delays in their full operational status. This delay incurs an average cost of $203.39 per day per individual, directly impacting productivity and affecting our program Service Level Agreement (SLA).

If we had limited our analysis to simply reviewing historical passing rates (refer to Table 1), we might have concluded that the solution was to revert back to instructor-led classroom training. However, such a shift raises critical questions:

- Would this truly address the root cause?
- What are the financial and logistical implications of returning to a classroom setting?

Table 1. Three-year Ramp-up First Attempt Pass Rates

Year	Training format	Pass rate percentage			
11/21 – 01/22	100% remote, sites trained together. Largest class size: • Nov: 125 • Dec: 56 • Jan: 24	Nov	56.5		
		Dec	52.8		
		Jan	66.7		
	Nov–Dec: onsite, trainer in another room.		Site A	Site K	Site O

11/20 – 01/21	Jan: 100% remote, sites trained separately. Largest class size: • Nov: Site A 85, Site K 36, Site O 47 • Dec: Site A 36, Site K 29, Site O 34 • Jan: Site A 55, Site K 57, Site O 50	Nov	62.3	71.4	67.5
		Dec	75.4	78.8	86.7
		Jan	53.8	50.7	57.0
11/19 – 01/20	No virtual training, 100% classroom, sites trained separately. Largest class size: • Nov: Site A 46, Site K 32, Site O 40 • Dec: Site A 28, Site K Y 19, Site O 39 • Jan: Site A 24, Site K 16, Site O 19	Nov	84.4	82.1	95.7
		Dec	79.2	87.5	90.5
		Jan	71.2	88.7	98.6

Rather than relying on assumptions, we chose to apply the LSS tools and techniques, which leadership was encouraging teams to use to thoroughly analyze and improve the training process. Our goal was to increase the first-attempt certification pass rate for new hires to 75% or higher, ensuring a data-driven, cost-effective, and sustainable solution.

LEAN SIX TOOLS AND TECHNIQUES

Overview

Figure 1 depicts the LSS tools and techniques for identifying the root cause of the problem.

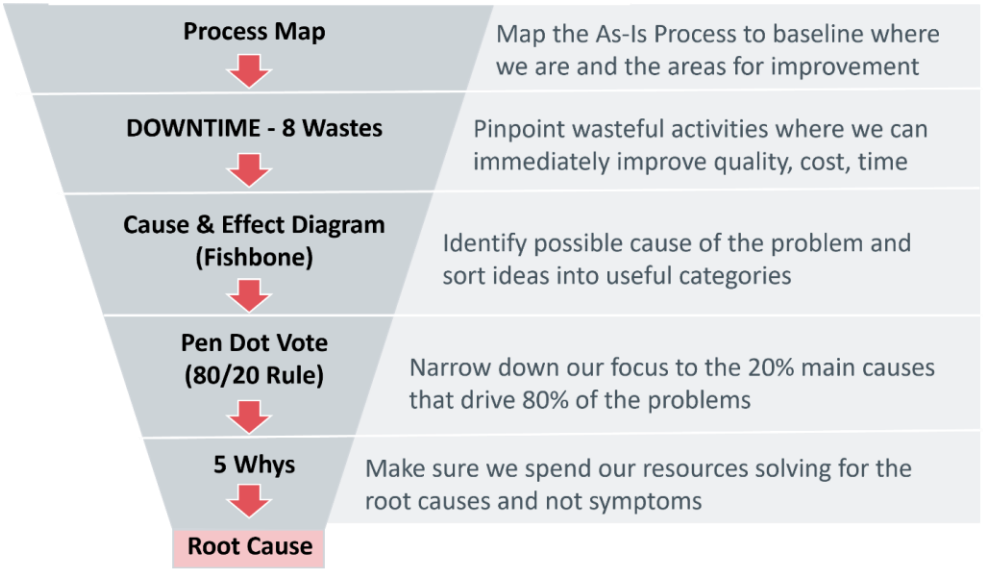

Figure 1. Summary of Actions Taken and Tools Used to Uncover the Root Cause

Figure 2 depicts the commonly used tools to generate ideas and evaluate and prioritize solutions after identifying the root cause in LSS.

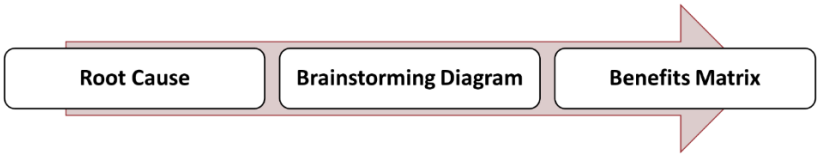

Figure 2. Commonly Used Tools in Identifying and Prioritizing Solutions

APPLYING LSS

Process Map

The first action of the LSS process is to create a Process Map of the "As-Is" process (George, M. L., Maxey, J., Rowlands, D., & Upton, M., 2005). Creating a process map of the as is process helps you visually identify where unnecessary steps, or redundant activities occur, which are potential areas for improvement. The training team identify steps that are:

- Value-add – the customer is willing to pay for work characterized by transformation.
- Non-value add – the customer is not willing to pay for but are necessary for the company such as government regulations.
- Waste – the customer and company are not willing to pay for; activities that consume resources but do not add any value to a product or service.

Figure 3 is a high-level map of the training and certification as-is process.

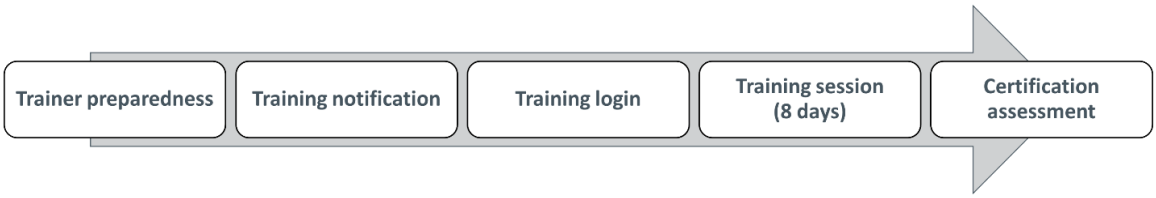

Figure 3. High-level Map of the As-Is Training Process

Most work conducted consists of non-value add activities. For example, training notification which includes creating a training session on learning management system (LMS) is necessary, but its steps are non-value activities as shown in Figure 4.

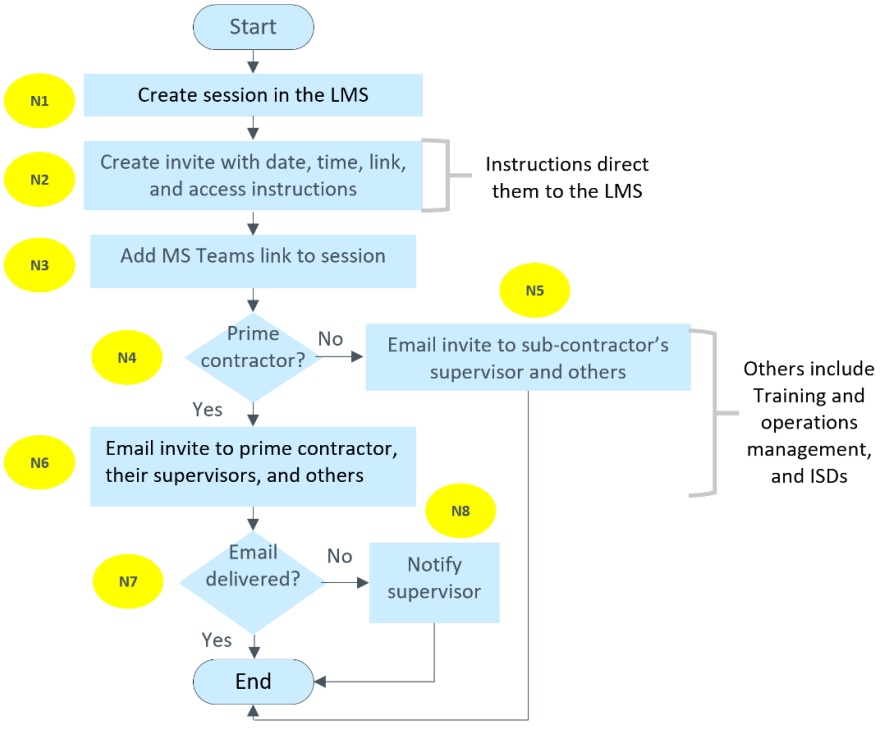

Figure 4. Detailed As-Is Process Map for Training Notification

Non-value activities should be simplified, if possible, and waste activities should be eliminated.

DOWNTIME

DOWNTIME is an acronym, which stands for: Defects, Overproduction, Waiting, Non-utilized talent, Transportation, Inventory excess, Motion waste, and Excess processing. Use DOWNTIME along with the process map to conduct a more thorough analysis of workflow inefficiencies by reviewing each step in the process map and asking whether any of the activities fall under the eight types of waste in DOWNTIME.

For example, when applying DOWNTIME to training development or remote learning environment:

- Waiting – Is the training team delayed awaiting information, decisions, or approvals? Are the learners delayed due to access issues?
- Non-utilizing talent – Are trainers failing to leverage available tools—such as breakout rooms, whiteboards, chat features, quizzes, or polls—that could enhance engagement and learning outcomes?
- Motion – Are learners required to toggle between multiple software applications or interfaces just to participate, such as unmuting different programs?
- Excess processing - Are there redundant steps or overly complex procedures that could be simplified or removed entirely?

Using DOWNTIME in this way allows organizations to uncover hidden inefficiencies and design more effective, streamlined processes.

The team used DOWNTIME to identify the following wastes:

- Defects – 4
- Overproduction – 2
- Waiting – 7
- Non-utilized talent – 2
- Transportation – 0
- Inventory – 0
- Motion waste – 1
- Excess processing – 2

In addition, they reviewed the non-value add activities to determine if any of the activities could be simplified. For example, in the training notification map (refer to Figure 4), participants received the link to the training session in the body of the invite and the attachment on the invite. This is an example of overproduction, two access points to the link for the training session. Figure 5 depicts how the team simplified the training notification process.

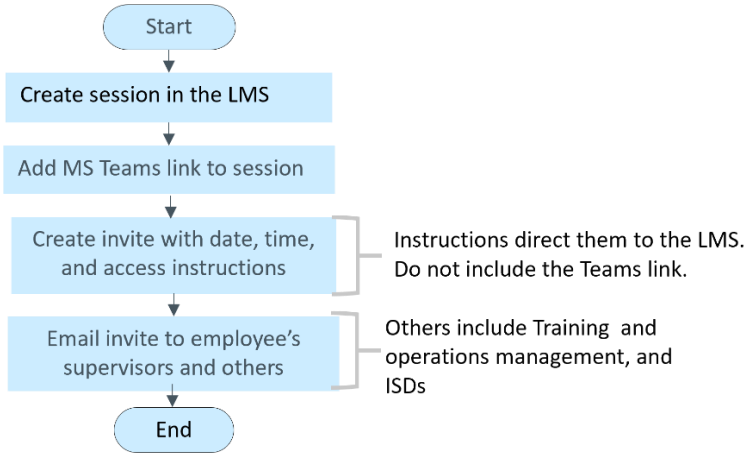

Figure 5. Detailed Training Notification Future Process Map

Fishbone Diagram

The cause-and-effect diagram referred to as the Fishbone diagram is a visual tool used to identify potential causes of a problem. It is widely used in quality management and root cause analysis (Ishikawa, K., 1985).

The Fishbone diagram has six categories that point to the problem (**Error! Reference source not found.**) which help in structuring brainstorming sessions and isolating key areas of concern:

- Man – includes human behavior, human knowledge, and human experience.
- Machine – assets required to complete the work such as, hardware and software.
- Measurement – involves the methods and tools used to collect data and assess performance or outcomes.
- Mother Nature – includes internal office and outside environment (location-based factors).
- Materials – are consumable resources e.g., participant workbooks or materials used to produce training materials such as, standard operating procedures.
- Method – relates to processes or techniques used to perform task or deliver training.

Based on the review of end-of-course evaluations, help desk tickets, and recorded training sessions, the team identified potential causes of the problem and grouped them in one of the six categories (Figure 6).

Pen Dot Vote (Pareto 80/20 rule)

The Pareto 80/20 rule (Pareto, Vilfredo, 1896–1897) states that for many events, roughly 80% of the effects come from 20% of the causes. To apply Pareto 80/20 rule, teams often conduct a pen dot voting exercise after completing a Fishbone diagram. In this exercise, each team member is given three dots (votes) and asked to place one or more of their dots on the causes they believe are most significant.

The causes from the Fishbone Diagram that received the most votes (Figure 6) were:

- Loss of training time due to technical issues – Machine (5 votes)
- Cognitive overload—too much information – Man (4 votes)
- Shorten training schedule – Method (3 votes)
- Participants did not complete the practice activities in the allotted time – Man (3 votes)

The causes receiving the most votes are considered the main causes of the problem and are selected as the starting point for deeper analysis using the 5 Whys method, which involves asking "why" repeatedly (typically five times) to trace the root cause of a problem (Ohno, T., 1988).

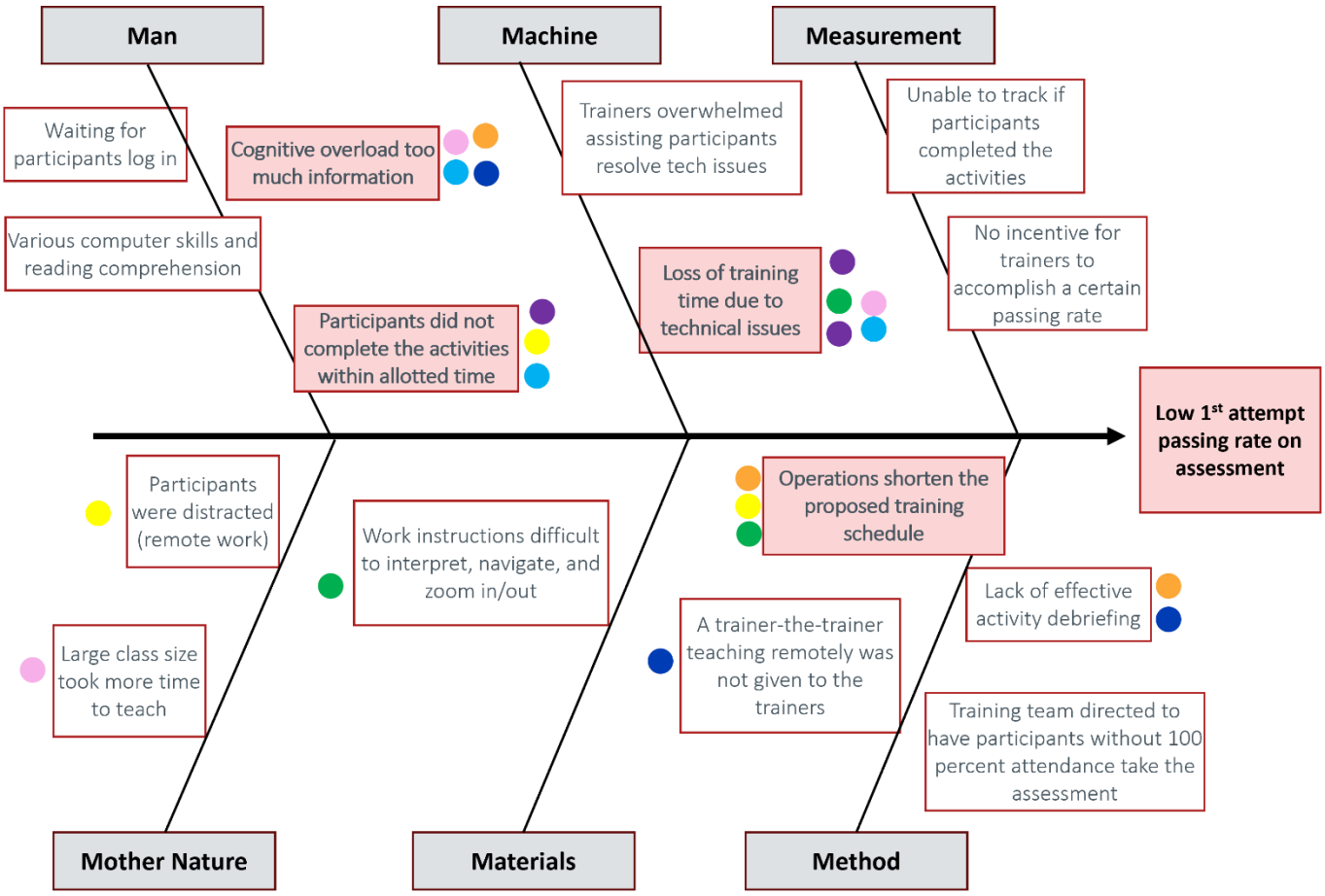

Figure 6. Fishbone Diagram with Pen Dot Votes

The 5 Whys

After identifying the root cause from the Fishbone diagram—based on team consensus through pen dot voting, the root cause is placed in the first box of the 5 Whys diagram (Figure 7).

Then asked the question “why” and entered the answer in the next box. For each response, the next "why" question is asked, with each answer documented in a subsequent box. To verify logical consistency, the team uses a check step: ensuring that the answer in the current box logically follows from the one above by inserting "and so" as a connector. This validation technique helps confirm that the reasoning flows coherently both downward (cause-effect) and upward (effect-cause).

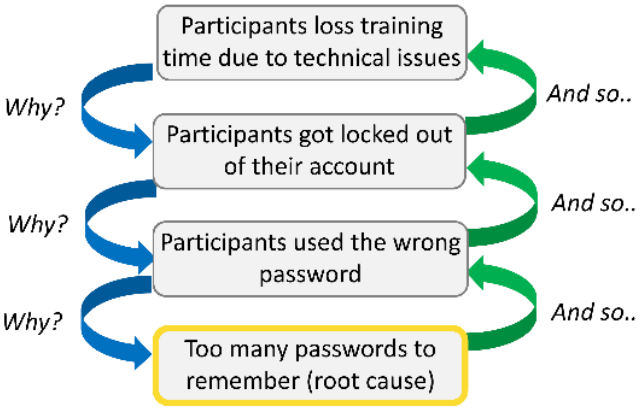

Figure 7. The 5 Whys Diagram

IDENTIFY SOLUTIONS TO IMPLEMENT

Brainstorming Diagram

The brainstorming diagram is a visual diagram that starts with the root cause in the center circle with branches representing solutions to the root cause. After the team identified the root cause, the team conducted a brainstorming session to list solutions for the root cause. For example, too many people in the class (root cause), the ideas were: make the class size a maximum of 15 Participants with a trainer and facilitator and improve coordination with operations regarding training resources. Figure 8 depicts another example of solutions for loss of training time due to technical issues.

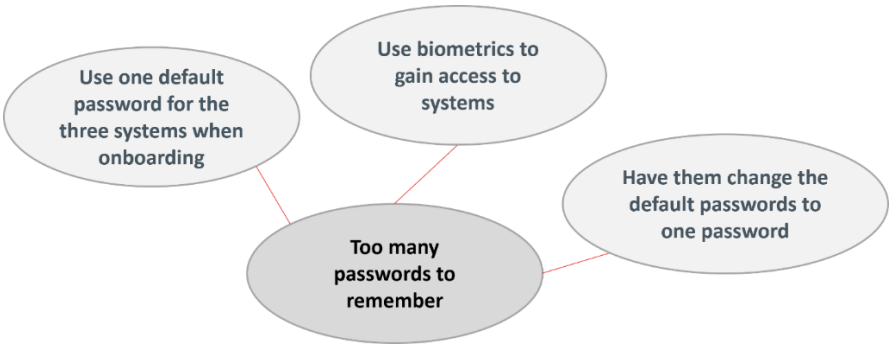

Figure 8. Brainstorming Diagram

The Benefits Matrix (Figure 9) is a decision-making tool that helps prioritize actions based on their potential benefit and the effort or resources required to implement them (MindTools., n.d.).

Each solution is evaluated and categorized according to two criteria:

- Benefit: The potential benefit or effectiveness of the solution in reducing waste and improving training outcomes.
- Effort: The estimated time, cost, and complexity involved in implementation.

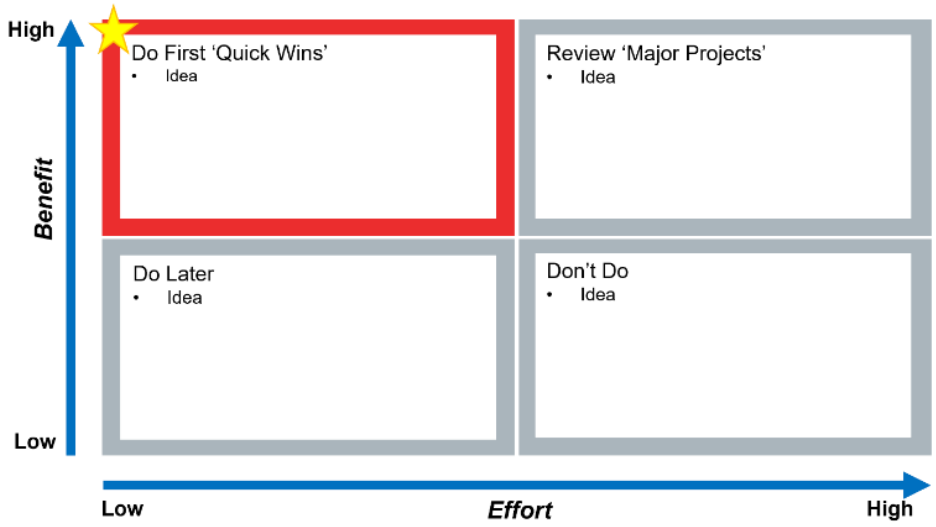

Figure 9. Benefits Matrix

Solutions listed in the high-benefit, low-effort quadrant—labeled Do First "Quick Wins"—are prioritized for immediate action. These are typically the most efficient interventions that yield substantial results with minimal resource investment.

Once these prioritized solutions are implemented, their effectiveness should be measured using predefined metrics to assess improvements in training delivery and reductions in waste, in alignment with continuous improvement principles.

The team implemented the ideas in the Do First 'Quick Wins' box before the next ramp-up:

- Eliminated any irrelevant information from the training materials.
- Remove excess information from slides – space the information out.
- Had Participants change the two default passwords to one password while in training.
- Had a supervisor attend the training so help desk tickets could be submitted immediately.
- Extended the training schedule from 9 days to 12 days.
- Provided troubleshooting tips booklet when Participants picked up their workstation.
- Ensured class sizes are 30 Participants or less.
- Provided additional training on the two networks the Participants access.
- Converted the remote onboarding booklet to a remote onboarding workbook.
- Started classes on time with a 10-minute technology check instead of waiting for Participants to join.

RESULTS

The average pass rate for the 2021 ramp-up was 57% and for the 2022 ramp-up the pass rate increased to 69%, resulting in reducing the cost per new hire from $203.39 to $178.98 ($203.39 – ($203.39*0.12) = $178.98). In addition, the pass rate improved by 21% [((69-57) / 57) * 100 = 21].

Table 2 shows the pass rate for the 2021 and 2022 ramp-up after the "Do First" ideas were implemented.

Table 2. 2021 and 2022 Ramp-up First Attempt Pass Rates

Year	Training format	Pass rate percentage	
11/22 – 03/23	100% remote, sites trained separately. Largest class size: • Site A and K = 40 • Site O = 36	Site A	64.6
		Site K	72.8
		Site O	72.2
11/21 – 01/22	100% remote, sites trained together. Largest class size: • Nov = 125 • Dec = 56 • Jan = 24	Nov	56.5
		Dec	52.8
		Jan	66.7

Table 3 shows the pass rate for the 2023 and 2024 ramp-up after the "Do Later" ideas were implemented. The pass rate surpassed our goal of a 75% pass rate.

Table 3. 2023 and 2024 Ramp-up First Attempt Pass Rates

Year	Training format	Pass rate percentage	
10/24 –12/24	100% remote, sites trained together. Taught three classes. October's class size is two. November's class size is three. December's class size is 17.	Oct	100.0
		Nov	100.0
		Dec	100.0
10/23 –01/24	100% remote, sites trained together. No classes started in January. Only assessments in January.	Oct	100.0
		Nov	96.1

	Largest class size: • Oct = 25 • Nov = 20 • Dec = 24	Dec	94.1
		Jan	95.6

LSS APPLIED – IMPROVE PASS RATE FOR DOCUMENT AUTOMATION

One of the program goals was to improve the pass rate for document automation, which at the time was 70%. The team used the LSS to identify the root cause and prioritize solutions. After implementing the "Do First" solutions, the pass rate surpassed the goal of a 75% pass rate.

LSS APPLIED – IMPROVE CALL QUALITY SCORES

Our SLA requires maintaining a call quality score of 95% or higher. However, over the past six months, scores have fallen below this benchmark on multiple occasions—primarily due to issues related to providing consumers with correct and necessary information.

Given the urgency and severity of the problem, we decided to bypass the use of a Process Map and the DOWNTIME tool and instead began directly with a Fishbone Diagram to identify potential causes. This expedited the LSS process for us and allowed us to act quickly on a time sensitive training issue.

Root Cause Analysis

Through the Fishbone Diagram, we categorized the contributing factors as follows:

- 8 Man (e.g., behaviors, knowledge gaps)
- 1 Machine (e.g., system tools or software)
- 2 Measurement (e.g., how quality is assessed)
- 5 Method (e.g., process or script adherence)

The primary cause identified was: "Employees do not follow the guidance and \call script." We then applied the 5 Whys technique to this issue and identified three root causes.

Solution Brainstorming and Prioritization
Following root cause identification, we conducted a brainstorming session and plotted potential solutions in the Benefits Matrix, prioritizing those in the "Do First – Quick Wins" quadrant. These actions were implemented immediately. Unfortunately, the quality scores did not improve significantly or consistently following their implementation.

In response, we shifted to assigning only high-performing employees to handle the affected tasks. This led to a temporary improvement in quality scores, but the gains were not sustained.

We also implemented training reminders, which helped raise quality scores to 95% or above for one to two weeks, but again, this improvement was short-lived.

Although multiple corrective actions have been taken, including root cause analysis and targeted interventions, the issue of inconsistent call quality persists. Solutions identified in the Review "Major Projects" are now being reviewed which involve a redesign of scripts and work instructions of our knowledge management system (Panviva).

CONCLUSION
While LSS tools and processes have traditionally been applied in manufacturing to minimize waste and enhance efficiency, their principles are equally valuable in the context of training and development. By applying LSS methodologies to training programs, organizations can identify and eliminate inefficiencies, streamline delivery, and

improve the overall quality and effectiveness of learning experiences. This not only ensures better outcomes for learners but also aligns training efforts more closely with organizational goals.

LSS equips organizations with the tools to continuously assess, refine, and realign training strategies—enabling agility and responsiveness at every stage of the training system design cycle. Whether applied in the analysis, development, or evaluation phase, LSS fosters a culture of continuous improvement and measurable outcomes.

Furthermore, integrating LSS into training development directly enhances training effectiveness by grounding improvements in quantifiable data and stakeholder feedback. LSS is not just a quality improvement tool—it is a game-changer that empowers training organizations to design, implement, and sustain impactful learning experiences across diverse and dynamic operational domains.

The application of LSS is particularly impactful for our environment of providing Instructor-Led Training (ILT) with a varied curriculum and short implementation timelines. LSS helped us identify and reduce waste and improve learning outcomes. LSS forced us to slow down and put our processes under the microscope. Not only did we identify ways to reduce waste, but we learned a lot more about the inputs and influences on our training program. We continue to benefit from this detailed look and are designing curriculum and new training products that have a more effective and faster impact on our goals and our participants experience.

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