

# Assessing a New Way to Develop More Lean Thinkers

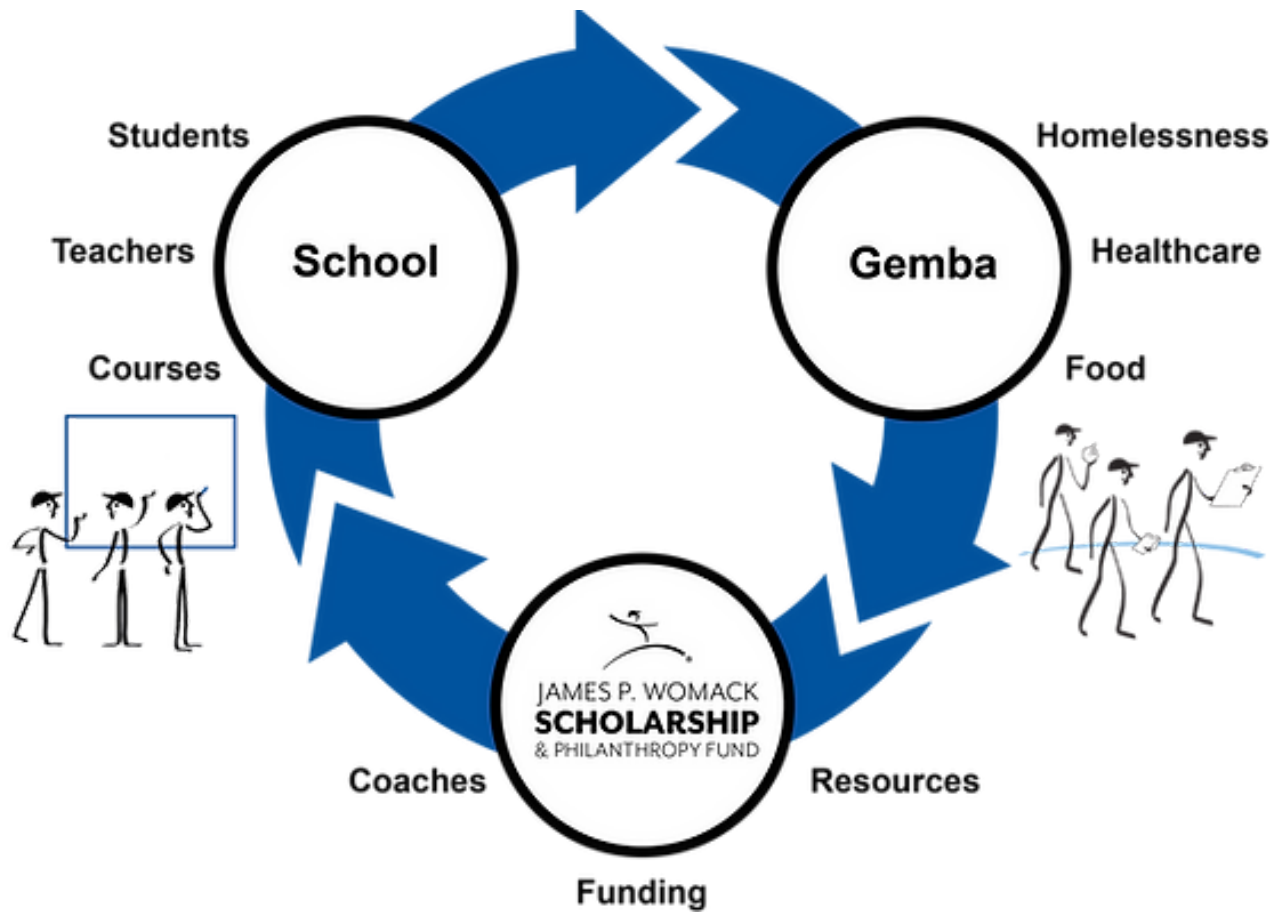
The James P. Womack Scholarship & Philanthropy Fund reflects on the outcomes of their 'lean internship,' which offers a hands-on practical experience to students while helping nonprofits help more people.

by Patricia Panchak

  
**NEW  
WAY**



**OLD  
WAY**  

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JAMES P. WOMACK  
**SCHOLARSHIP**  
& PHILANTHROPY FUND

# By the Numbers: Tallying the Scholarship's Impact

Spring 2022 Update



**\$97k** Scholarship Funds Distributed

**7** Internship Teams  
12 interns (two interns did two internships)

**2**

Pro-Bono LEI Coaches



Eric Ethington Matt Zayko

OAKLAND UNIVERSITY

**2** Universities



CAL POLY

**2**

Academic Coaches



Eric O. Olsen Bill Edwards

**3** Nonprofit Community Service Organizations



**RESULTS**

PROJECT Streamline Warehouse Work Processes with Humble Design

**10**

Increase in the number of additional houses furnished from 2020 to 2021 credited to JPW Fund intern improvements

PROJECT Streamline Online Application with Leader Dogs for the Blind

**77 to 47**

Change in number of questions on application

**30 to 18**

Reduction in minutes required to complete application

# Making the World Better by Advancing Lean Thinking and Practice

Lean Enterprise Institute practices what it preaches in establishing a scholarship and philanthropy fund.

Staying true to lean principles leads to good outcomes, and the James P. Womack Scholarship and Philanthropy Fund (JPW Fund) is emerging as a prime example. The Fund, launched in 2019, adheres to fundamental lean principles to achieve the Lean Enterprise Institute's goal of creating and providing innovative gemba-based learning opportunities.

The story of the Fund's first (series of) grants illustrates how it epitomizes lean principles and practices, including eliminating waste in work processes, going to the gemba, using plan-do-check-act (PDCA) problem-solving based in experimentation, and, perhaps most of all, working to improve the lives of everyone involved in value-creation.

## Eliminating Waste

The JPW Fund originated as all lean initiatives do — indeed, as lean thinking itself did — to solve a problem.

### Gemba

The Japanese term for “actual place,” often used for the shop floor or any place where value-creating work actually occurs; also spelled genba.

The term often is used to stress that real improvement requires a shop-floor focus based on direct observation of current conditions where work is done. For example, standardized work for a machine operator cannot be written at a desk in the engineering office, but must be defined and revised on the gemba.

from the *Lean Lexicon 5th Edition*



*Matt Lovejoy, a former LEI board member, led the initiative to establish the JPW Fund, and his company, Lovejoy Industries, Inc., remains the Fund's largest contributor. Lovejoy credits Jim Womack for introducing him to lean thinking and practice, which he says saved his company from near collapse when the*

*telecom industry, on which his company had a high dependence, went bust in 2002. “Jim Womack and LEI saved my business, my livelihood, my life savings, my life’s work,” he says. “I’m just trying to repay the debt I have to the lean community and lean thinking. I just so completely believe in that method, that way of thinking, that I think we should disseminate that. So it’s with great fervor that I promote this.”*

According to Matt Lovejoy, who, as an LEI board member, led the team creating the internship program, the problem, in this case, was: How do you create more lean thinkers? The team contemplating this question recognized the dearth of lean curricula at every level of academia and the resultant waste of rework — reeducating those steeped in traditional management.

“To this day, lean thinking and practice is infrequently taught in our education system. With a few notable exceptions, universities remain committed to curricula that are out of touch with the problems of the real world,” Jim Womack, founder and senior advisor to LEI, lamented at the time. “Companies need critical thinkers and creative problem-solvers, not memorizers of formulaic solutions — still the content of many university courses.”

Worse, he noted: “As a result, companies find they must reeducate (rework — one of the worst forms of waste!) recruits hired from even the best universities.”

**Project:** James P. Womack Fund **Owners:** O'Donnell, Gandek, Lovejoy **V7** | **3.18.19**

**Background:** LEI entered its third decade in 2018 as the pre-eminent organization dedicated to the advancement of Lean Thinking & Practice. LEI was established by Dr. James Womack as a not-for-profit, publishing, education, and research organization, with a clear mission to "Advance Lean Thinking & Practice throughout the world to make things better for individuals, organizations, and society".

LEI operates as a "fee-for-service" business and does not generate any revenue via fundraising, donations, or grants to support its mission.

**Analysis:**

- Toyota is the recognized exemplar of a continuous improvement culture. Dr. Womack and Ian Jones captured the practices of Toyota into a holistic tome by naming and memorializing the approach - they called it Lean Thinking.
- Womack manifested his dedication to these concepts by creating the Lean Enterprise Institute with the express desire to disseminate these notions throughout various industries, disciplines and geographies.
- Dr. Womack promised that as LEI learned and created new knowledge, it would be made available to the public to improve people's lives.
- To foster these notions, tools were developed to help explain the concepts. Sadly, use of the tools was widespread but the deep cultural change mandated to form a Lean Enterprise often never goes beyond the tools. Thus, "success in a partial way".
- Turns out, embracing and practicing Lean Thinking is hard, making the widespread adoption of these concepts rare.
- Modern Management rules executive suites at most organizations. In that environment, results are measured; rewards and punishments are meted out against metrics and Lean Management finds no place in the culture. For Lean to enjoy widespread success, organizations will need to embrace Lean Management.

**Lean Management has four tenets:**

1. Create basic stability in all Value-added processes (eliminate activities that do not add Value)
2. Steadily improve every Value-creating process
3. Periodically re-think Value and how to create it, and
4. Persistently increase the capability of every manager and worker to do and improve the work

**Problem:** Development of people emanates principally from internal efforts to enlighten managers & workers to the precepts of Lean. These efforts are typically led by "improvement" staff focused on teaching tools to improve processes. As a result, we are not developing people who understand and apply the key principles of Lean Thinking throughout the organization; we are not seeing successful Lean Transformations at the scale we might expect.

**Deep learning and sharing come only from practicing and learning Lean Thinking done at the Gemba by every employee at every level. How might LEI accomplish its charter to "make things better for individuals, organizations and society" while**

**Desired Future State:** Develop the next generation of Lean thinkers, practitioners and leaders by sponsoring students to actively engage in Gemba based improvement and experimentation inside Community Based Organizations (CBO's) - thus making people's lives better through the experiences of Lean. "Do Good by Doing Good"

**Proposed Experimentation:** **Year One - Do Good by Doing Good - Three "Learning Experiences"**

- Identify Knowledge Centers**
  - Existing higher education programs
  - Support PhD and MBA candidates in Lean Thinking management systems
- Identify Community Based Orgs (CBO's)**
  - Referrals from LEI/IGM faculty
  - Referrals from ones we know
  - Application, award and coaching
- Identify Scholarship candidates**
  - Tuition assistance, internships, grants
  - Blended learning - study and Gemba
  - Vocational outreach programs
- Partner with target CBO's**
  - Develop co-learning partnerships
  - Develop key personnel - champions
  - Model specific problems to solve
- Fundraising**
  - Philanthropists, Foundations, Corporate
  - Board, faculty, authors, IGM directors
  - Lean community
- LEI Resources**
  - Local coaching (LEI Faculty)
  - On-Line "Preparatory" Learning
  - LEI workshops, seminars, summits,
- Establish output & outcome expectations**
  - Process to measure success in student learning
  - Basic research and measuring success at CBO's
  - Publication thereon - technical and mainstream outlets
  - Report-out findings (Summit, case studies, videos)
- Adjust, Improve, Repeat Year 2**

**Estimate for one Gemba-based Learning Experience**

\$36,000	CBO Coaching	Students (Grad/Under)	Award Mgt, Oversight
\$34,000			
\$32,000			
\$30,000			
\$28,000			

Each Gemba-based "Learning Experience" will cost about \$100k per year. We wish to launch three such experiences starting in September 2019. Our fundraising target is \$500k by that date and \$1MM per year thereafter.

Action	Who	When	Comments
Review-A3	IGD, KG, MAJ	03/14/19	Share with Womack, Ferro, Jean, Shook (3/18/19)
Sample forms, applications	JOD, KG	03/19/19	Putting pencil to paper - out of the etheral
Socialize at Summit	All	Summit	Make appointments - be prepared
Presentation at Summit	MAJ	03/28/19	Three minute teaser - super-professional
Infrastructure-Legal framework	JDS	6/30/2019	Legal, Web, Paperwork, 3-ling binder

How we Measure	Current State	Future State
Structured alliance of LEI, education, charities and students	Yes, Oakland University	Yes
Mechanism for raising funds	Yes, see website	Yes

The JPW Fund leaders used A3 thinking to plan the details of the internship.

Lovejoy adds that lean practitioners' belief in "learning-by-doing" informed the programs' design. "Once they're [interns] able to apply these concepts and notions to a real environment — where you have real people who have real opportunities to improve — it allows them to see how the training they've had previously in a classroom setting can be applied in the real world."

With these ideas in mind, the program's founders set out to eliminate the need for such rework by offering learning opportunities in which students could practice lean management in a real-world setting while still in school.

**Making Things Better**

As planning commenced, explains Lovejoy, who oversaw the JPW Fund until May of 2020, a small group of LEI board members — Womack, Jose Ferro, and him — and former LEI executive John O'Donnell sought to connect the idea of funding lean research and education to LEI's broader mission: to make things better for customers, employees, owners, and society-at-large by advancing lean thinking and practice.

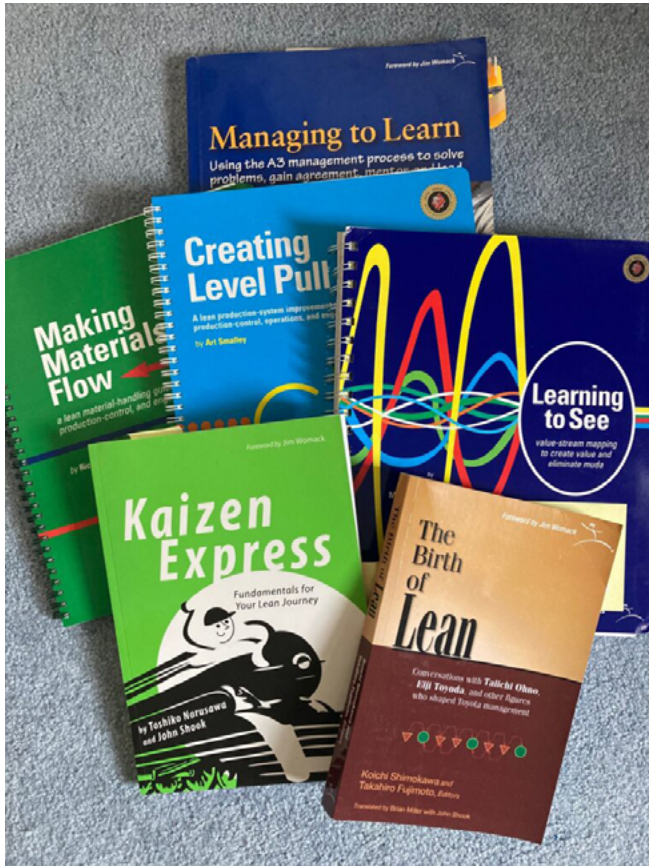
"Jim Womack wanted very much to make sure any effort we put forth would actually benefit society," Lovejoy explained on a WLEI podcast. "So, he came up with this catchphrase, a paraphrase of *Poor Richard's Almanac*, saying, 'why don't we just do good by doing good?' And that caught on."

**"Jim Womack wanted very much to make sure any effort we put forth would actually benefit society."**

— Matt Lovejoy

The idea prompted the group to attach a condition to scholarship funding: "that the gemba would be a community-based service," he added. Ultimately, the team decided to conduct a pilot project that would fund internships that provide students with hands-on, problem-solving experience at mission-driven gemba under the guidance of an LEI coach. "As such, we could help community-based service organizations, help the students,





LEI also supports the JPW fund interns by giving them a full complement of books and workbooks.

and promote lean learning at the college and graduate level,” Lovejoy explains.

## Finding University Partners

With the criteria set, Lovejoy set out to identify colleges and universities offering coursework in lean thinking that would partner with the JPW Fund to offer community-service-based internships where students could put theory into practice. Several universities “are making a valiant effort to add lean to their curricula,” Lovejoy notes. However, “Very few formal programs are centered around lean in this country.”

In his research, he discovered the Pawley Lean Institute at Oakland University, a Michigan State University affiliate in Rochester Hills, Michigan. The Institute, established by Dennis Pawley, an OU alumnus and a former director of manufacturing for Chrysler, offers an interdisciplinary approach to lean/continuous improvement education

for students in OU’s School of Education and Human Services (SEHS), School of Engineering and Computer Science (SECS) and the School of Business (SBA). Also, the programs’ lean management courses required students to complete a hands-on project, so it already had the infrastructure to oversee the JPW Fund pilot.

Upon talking with Dennis Wade, the Pawley Lean Institute’s executive director, “we hit it off immediately,” Lovejoy says, recalling that he thought, “Wow, this is too good to be true.” Wade jumped at the idea of creating the new lean internship program, thinking it could become a way for students to augment their coursework outside the classroom, being paid for their time rather than earning course credits.

Lovejoy found the second partner at California Polytechnic State University (Cal Poly) in San Luis Obispo, where Eric O. Olsen, professor in the Industrial Technology department at the University’s Orfalea College of Business, teaches courses in lean thinking and continuous improvement. Olsen also is the founder and heads Central Coast Lean, a “community of lean practitioners,” which, with Cal Poly, forms a “lean learning ecosystem,” he explains. “So that’s why the [JPW] Fund was a natural fit for us,” Olsen says, adding that, in his view, the JPW Fund became “part of that ecosystem.”

**“The fact that we’re funding students to both learn and also help the nonprofit at the same time, that was a very attractive piece of this.”**

— Eric O. Olsen

Olsen says that the internship’s focus on community service was an excellent potential addition to Cal Poly’s existing approach to coordinating the placement of students at for-profit companies. “So, the fact that we’re funding students to both learn and also help the nonprofit at the same time, that was a very attractive piece of this,” he says. Noting that Cal Poly students are in high demand for both internships and employment, Olsen adds: “This program is about

giving those nonprofits access to this pool of talent with these kinds of skills,” where they would otherwise be priced out of the market.”

**Launching the Pilots**

With OU and Cal Poly, the JPW Fund explored two internship models — the educational institution has free reign in designing the internship if it meets the criteria of offering students hands-on lean management experiences at community service organizations. At OU, students work on kaizen for about 10 hours per week over 10 weeks during the academic semester. At Cal Poly, students devoted 40 hours per week during the summer, mid-June through the end of August, working alongside others, with their lean thinking and practice efforts embedded in the work. In both instances, the interns earn \$10,000 for their work.

Wade and Olsen cite the benefits of offering the JPW Fund Internship to their students. At OU, the internship program has become part of the Pawley Lean Institute programming, having offered internships to two students each semester since the Fall 2019.

Meanwhile, Cal Poly sponsored only one due to having fewer administrative resources and complications from the pandemic. Still, Olsen says he’s “definitely” considering working with the JPW Fund to offer the internship in the future, adding that he’ll need to create a process to recruit students for it. He notes that he selected the first interns-community service organization pairing in an ad hoc networking process. So, to formalize the program, “it’s going to take a few more turns of the crank to figure out how to make the scholarship process lean enough for us.”

**Reflecting and Determining Next Steps**

Having reviewed and reflected, completing the “check” phase of its PDCA problem-solving effort to eliminate the waste from the lean education process, the LEI board of directors is pleased with the results. Now, it is determining its next steps to grow the internship program. In the meantime, it continues funding the OU-Pawley Lean Institute. ■

**Plan, Do, Check, Act (PDCA)**

Also known as plan-do-study-act (PDSA).

An improvement cycle based on the scientific method of proposing a change in a process, implementing the change, measuring the results, and taking appropriate action (see illustration). It also is known as the Deming Cycle or Deming Wheel after W. Edwards Deming, who introduced the concept in Japan in the 1950s.

The PDCA cycle has four stages:

Plan:	Determine goals for a process and needed changes to achieve them.
Do:	Implement the changes.
Check:	Evaluate the results in terms of performance.
Act:	Standardize and stabilize the change or begin the cycle again, depending on the results.

Source: *Lean Lexicon, Fifth Edition*

# Unique Philanthropy Does Well by Doing Good

An internship program enables students to attain real-world lean management experience while helping community service organizations reach more people.

**H**umble Design Detroit furnished ten more homes in 2021 than it did in 2020, an increase that the community service organization previously couldn't imagine. That's according to Laura Corp, the nonprofit's operations manager. And, she adds, the organization, which furnishes homes for individuals and families transitioning out of homelessness, doesn't plan to stop there: It's aiming to provide an additional 12 homes in 2022.

Corp credits the increase — and the mindset change that enabled it — to a partnership between Humble Design Detroit, the Lean Enterprise Institute's James P. Womack Scholarship and Philanthropy Fund (JPW Fund), and Oakland University's (OU) Pawley Lean Institute (PLI).



**“This change in mindset would not have been possible without the contributions you have all made, as well as the previous students we were able to work with.”**

— Laura Corp, Operations Manager, Humble Design Detroit

“Before we started partnering, reaching three houses per week was each Humble location's goal, and there was never any thought about attempting to do more,” she says. “As our team began working with the OU students and learning



Humble Design serves individuals, families, and veterans emerging from homelessness by transforming their empty houses into warm, welcoming, uplifting homes with donated furniture and household goods. Established in 2009 in Pontiac, Michigan, the nonprofit now supports five communities: Chicago, Cleveland, Detroit, Seattle, and San Diego. Its impact is evident in the following data: Without Humble Design's help, up to 50% of families return to homelessness within a year of securing housing. With its help, fewer than 1% return to homelessness.

### About Pawley Lean Institute

The Pawley Lean Institute (PLI) at Oakland University, Rochester, Michigan, shares concepts and practices of lean thinking to create leaders and learners in the university, public and private sectors, and the community. It offers an interdisciplinary approach to lean/continuous education within the School of Education and Human Services (SEHS), School of Engineering and Computer Science (SECS), and the School of Business (SBA). Each school offers undergraduate and graduate programs that integrate theory, research, and experience with solid academic preparation and practical skills to prepare graduates for professional success.



Dennis Wade (pictured above) is the director of the Pawley Lean Institute (PLI) at Oakland University, Rochester, Michigan.



about looking at the need that exists instead of our capacity, things began to shift.”

“This change in mindset would not have been possible without the contributions you have all made, as well as the previous students we were able to work with,” Corp wrote in a letter to LEI President Josh Howell.

The partnership to which Corp refers is an internship program coordinated by the JPW Fund as part of its broader mission to facilitate research and creative learning experiences that advance lean thinking and practice. The program funds interns at schools teaching lean thinking and community service organizations willing to provide gemba-based learning and improvement opportunities. Additionally, LEI supports the internships by supplying books and other learning materials and, when possible, recruiting an LEI coach to work with the interns in partnership with their academic coach/advisor.

Its goal is to experiment with ways to end “rework” in the lean education process while improving society at large by teaching and encouraging more organizations to adopt lean thinking and practices.

## **Doing Well by Doing Good**

The success of the internship program, the JPW Fund’s first foray into grantmaking, came despite the crippling effects of the pandemic, demonstrating its resilience. Now LEI, the Fund’s organizer, is reflecting on the program’s initial results to determine the next steps.

Since funding the first two interns in the Fall of 2019, the JPW fund has sponsored six successful student-intern teams from two university partners serving three community-service organizations — and it’s seeing meaningful benefits for all parties involved. In addition to the internships at Humble Design Detroit, the JPW Fund sponsored two Cal Poly interns’ Summer 2020 internships at Transitions-Mental Health Association (TMHA) in San Luis Obispo, California. TMHA is a commercial farm and nursery that offers job experiences to people struggling with mental illness.

In an unexpected twist, the JPW Fund has also inspired other organizations to sponsor similar internships where

students gain practical hands-on lean experience at community service organizations, helping improve their operations and, ultimately, serve more people.

Overall, 18 students (12 students under the JPW Fund) and four community service organizations are evidence that LEI’s experiment to find a way to end rework in the lean education process while improving the society-at-large is working.

In addition to Humble Design Detroit’s increase in the number of families they help, JPW Fund interns and their future employers also benefit. “The JPW Fund allows students to complete internships that add value to their resumes when looking for career opportunities,” Dennis Wade, the PLI executive director, says. “The value of lean, the community service internships, and the association with the JPW Fund is a differentiator when they interview for potential job opportunities.” The students also credit the practical experience gained from the internship for giving them an edge in the job market. Still, they say the more significant benefit was learning how to apply lean principles they learned in the classroom.

Monisha Vasudeva, part of the first team to apply the lean theory she learned in the classroom to address issues and innovate work processes at the Humble Design Detroit warehouse, notes that the internship helped her realize that “[lean] is not theory. Lean is something I have to work on based on what people right now are doing.” This lesson is one that lean practitioners will recognize as one that is difficult for mid-career professionals to understand.

**“Lean is not theory. Lean is something I have to work on based on what people right now are doing.”**

— Monisha Vasudeva, JPW Fund Intern at Oakland University

Kaitlyn Trombly, who interned during the Winter 2021 semester, noted that “This opportunity not only gives students real hands-on experience but also teaches them lessons that they can use as reference for future endeavors.”

And, of course, the JPW Fund, with this first experiment, is demonstrating the value of introducing students to lean thinking and practice before they enter the workforce.

## **A ‘Humble’ Beginning**

OU’s Pawley Lean Institute was the first academic program funded by the JPW Fund, choosing the Detroit location of Humble Design, established in 2009, as the first internship site. Humble Design Detroit already was working with an OU engineering professor to coordinate a student group project “to work with us on a much smaller scale,” Corp explained. But then, she “ended up connecting us to [the LEI internship program] to tackle some of the bigger problems.”

[In a video](#) about the first interns’ progress, Corp recalls that she and the professor had talked about how she and her team were “kind of just surviving, always putting out fires.” She says they discussed “the opportunities we’d have if we had people coming in to help us look at those problems and figure out different ways to address them and think about them.”

The original goal of partnering with OU and the JPW Fund, Corp adds, was merely to “switch our mindsets from surviving to being sustainable and calm.”

## **Getting Started**

Vasudeva and Sagar Bajaj, who at the time were both candidates for a Master of Science in Industrial and System Engineering, received the first internship to optimize the space in the nonprofit’s warehouse. Their first actions, suggested by their coaches, LEI’s Matt Zayko and OU’s Bill Edwards, were to go to the gemba to learn more about Humble Design’s purpose and how the work supports it. For Humble Design, the work occurs in two locations: at the warehouse and at the homes when designers are setting up and helping people move in. So though the interns’ focus was on improving warehouse work processes, they participated in a housing setup and move-in reveal to understand what the organization does — and its impact on its clients.

When they toured the warehouse, they found it in a state of disarray that you might expect at a place primarily staffed



*Monisha Vasudeva and Sagar Bajaj were the first to work at Humble Design Detroit as JPW Fund interns.*

by volunteers and where donations large and small arrive at irregular intervals from various sources. Also, they met a group of people — staff and volunteers — so focused on achieving their mission — fitting out houses for the homeless — that they felt they couldn’t spare any time to fix the problems that frustrated their efforts.

Though the warehouse had designated areas for different types of donations — sofas, bed frames, rugs, and the like — there was no standardized way to organize the types of items within each area, for example, by size and style. Also, most items lay in stacks and piles on the floor, spilling into aisleways; worn, unusable items mixed with nice things; rugs of different sizes, styles, and colors lay in mounds; chairs and tables were stacked precariously. In their “current state” observations, the interns noted that the disorganization made the warehouse unsafe and limited designers’ ability to select items efficiently.

## **Learning by Doing**

Zayko and Edwards coached Vasudeva and Bajaj through using the A3 process they’d learned in the classroom to identify and prioritize what they could accomplish during the 10 weeks of their internship. Since the interns had learned the concepts through their coursework, “It was more important for us to help teach them the mental model” — the thinking involved, Zayko explains. For example, the interns first had to decide which of the many opportunities would be the most impactful for the organization and what they could accomplish in 10 weeks.

The interns narrowed their focus to a few areas through close observation, discussions with the staff, and coaching.



*The current state the JPW Fund interns documented shows that though the Humble Design warehouse layout designated spaces for the various donations, no standards existed to govern the organization within each area, as shown in these photographs of the couch (left) and rug spaces.*

They decided to target their efforts on improving overall warehouse safety and space utilization by organizing three areas, creating aisleways between rows of items to improve safety, and sorting the goods within each section by type. In addition to improving safety, they thought these changes would increase the visibility of donations, helping the designers to more easily find what they need as they fit out a home.

This situation was another where the coaches emphasized “going to the gemba and seeing” to gain an in-depth understanding of the work processes. “We encouraged them to actually do the work [the volunteers do] and show respect — including when they would deliver the furniture and set up homes” rather than simply advising people how to do their work better, Zayko says. “That’s when you realize the work may seem mundane or repetitive but serves the bigger purpose.” So, figuring out how to safely store more donated items so designers can more quickly select items for a particular house is about helping Humble Design help more people.



Industry Coach Matt Zayko



Academic Coach Bill Edwards

In addition to helping the students evolve their thinking as they used lean “tools” such as A3 problem-solving, mapping, and 5S, Zayko says he coached them through lean’s approach to managing change. “That’s probably one of the hardest parts about this, managing change,” Zayko adds. “You don’t realize how tough it is to get people to align on what the problems are until you try it.” It’s one thing to hear in a lecture that the A3 process is a way to gain agreement on the problem and resolve it by focusing on facts and collaborating with the people doing the work; it’s another thing to experience it.

**“We encouraged them to actually do the work [the volunteers do] and show respect ...”**

— Matt Zayko, Lean Coach, LEI

Another situation Zayko helped coach the interns through was the importance of checking and adjusting countermeasures that don’t work according to the plan. For example, the interns’ first idea for organizing the rugs was too expensive, forcing them to rethink their options.

Yet another lean experience was seeing the importance of teaching everyone to see and identify waste and problems to address. For example, Zayko describes how the interns noticed that a recycling bin for metals from broken, unusable items that a service retrieved weekly always filled



up within a few days, leaving no place to put recyclable items, so things piled up. So, the interns suggested a solution that the busy staffers, not yet educated about identifying and tackling issues, overlooked: scheduling the service to empty the bin twice a week. This change had an immediate twofold impact: it reduced the clutter of items that they couldn't put into a filled-up container and, since the service paid Humble Design for the metal, increased the money they made from recycling.

**Tallying the Improvements**

Among the most significant achievements, the interns improved safety in the warehouse by clearing pathways.

They paid particular attention to the areas leading to the fire exit and electrical panels, clearly marking them with floor tape to visibly communicate that they must remain clear. They also reorganized the area designated for storing hygiene items, again clearing the floors to make the area safer and marking the aisleways to keep them clear. Finally, the interns identified an OU source to print and hang banners to visually indicate where specific items should go, setting the stage for written standardized work. They also installed shelving for tables and chairs and researched and identified shelving vendors for other areas.

After the first 10-week internship, with the interns dedicating 10 hours per week, the Humble Design

**Before**



**After**



*Vasudeva and Bajaj focused their initial efforts on improving safety in the warehouse by clearing the area and marking pathways near the fire exit and switchboard.*

**Before**



**After**



*The interns also reorganized and cleared the aisles in the hygiene area of the warehouse, where Humble Design Detroit stores cleaning supplies for new homes.*



staff noted significant improvements. “We had these racks installed, which has completely transformed our warehouse,” Corp said. “I think the biggest impact is that it’s much safer. We used to have chairs and tables stacked and then [stored] about three deep. Our warehouse manager was having to reach over, which isn’t good for your back, so installing these shelves has allowed us to become a much safer environment.”



“When I first heard about it, I said you guys are crazy, but as it got going, I love it.”

— Carl Kyles, Warehouse Manager, Humble Design Detroit

Carl Kyles, Humble Design Detroit’s warehouse manager, concurs, “When I first heard about it, I said you guys are crazy, but as it got going, I love it,” he said. “You organized stuff, and that’s made it easier for me and the designers.”

### Achieving Steady Progress

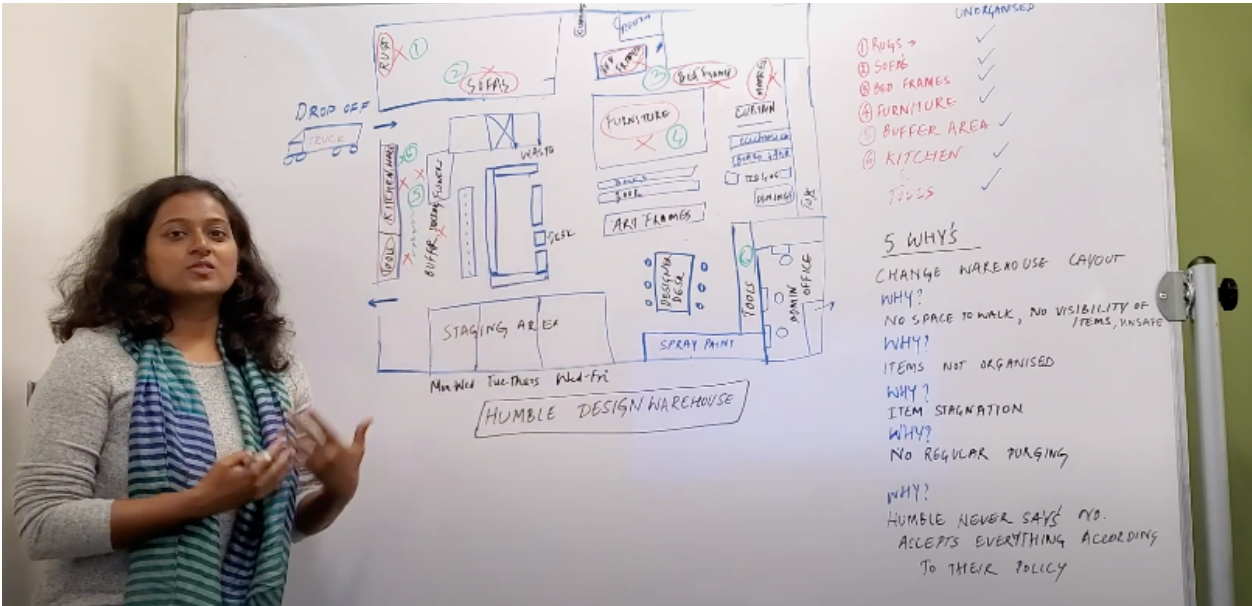
Over the subsequent four semesters, eight other interns working in pairs followed Vasudeva and Sagar, each team working with the staff to build on the improvements made by the previous one. Having interns demonstrating lean

thinking and practice over those two and a half years helped the Humble Design staff see how ongoing day-to-day work making minor improvements over time makes a big impact.

This lesson, according to Corp, was a significant takeaway for the small team with little time to complete big projects. “It’s been important that we’ve [had JPW Fund interns] for more than one semester, to keep building little by little and, at the same time, hoping that when this ends, that we have learned enough to keep going on our own,” she says. “We’re slowly getting better at not starting something really ambitious and then letting it die off, which has been a continual problem,” she says, noting that the staff members have started doing improvement projects without the interns’ help. She describes how the staff recently installed additional shelving in the chair section as an example. “It’s not that we didn’t want to do these things before, but we never made it a priority, because it just seemed overwhelming.”

### Growing the Impact

Though the pandemic interrupted the original JPW Fund growth plans, the LEI board is pleased with the results of these initial experiments. OU and Cal Poly’s internship programs demonstrate the many benefits of reducing the rework in lean education: The students gain hands-on experience practicing lean. The nonprofit organization



Intern Monisha Vasudeva describes how the team identified problem areas within the warehouse layout, then chose where they would focus their improvement efforts.

# Internship Program's Impact Grows Semester by Semester

## Winter 2020

Vasudeva returned to Humble Design with Ansu John, a fellow student in the Industrial and Systems Engineering (ISE) program, to pick up where the first internship left off, working to improve warehouse operations. Their specific plan was to tackle two areas — rugs and chairs — created during the Fall 2019 internship. Then they worked with Corp, Kyles, and the volunteer designers to document standardized work for maintaining order while processing donated items.

Despite the significant disruption caused by the pandemic, they achieved most of their goals. Though they identified a resource for racks to hold the rugs and chairs, they still needed to finalize the sizing for the rug racks and install additional chair racks, which they were unable to do because they couldn't work on-site due to pandemic restrictions.

## Fall 2020

The following semester, Monica Elancheran and Natasha Hampshire, from OU's ISE and Business programs, respectively, took the next steps to organize the rugs and tables while improving and creating standardized work for overall inventory management. Their goals were to help staff and volunteers more easily track the amount of inventory and locate it when designing décor for a home.

Though they reorganized the tables, the interns found that the cost of the rug racks exceeded the budget. So, after brainstorming other options, they designed a rug storage structure to be built, which included a labeling system and standard work for organizing them by size, color, and style (e.g., floral, vintage, modern, etc.).

## Winter 2021

In the Winter 2021 semester, Kaitlyn Trombley, a business major, and Noah Redoute, an engineering student, worked toward improving workflow throughout the warehouse and helping volunteers select and complete tasks independently. To achieve this goal, the interns printed signs to indicate where each type of donation goes and created visual standardized work instruction cards that detail how to do various tasks within each area. Then, they placed the "task cards" where the volunteers do the work and included copies of each in a reference binder for Corp and other staff members. They also printed and posted laminated signs to remind volunteers of safety protocols and created a kanban board where the volunteers can select from the day's tasks, indicating that they are in progress or completed.

## Fall 2021

Finally, in the Fall of 2021, Carly Kallen and Lauren Woolford, both from the ISE program, tackled organizing a warehouse Humble Design Detroit operated as part of a partnership with U-Haul, seeking to free up space in the main warehouse. Building on the work previous interns completed in the main warehouse, they created a storage layout, optimizing it to make it easier to move furniture into and out of the building. The work involved interviewing designers to learn more about their needs and then determining which items to move from the main warehouse to the U-Haul space. Additionally, they completed the first three steps of 5S implementation (sort, set in order, and shine) at the site.

The team improved mattress/box springs inventory tracking, increased access and visibility of most items, established locations (visually indicated with signs) for where to unload incoming donations, discarded unusable furniture, and freed up floor space to meet U-Haul's regulations.

staff learns along with the interns while leveraging the improvements to help more people. Potential employers who hire the JPW Fund interns get employees who can work the lean way from day one.

With these results and the challenges from the pandemic receding, the board is eager to begin planning how to build the program through fundraising and educational partner recruitment. In the meantime, the board continues this internship partnership with the OU-Pawley Lean Institute and plans to work with Cal Poly to explore how it could offer perhaps a second internship.

Though Matt Lovejoy, who, as an LEI board member, led the team creating the internship program, no longer oversees the internship program, he's still a strong supporter. He continues to donate through his company, Lovejoy Industries, Northbrook, Illinois, and attends most student report-outs.

“LEI has been on a mission for 25 years, trying to spread the word about lean, trying to improve the world through lean

concepts and principles,” Lovejoy declares. “That mission needs to continue because lean works, and the more people we enlighten and the more people we get into this way of thinking, the better off we’ll be.”

**“The internship ‘kind of lit a fire under us’ and then helped us figure out what we need to do to have a more efficient and mainly safer warehouse.”**

— Laura Corp., Operations Manager, Humble Design Detroit

Humble Design Detroit’s experience bears out Lovejoy’s assertion. The internship “kind of lit a fire under us and then helped us figure out what we need to do to have a more efficient and mainly safer warehouse,” Corp said. “I think that we have learned a lot, and all of us as a team are slowly learning to think this way.”■

## **JPW Fund Internship Inspires Others to Improve Lean Education**

Reports of the first successful PLI-JPW partnership at Humble Design led to an unexpected boost to OU’s PLI internship offerings — lean practitioners at a nearby Jabil plant contacted OU to see how they could participate. In the early phases, the representatives’ contribution was to help build and install the shelves that the interns had suggested as a countermeasure to cluttered aiseways. Later, Jabil representatives offered coaching and mentorship, funded projects, and donated time to build and install student-designed storage — support needed to help the interns implement the work process improvements they’ve identified.

For the Winter 2021 semester, AT&T Michigan, based in Detroit, and Jabil in Auburn, Hills, Michigan, teamed up with PLI to sponsor an internship at Fleece & Thank You, based in Farmington Hills, Michigan. The nonprofit offers “comfort and connection” to children facing extended hospital stays. The group coordinates the delivery of fleece blankets and a personal video message from the blanket maker to recipients, who then can send a thank-you message to the maker.

The following fall, 2021, Bosch Community Fund, Farmington Hills, stepped up to sponsor the second internship at Fleece & Thank You, focusing on improving quality. Finally, for Winter 2022, AIC-PlastiCo Equipment, Wixom, Michigan, and Jabil joined forces, sponsoring an internship at Fleece & Thank You that targeted improvements in inventory tracking.

The LEI Board applauds these organizations for taking up the challenge of helping to solve the “rework” problem in lean education.

# A Philanthropic ‘Lean Internship’ Experiment Yields Unexpected Question About Purpose

To understand what could work in a hands-on, gemba-based lean learning experience, the LEI’s JPW Fund did what lean practitioners do — they ran a test. Here’s the outcome of one.

Among the many outcomes of continuous improvement practices is one that happens so frequently that it’s become a lean truism. Nevertheless, the result continues to surprise even the most advanced lean practitioners. That truism is that nearly every time you address an issue with lean thinking and practices, you not only make progress toward resolving it. You also uncover more issues to address — and sometimes unexpected ones. This consistent outcome reminds us that lean is about learning as much as it is about removing waste, resolving problems, and improving the work environment.

Such was the case with the partnership between the [James P. Womack Scholarship and Philanthropy Fund \(JPW Fund\)](#) and the [California Polytechnic State University \(Cal Poly\)](#) in San Luis Obispo. The two organizations teamed up to advance the JPW Fund’s goal: to encourage innovative learning experiences in partnership with schools teaching lean thinking and community-based service organizations (CSOs) willing to provide gemba-based learning and improvement opportunities.

The partnership established two scholarships that offer students an at-the-gemba experience — hands-on practice of the lean concepts they learned in the classroom. The primary goal was to have the two interns analyze and improve core processes at a nonprofit organization, thus inspiring the organization to implement lean practices by showing them various methods to improve their operations.

## Experimenting With Pilots

The Cal Poly internship scholarship program was one of two “experiments” the JPW Fund conducted to explore “lean internship” models. At Cal Poly, two interns worked 40 hours per week during the summer alongside the staff, embedded as workers who also demonstrate lean thinking and practices. The other, administered by the Pawley Lean Institute at Oakland University in Richmond Hills, Michigan, features a series of internships. The student intern pairs work 10 hours per week during a semester, leading lean continuous improvement efforts.



*Transitions-Mental Health Association (TMHA) Growing Grounds Nursery in San Luis Obispo, CA.*

A review of both programs serves as a reminder of how effective lean thinking and practices are in reducing waste and, in turn, improving the work environment and performance outcomes. It also demonstrates how the lean community can help CSOs adopt a lean mindset and practices that can help them help more people with fewer



resources. However, it also suggests that lean practitioners may need to consider tailoring how they approach improvement to meet CSOs' needs.

## Exploring a New Way to Teach Lean Thinking and Practice

Eric O. Olsen, a professor in the Industrial Technology department at the University's Orfalea College of Business who teaches lean thinking and continuous improvement courses, oversaw the JPW Fund internships at Cal Poly. In addition to the JPW Fund goals, he sees the internship partnership as an opportunity to offer students lean experiences at nonprofits similar to what the university provides at for-profit companies. Also appealing, he says, was that the internship partnership would give the nonprofit "access to this pool of talent with these kinds of skills where they would otherwise be priced out of the market."

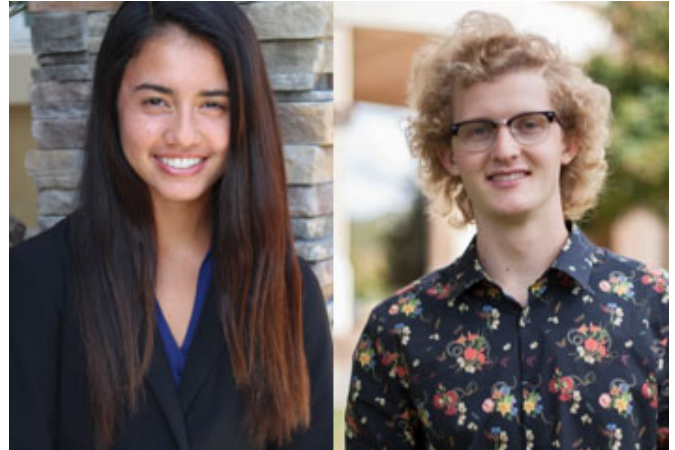
Olsen notes that the scholarship program also fits the goals of [Central Coast Lean](#), a community of practice he founded and heads. With Cal Poly, the organization and its members serve as an ecosystem that teaches and promotes lean management in the area. For example, both organizations arrange for people to practice lean methods at the gemba to complete class projects or attain green and black-belt certifications. "The fact that we're funding students to both learn and also help the nonprofit at the same time, I think that was a very attractive piece of this whole thing," Olsen says. "So, the JPW Fund was a natural fit for us."



**"The fact that we're funding students to both learn and also help the nonprofit at the same time, I think that was a very attractive piece of this whole thing."**

— O. Olsen, Professor, California Polytechnic State University's Orfalea College of Business

Olsen awarded the JPW Fund scholarships to Strow Watson and Bianca Pugliese, both majoring in Industrial



*Cal Poly JPW Fund interns Bianca Pugliese and Strow Watson spent the summer of 2020 working at TMHA's Growing Grounds, teaching and gaining real-world experience in lean thinking and practices. They not only observed but worked in the gemba at the nursery for three weeks before introducing lean concepts to the staff and clients.*

Technology & Packaging. Next, he relied on ad hoc networking to identify a nonprofit, choosing [Transitions-Mental Health Association](#) (TMHA) Growing Grounds Nursery in San Luis Obispo. TMHA provides mental health services throughout the Central Coast of California, including the Growing Grounds Nursery, which provides therapeutic horticulture socialization opportunities, paid employment, and soft job skills training for adults with severe and persistent mental illness. Clients work in the nursery that sustains TMHA by growing and selling plants to retail stores and landscaping companies. The choice of CSO was, in hindsight, particularly appropriate in the context of TMHA's purpose, according to TMHA leaders. They note in a press release about the internship that "A fundamental insight of lean thinking is that by training every person to identify waste and effort in their own job and having them improve their work as a team by eliminating such waste, the resulting organization will deliver value at less expense *while developing every employee's confidence, competence and ability to work with others.*"

## Going to the Gemba

The internship began as most continuous improvement efforts do but with a twist. As usual, the students started by going to the gemba to gain a detailed understanding of the work and note potential areas to improve. However, instead of merely observing, they spent the first three



*Making a layout of the grounds gave the students an appreciation for the organization’s size and scope, allowing them to visualize the various areas — where plants are maintained, the work areas, and a break area — and gather data on the distances, by the number of steps, between them. Ultimately, the interns focused their lean demonstrations on the “Enterprise” building.*

weeks working side-by-side with the TMHA staff and its clients. “They were in the gemba, doing the work,” Olsen recalls. “They were planting and moving plants and selling things, so it wasn’t [only] specifically lean work.” He adds that this approach was “the real needle-mover, what made this project different from the others we had done and was a real improvement.” With the students going in every day and working with people in the organization, “they were building insights [about the organization’s work processes] and trust with the people in the organization,” Olsen explains. (Taking time to build trust is a lesson that any organization looking to introduce lean thinking and practices would be wise to heed.)

In addition to getting to know the work and coworkers, Watson and Pugliese conducted some preliminary analysis to gauge the scope of work, including counting inventory and mapping the nursery layout from a bird’s-eye view to get a sense of the overall work environment and distances between work areas.

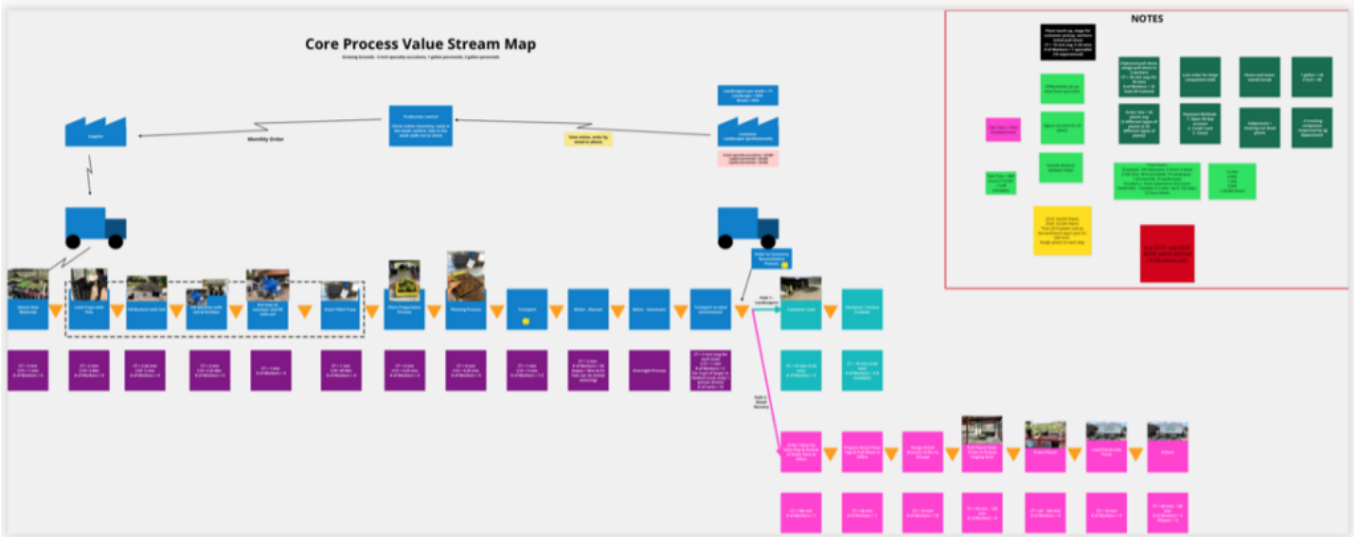
The interns also drew a value-stream map and analyzed the organization’s “core process” of producing four-inch specialty succulents and one- and two-quart perennials from the suppliers’ delivery of seedlings to the Growing Grounds’ delivery to landscapers and retail nurseries.

**Conducting Demonstration Projects**

With the perspective gained from their hands-on work, the value-stream map, and process analysis, the interns, with the TMHA staff and Olsen, determined that the overall goal would be to target their efforts toward expanding production capacity. Since this was a learning experience for the interns and an introduction for the TMHA staff, the team did not identify a specific gap or state a particular goal, as is customary in lean improvement initiatives.

Reviewing the current conditions using the A3 problem-solving process turned up multiple areas needing improvement. Still, the team zeroed in on addressing issues in the potting operation in the “Enterprise” building, which, Olsen recalls, has “more of a manufacturing cell feel to it.” So, it seemed the best area to conduct demonstration projects that would deliver significant performance improvement while offering good hands-on practice for the interns and educating the staff.

During the potting operation housed in the Enterprise building, workers transplant seedlings from trays of 64 into 1-gallon pots, then take the newly potted seedlings to an area outside where they’ll grow to a size ready for sale to the customer.



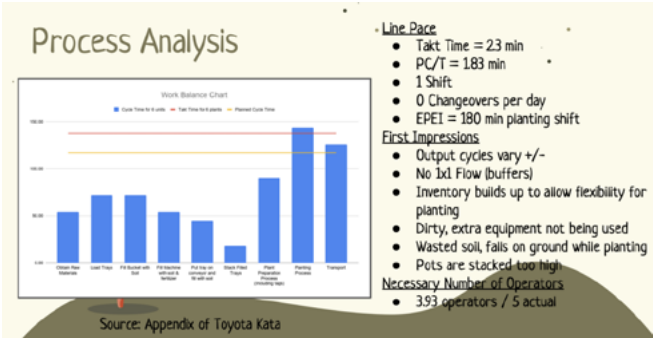
The “Core Processes” value-stream map helped the interns visualize the Growing Grounds’ work processes, from receiving raw material to delivering plants. It also enabled them to identify areas to improve and where they could demonstrate lean practices. The interns, TMHA staff, and Olsen agreed that the potting operation in the Enterprise building would serve these purposes best.

A few specific issues the interns noted in their analysis of the area involved workplace organization and cleanliness, inconsistent work levels, and some confusion about work assignments. They also noticed a lack of standardized work documentation and training on work processes. As a result, addressing these issues became the focus of productivity improvement efforts, culminating in a pull system demonstration.

**Clearing the Way for Improvement**

First, Watson, Pugliese, and Olsen conducted a modified 5S project to improve work area organization and cleanliness. Unable to work with the TMHA staff due to a spike in the pandemic, the three cleaned and cleared the area, taking several items outside. Then, the staff took over, returning only those items they needed to the work area and disposing of the rest. The team finished by creating guidelines to show where tools, supplies, and equipment should go when not in use, including visually marking the locations. They also drafted an end-of-day standardized operating procedure (SOP, aka standardized work) to keep the workspace clean and organized.

Other lean practices that the interns shared with staff included using the flowchart and gemba observation of the potting operation to define and set standardized in-process (SIP) inventory (also called SWIP for standardized work-



The detailed analysis determined the potting line pace and a few areas of improvement, including inventory management, worksite organization and cleanliness, and wasted raw material (soil).

Process:	Enterprise	Who:	Everyone			
Step:	Clean	Step No.:	Last			
		Takt Time:				
		Process Step Cycle Time:				
Sub Step No.	Work Description	Material Required	Equipment Required	Key Points (safety, quality, ease of work)	Time (seconds)	SIP (std Inventory In)
1	Stack any remaining filled trays 5 high against wall					
2	Return bins to shelf in stacks of 4 alternating colors					
3	Brush off dirt from tables and machine onto the floor					
4	Back up floor					
5	Turn off soil filling machine and put cover on machine					
6	Add empty pots in 2 stacks of 50 onto west facing wall near soil filling machine					
7	(Add new cleaning standards here.)					

Though the interns ran out of time before finishing the standardized work for 5S in the Enterprise building, they wrote an initial draft and recommended that the TMHA team complete and follow a plan for keeping the work area clean and organized.



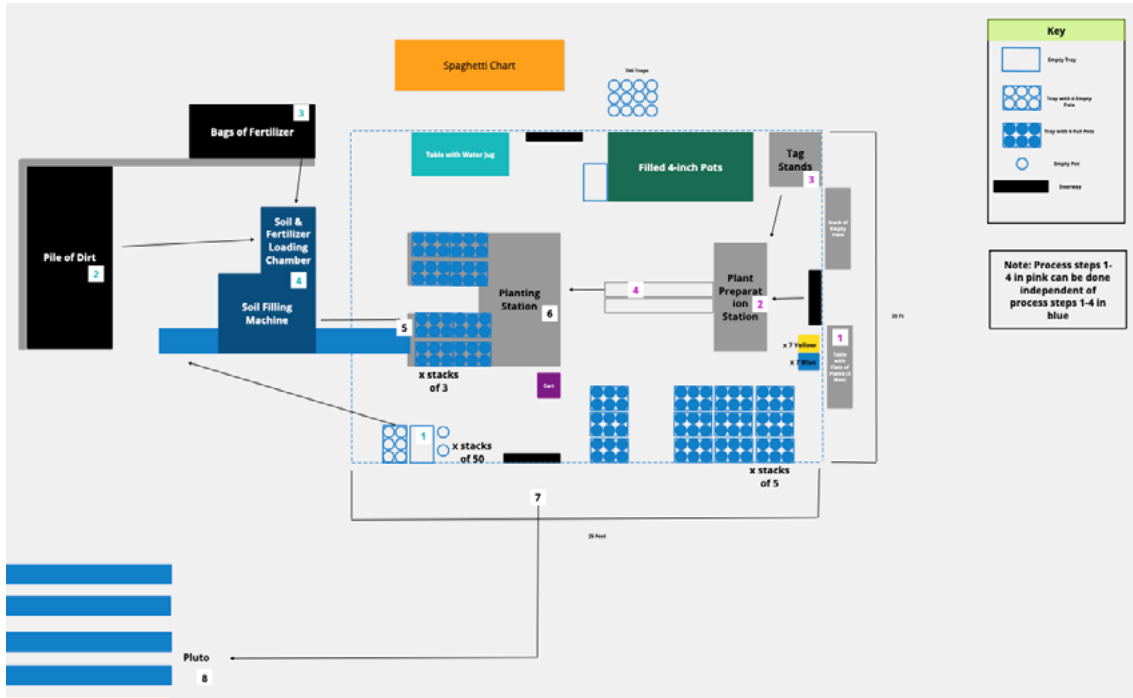


Watch the video: A quick look at the Enterprise potting operation at the beginning of the 5S effort shows wasted soil and fertilizer laying on tables and the ground, a table holding way too many pots in inventory, and a growing discard pile of materials removed from the building. In this 5S, modified due to the Covid-19 pandemic restrictions, the interns completed the 5S, removing what appeared to be unnecessary to complete the task. Then, when the workers took over, they returned a few items necessary to complete the job, as they made the newly organized space their own. Professor Eric O. Olsen narrates.

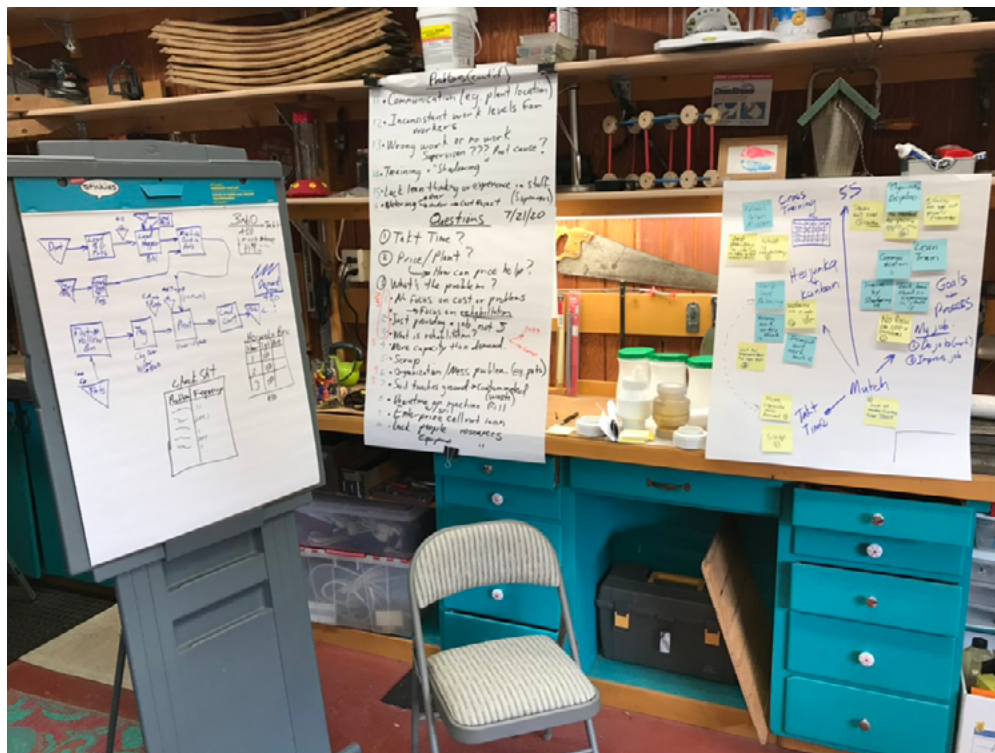


Watch the video: Interns Strow Watson and Bianca Pugliese do some final cleaning up of the Enterprise work area, with tables and floors cleared of soil, amount of inventory (pots) rightsized, and worktables cleared of clutter.

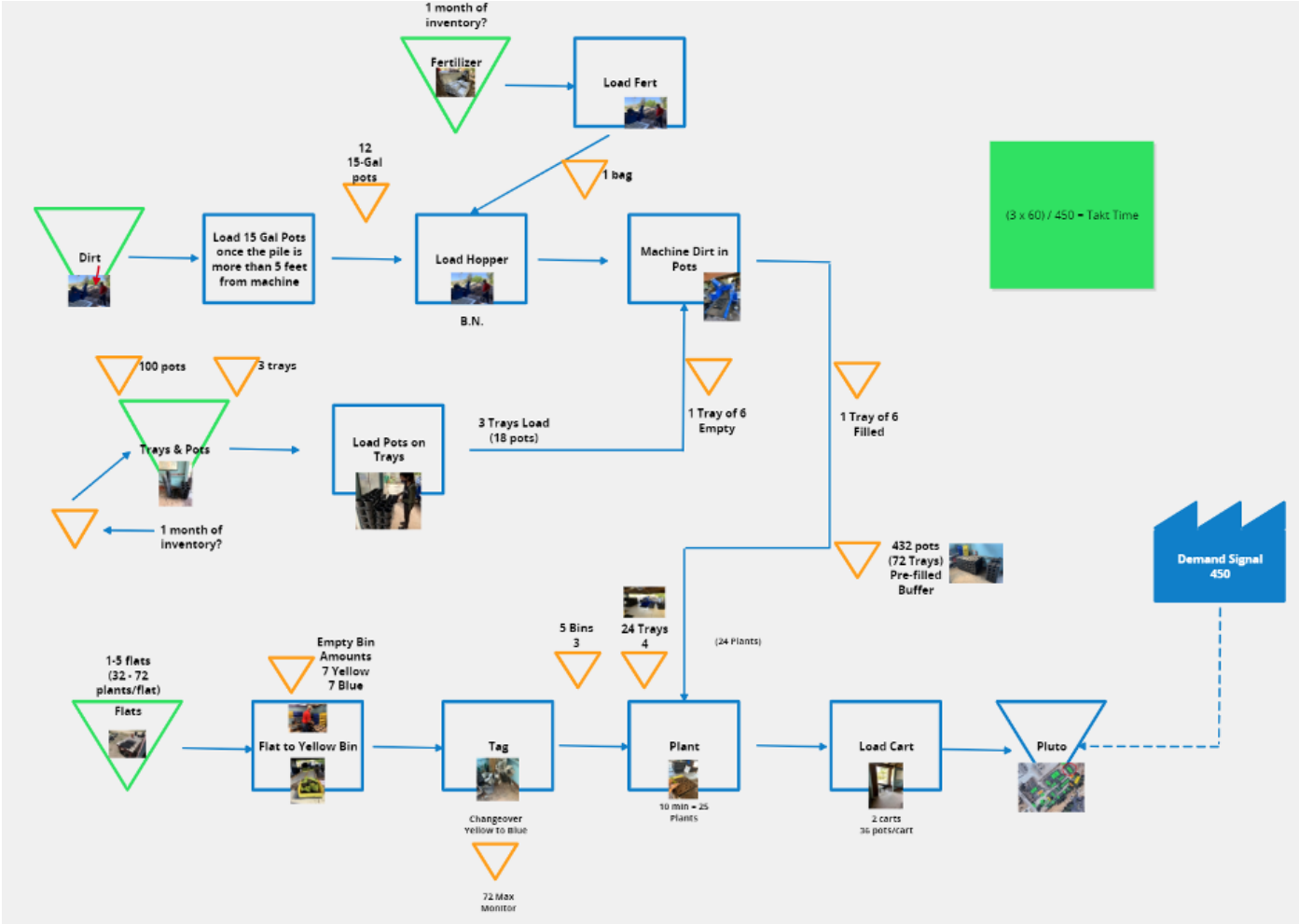




When the staff analyzed the workflow documents drawn by the interns, they realized that the pot-filling process (steps 1 to 4 in blue) could be done independently at a different time than the planting process (steps 1 to 4 in pink), leading them to recommend completing the two tasks at separate times. This change would allow staffing for this work to flex to meet demand.



Because they couldn't meet at Growing Grounds Nursery due to Covid-19 pandemic restrictions, the interns met in Professor Olsen's garage to complete the planning for the pull-system demonstration project.



As part of their pull-system demonstration, the interns shared a more detailed map of the potting process.

in-process) levels at stations requiring work-in-process inventory. They also created standardized work documents to standardize training, govern day-to-day work, and sustain the 5S effort.

They also charted workers’ movements as they completed the work that, with the other analysis, led to a recommendation to change the order of tasks and rearrange communal workspaces to improve the work environment and maximize productivity.

For example, as the interns cleaned and organized the area, they moved the tables, intending to create one continuous flow cell from filling the pots to potting the seedlings. However, with the space cleared, the TMHA staff noticed that the work involves two processes that they could complete separately. They also realized that separating the

two processes would allow them to put away the conveyor belt that leads from the machine to the potting table. Thus, they could free up space and create a walking path between the machine and the table, allowing more workers to simultaneously work at the potting table. Though such an arrangement does not adhere to the lean concept of continuous flow, it suits TMHA’s higher purpose of offering its clients a positive work experience. Having them work together on the same task serves that purpose. Also, the new arrangement helped the staff schedule workers more effectively, enabling them to ramp up the number of potters when orders spike or reduce them when they get fewer orders.

As a result, the team set up the room so the workers could complete the two tasks at different times, recommending that workers complete process A from 9 a.m. to 10 a.m.

daily, which would ensure that Growing Grounds has enough inventory of filled pots ready for planting from 10 a.m. to 1 p.m.

## Setting Up the Pull-System Demonstration

In final preparation for the pull-system demonstration, the interns walked through the process, marking inventory locations and levels and placing the SOPs at each station.

For the pull-system demonstration, Olsen and the interns walked through the entire process with empty pots, explaining how the work tasks progress through the steps, planting the requested number of plants with minimal waste or excess in-process inventory. They also shared a more detailed work process map. Though the interns did not implement a pull system, the demonstration was an opportunity to show its potential benefits. Also, organizing the work to flow this way gets Growing Grounds production closer to a true pull system based on the pull of customer orders, with each step completed at a calculated takt time that levels production and is visually controlled with the kanban system.

Perhaps most important, Olsen recalls, they'd posted the value-stream map and flip charts in the work area during the demonstration, asking the staff to write their ideas about improving the work process, emphasizing that they know best how to do so. Then, "we just had a nice hour-long discussion: 'What do you think and what are your ideas for how to make this better,'" he says. "I think that was really the first time they said, 'oh boy, we can't wait to see what we can do.' We got pretty good buy-in at that point."

## Wrapping Up and Reflecting on the Internship

At the internship's end, the students delivered a presentation to the TMHA leadership summarizing the results and offering a list of several other work process improvement ideas for the staff to consider implementing. Cal Poly, Central Coast Lean, and Olsen continued to support TMHA. For example, several other Cal Poly students completed class projects there, Central Coast Lean granted free access to learning activities, and Olsen led several monthly gemba walks with the nursery manager. Still, eventually, onsite activities ended without daily interaction

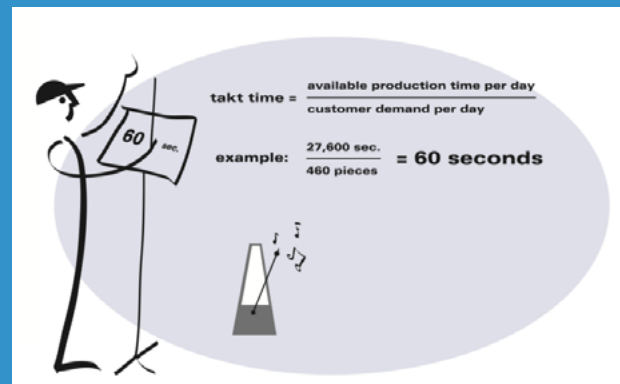
## Kanban

A kanban is a signaling device that gives authorization and instructions for the production or withdrawal (conveyance) of items in a pull system. "Withdrawal" means the conveyance called on by the downstream operation. The term is Japanese for "sign" or "signboard."

Kanban cards are the best-known and most common example of these signals. They often are slips of card stock, sometimes protected in clear vinyl envelopes, stating information such as; part name, part number, external supplier or internal supplying process, pack-out quantity, storage address, and consuming process address

Source: [Lean Lexicon, Fifth Edition](#)

## Takt Time



Takt time is a calculation of the available production time divided by customer demand.

For example, if a widget factory operates 480 minutes per day and customers demand 240 widgets per day, takt time is two minutes. Similarly, if customers want two new products per month, takt time is two weeks. The purpose is to precisely match production with demand. It provides the heartbeat of a lean production system.

due to complications from the pandemic and changes to TMHA's leadership.

**“My staff originally had a healthy dose of skepticism. But that skepticism vanished in about ten minutes, once Strow and Bianca started to make their presentation.”**

— Frank Ricceri, Retired Director of Vocational Programs, TMHA

Overall, TMHA and Olsen rate the internship partnership a success, a three-way win for students, CSOs, and the greater lean community for the JPW scholarship approach. First, it offered students the real-world lean work experience necessary to fully comprehend and appreciate lean concepts and methods. Second, the internship also helped and inspired TMHA to learn and implement lean practices. Notably, the interns convinced the staff about the effectiveness of this new way of thinking and working. “My staff originally had a healthy dose of skepticism,” admits Frank Ricceri, TMHA's now retired director of Vocational Programs. “But that skepticism vanished in about ten minutes once Strow and Bianca started to make their presentation. They had taken the time to work alongside us and understand what we do, and everything they presented made sense and was rooted in our reality. Above all, it benefited our clients — it made their work that much easier and that much more rewarding.”

Finally, it offered the JPW Fund the information it seeks in trying to identify ways to teach students about lean management by providing them at-the-gemba hands-on experience with lean thinking and practices.

### **Adjusting to Meet a Different Core Purpose**

Still, as Olsen reflected on the experience, he realized that, in the future, when helping an organization like

TMHA learn and adopt lean thinking and practices, he'd recommend taking a bit of extra time thinking through the organization's core purpose. For example, though Growing Grounds Nursery's most visible value stream is its work process — planting, growing, and preparing plants for sale and then selling them — its more significant value stream is the help it provides clients. TMHA's primary purpose is to help people struggling with mental illness. So, the nursery's role is to help fund this work while providing job experience and opportunities for people needing transition services.

“It's not only about getting more plants out there and making money, but it's also about developing the people at the same time,” Olsen says. “I understand they could be very compatible goals, but I think we need to scratch our heads a little more about what we emphasize and how we approach that piece of the challenge.”

**“I don't know how many times I have to learn that it's always about learning.”**

— Eric O. Olsen, Professor, Cal Poly

Olsen muses that he thinks identifying this new “people part” of the TMHA internship contributes to moving the JPW Fund internship forward. Though “people development” is a pillar of lean thinking and practice, the goal takes on new meaning in the work TMHA does. “The group overseeing the JPW Fund said, ‘we're not only going to do something, but we're going to find something about how we're going to do this,’” Olsen notes. “Moving into the future, maybe that means we go this way, instead of that way.” Overall, he adds: “We did some good stuff, and I'm asking: What do we do next time? How can we do it a little better? I don't know how many times I have to learn that it's always about learning.” ■



**Suggested Next Steps**

Among several improvement ideas that the interns suggested for future implementation are the following:

**1. Use the Tractor to Reposition and Maintain the Quality of the Soil**

A TMHA associate suggested using the tractor that’s available onsite to maintain a FIFO system for the soil. The current process adds the new soil to the front of the pile, where the person filling the potting machine retrieves it. However, with this approach, the soil in the back dries out, becoming unusable. By moving the old soil to the front and dumping new toward the back, THMA will maintain a FIFO system that ensures soil quality.

**2. Create a “# of Workers vs. Output Matrix” to Help with Scheduling**

Creating a chart showing the number of plants a worker can pot per shift will help TMHA staff schedule the appropriate number of workers to meet output requirements.

	3 hours	1.5 hours
# of workers	# of plants	
1	100	50
2	200	100
3	300	150
4	400	200
5	500	250
6	600	300

**3. Change Workstation Labels**

Since Growing Grounds staff now considers the potting process as two separate processes, it should change each workstation’s label accordingly. Relabeling the work tasks this way would become the new current state, which will help staff better understand the work as it works to improve it. Currently, the two processes are labeled one through four in either pink or blue. With the new approach, the workstations/tasks associated with

process A, the loading-the-machine process (numbered 1 through 4 in blue on the left side of the image above), should be labeled as follows:

- Take trays from the pot tray stacking workstation (inventory) to conveyor leading to soil-filling machine – change from blue 1 to A1
- Transfer soil from inventory to soil and fertilizer loading chamber – change from blue 2 to A2
- Transfer fertilizer from inventory to soil and fertilizer loading chamber – change from blue 3 to A3.
- Operate soil filling machine – change from blue 4 to A4
- Place the soil/fertilizer-filled pots on the planting workstation, where they are ready for the next potting session – black 5

Then workstations for work process B, the potting/ planting process (numbered one through 4 in pink on the right side of the image), should be labeled as follows:

- Move the seedling flats to the “yellow or blue bins” workstation – change from pink 1 to B1
- Take seedlings to the plant preparation workstation – change from pink 2 to B2
- Move tag stands to the plant preparation workstation – change from pink 3 to B3
- Transfer the tagged seedlings to the planting workstation – change from pink 4 to B4
- Transplant the seedlings into the soil/fertilizer-filled pots – black 6

Operators place the newly potted seedlings on the cart (magenta-colored box) to the side of the planting workstation, then wheel them out to the Growing Grounds, where they mature until they are ready for sale.

# Students Take the Lead in JPW Fund Internship

A hands-on, gemba-based “lean internship” gives participants broad-based lean management experience backed by professional and academic coaches.

Lean practitioners understand the need to reflect on or check what they’ve done as part of a lean improvement cycle, but sometimes it’s as — or more — critical to focus on the how. Still, reflecting on the actions taken to improve a work process, while essential, is an often-overlooked practice — and reviewing how leaders led the change, arguably more vital, is even rarer. That requires an in-depth look at how leaders interacted with their direct reports to influence the change. Because how leaders lead a lean improvement cycle matters. Did they coach or command? Show respect or disdain — or worse, indifference? Help employees build their capabilities or merely meet the objective?

“How leaders lead a lean improvement cycle matters.”

Having reflected on the accomplishments of the first wave of interns sponsored by the James P. Womack Scholarship & Philanthropy Fund, the JPW Fund internship leaders are looking deeper into the coaching. Specifically, they’re exploring the specifics of the interactions between the coaches, interns, and host organization’s staff who worked together in what was a learning experience for everyone.

## Determining the Problem and Purpose

When JPW Fund leaders started planning an internship program, they sought to offer students opportunities to practice lean thinking in situations where the outcome matters rather than in simulations in a classroom. The problem to solve, they determined, was to figure out how to teach lean thinking and practices during the college years, so hiring companies wouldn’t have to reeducate (read: rework,

the worst form of waste) students steeped in traditional management and work practices. Then, to connect that mission with LEI’s broader vision of “making things better through lean thinking and practice,” they stipulated that the program would place students at community-service organizations (CSOs), the often money- and time-starved nonprofits dedicated to helping others. The idea was that not only would the interns gain experience with lean thinking and practices, but the CSO staff would also learn and be encouraged to adopt them.

In a couple of experiments to test how this approach would work, the JPW Fund leaders sponsored internships in partnership with two universities: one at Oakland University’s Pawley Lean Institute (OU PLI), Richmond Hills, Michigan, and the other at the California Polytechnic University in San Luis Obispo. For the OU PLI internships,



*Eric Etbington shared his 30-plus years of experience as a lean leader and coach in a wide range of industries. He’s been an LEI lean coach since 2010 and program manager of LEI’s lean product and process development practice since 2016.*



*Matt Zayko, now a lean leader at GE Hitachi Nuclear Energy, draws on over 25 years of experience, much of it gained in staff- and management-level roles under the guidance of former Toyota mentors.*

LEI Coaches Matt Zayko and Eric Ethington — with 25 and 30 years of experience leading lean transformations as executives or coaches, respectively — donated their time to guide the interns. First, Zayko coached four intern teams at Humble Design Detroit, a nonprofit that furnishes homes for individuals and families transitioning out of homelessness. Then Ethington stepped in, coaching the fifth semester at Humble Design and the first intern team at another nonprofit, Leader Dogs for the Blind, a guide dog training organization located in Rochester Hills. (Eric O. Olsen, a professor in the Industrial Technology department at Cal Poly's Orfalea College of Business who teaches lean thinking and continuous improvement courses, coached the Cal Poly team at Transitions-Mental Health Association.)

**“... not only would the interns gain experience with lean thinking and practices, but the CSO staff would also learn and be encouraged to adopt them.”**

The LEI coaches work in tandem with the interns' academic coach Bill Edwards, an instructor in OU's Industrial and Systems Engineering (ISE) department with 20 years of industry experience. Also, the CSO leaders work with the interns on location.

This review focuses on three interns (two internship teams) from OU's ISE program: Carly Kallen, currently a manufacturing group leader intern at General Motors' Lansing, Michigan, facility, who graduates in December, interned at both Humble Design and Leader Dogs for the Blind; Lauren Woolford, who joined Flat Rock, Michigan-based KLA as a data analyst in April (right after graduation), interned at Humble Design with Kallen (and at a JPW Fund-inspired internship at Fleece and Thank You); and Ryan Shore, an industrial engineering intern at BorgWarner, who will graduate December 2025, interned with Kallen at Leader Dogs for the Blind.

## Managing the Work

Generally, the interns spend the first half of the 10-week internship identifying the problem they will address and



*Bill Edwards, an instructor in Oakland University's Industrial and Systems Engineering (ISE) School, combines over 20 years of industry experience with over a decade in academia to support students' classroom and hands-on learning.*

concentrating on the thinking required to identify and fully understand its root cause. During this time, the interns work to deeply understand the situation, determining the improvements that would have the most significant impact.

“We like the lean terminology, ‘decide slowly, implement quickly,’” Edwards explains. “So, we spend a lot of time in upfront thinking — go and see for yourself, put your own eyes on it, get that better understanding, understand it deeply. And then when you've thought it through well enough, it becomes time to execute.”

Chief among this discovery or learning phase is taking the opportunity to join the workers in doing their work to



*JPW Fund interns Lauren Woolford and Carly Kallen credit “going to see” with helping them determine where they could best help Humble Design Detroit help more people*





*Before Woolford and Kallen 5S'd Humble Design's auxiliary warehouse, items were placed randomly throughout the warehouse, making it difficult and time-consuming for designers to locate what they needed for a new home.*



*Afterward, each area within the warehouse housed a particular type of donation, and within each zone, items were organized, making them easy to see. Additionally, since their interviews with the movers revealed that they loaded the beds from the auxiliary warehouse into the truck first, the interns decided to store them near the loading dock.*

experience it firsthand. For example, Kallen and Woolford helped with a Humble Design home setup and move-in reveal. And Kallen and Shore completed — and watched others complete — the Leader Dogs for the Blind “puppy raiser” online application they were working to improve.

“We encourage them to do the work with each person they worked with and see it firsthand,” Zayko explains. He adds that it is vital for students to learn that to “go and see” not only helps you deeply understand the work process but also shows respect to the people who do it. “When you’re advising people on how to improve their work processes, if you’re not doing the work yourself, it’s a disservice,” Zayko says. “It’s disrespectful.” Additionally, combined with a clear grasp of the organization’s mission, understanding the work that goes into fulfilling the organization’s mission in detail — at the task level — helps improvement teams decipher value-added from nonvalue-added work.

Then, following the midpoint review, the interns implement the countermeasures and create related materials to help the staff sustain the improvements. The latter included such activities as printing and posting signage, marking aiseways with tape to visually indicate storage boundaries, writing standardized work, and the like.

## Going to the Gemba

How vital it is to take the time to gain an in-depth understanding of which problem to address was especially evident in Kallen and Woolford’s semester at Humble Design. “We interviewed everyone and anyone — designers, movers, the operations people. Kallen recalls. “Next, we [looked at] what it’s like when they get donations and how that gets unloaded. Then we saw [the designers’] process of picking out and staging items,” she adds.

“We followed them [the designers] around the warehouse to see what their process was, because our original thought was, ‘how can we help them organize this warehouse to make things better for them?’” Kallen explains, adding that they spaghetti-mapped the designer’s movements through the warehouse.

Having considered ideas about how they could streamline the designers’ work, the interns asked a designer whether they could send the bar stools, rarely used in home setups, to the auxiliary warehouse. The designer’s reply was a question: “Have you ever seen the other warehouse?” Since they hadn’t, they went to see it.

“Once we saw the other warehouse, that [original plan] was out the door,” Kallen says. They found the place in such disarray that they didn’t need any other lean practices or tools to decide what to do next. “So that’s when we said, ‘we gotta do a 180 here and see what we can learn about this and what we can do with this,’” she recalls, adding that further investigation revealed other problems.

**“We could have left the warehouse alone and stuck with our original idea, but what impacted the designers and the company more was definitely that second warehouse.”**

— Carly Kallen

“We interviewed the designers again, asking ‘how do you feel about the second warehouse?’ and they said, ‘we don’t like going there.’” They also learned “that since there was no mattress organization over there, they never knew if they had enough mattresses — and there was no way to know because the mattresses might be buried under a couch,” Kallen explains. “So, we said, there are a lot of problems with this. Let’s focus on this. We could have left the warehouse alone and stuck with our original idea, but what impacted the designers and the company more was definitely that second warehouse.” She added that Humble Design staffers “were totally open” with them changing where they would focus their improvement efforts.

So they focused on completing a 5S activity at the warehouse, cleaning and standardizing locations for everything, then applying visual management — hanging up signs and taping off the floor — so the staff could sustain it.

### **Focusing on Lean Thinking**

Since the students had been introduced to the various lean tools and their uses in the classroom, the JPW Fund coaches focus their guidance on encouraging lean thinking. Though the interns use tools and practices, “the coaching is more on developing the thinking and the thought process,

their kaizen mindset, than [teaching] a specific tool,” Zayko explains. For example, the first pair of interns he coached at Humble Design used A3 problem-solving to winnow the myriad improvement opportunities to the most critical — the ones that would have the most impact within the 10-week timeframe. They also created value-stream maps to help them visualize problem areas.

“One of the things that I coached the students on is, just because you have the tool doesn’t necessarily mean you need to use it,” Edwards says. “You need to use the proper tool for the proper job.” For example, with that first Humble Design team, their role “was very exploratory and almost overwhelming,” Edwards recalls. The warehouse was filled with donations that, typical of many CSOs with money and staff constraints, were haphazardly stored, and the interns had to make sense of it. Still, though they identified several bottlenecks that reduced the flow of inventory through the warehouse, “it turned out that one of the best solutions was to do workplace organization [5S]” in a few areas,” he says.

**“Though the interns use tools and practices, “the coaching is more on developing the thinking and the thought process, their kaizen mindset, than [teaching] a specific tool.”**

— Matt Zayko

Notably, the JPW Fund coaches use the same approach to guide the interns as they would use for any other professional, with few exceptions, allowing the situation to determine the specific lean thinking and practices the students would learn. One significant difference, of course, is the time allotted for the improvement effort, which forces the students to scope their work carefully. For example, Edwards recalls one team who “about a week or two before the midterm review, throttled back their expectations about what they were going to accomplish. So they knew they had their hands full and [some of their improvement ideas] might be another team’s project to carry across the finish line.”

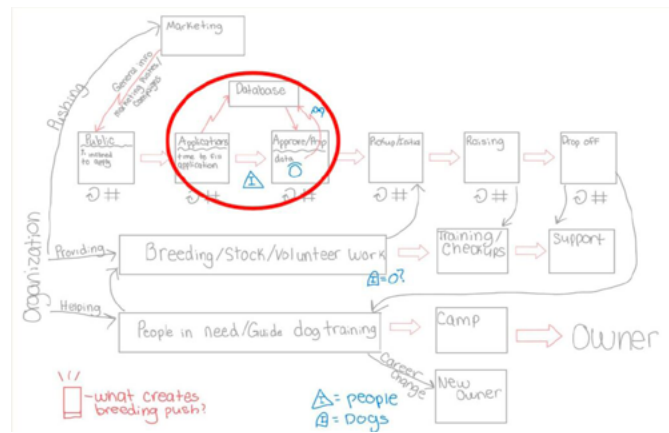
Still, as they would when guiding professionals, the coaches allow the students to discover for themselves whether they need to rescope their plan: “We would ask them, ‘do you think this is attainable?’” Edwards explains. He adds that he sees scoping the work as part of the learning experience. “I think that’s part of connecting the dots, using appropriate tools, synthesizing things, etc.,” he says, noting that the coursework tends to focus on each practice or tool separately. With the JPW Fund internship, they’re pulling together the concepts to resolve a specific issue or achieve a particular goal.

### Coaching to the Situation

The first internship team at Leader Dogs for the Blind experienced an unusual situation requiring particularly flexible coaching and thinking. Instead of being allowed to analyze the situation and identify a problem to resolve, the CSO leadership assigned the interns to improve the online puppy-raiser application. Still, the coaches encouraged the students to use lean thinking and practices to understand and narrow down the problem, brainstorm and evaluate various ways they could resolve it, and define how it would make a difference to the organization. “Lean, in general, focuses a lot on defining the problem,” Shore explains. “But when you’re given a project, it’s still important to understand the problem.”

The coaches encouraged the interns to complete a value-stream map to gain a broader context to make their recommendations. “Even though there was a decision as to where to focus, we had the conversation about how you might map this value stream,” Ethington says. “Because the act of doing a value-stream map has value. In addition to getting a clear “picture” of it for identifying bottlenecks and other issues. You [also] do a value stream map so that the different stakeholders you’re talking to — you can have a better conversation with and get some alignment on ‘why are we looking at this one spot? Why is it important to the overall flow?’ So let’s look at the whole value stream, and let’s have a conversation about why are we focused here — [the reason] is something beyond ‘because the leadership told us to.’”

So, as part of their analysis, the interns completed an end-to-end value-stream map, which starts when a potential



*By mapping the Leader Dogs for the Blind value stream, Kallen and Shore could better see how the puppy-raiser online application process influenced the organization’s ability to help more people.*

puppy raiser fills out an online application and ends when a puppy goes to its new home to help its new owner. “We did a general value-stream map to get a better idea of the organization as a whole and how different areas relate to each other,” Shore explains, adding that the map would also be available and helpful for future interns at the CSO. Kallen adds that the value stream map gave the interns “a bird’s-eye view of Leader Dog,” which helped them understand how each stage of the value stream feeds into and is fed by others. She says the map also helped them “stay in their lane.” They had identified other areas of improvement they would have liked to work on, but knowing the application’s crucial role in the value stream contributed to the overall mission — increasing applicants and application completion rates — kept them focused.

### Adapting Lean Thinking to CSO Processes

Mapping the value stream at Leader Dogs for the Blind was tricky. Since it was not a traditional manufacturing value stream, the interns first had to think through what “product” was flowing through it and what processes added value to the product. This situation, Ethington explains, would be challenging even for someone with experience mapping a manufacturing facility.

With the coaches’ encouragement, Kallen and Shore also followed the A3 thinking process to understand their assigned problem. “We did do some work on that left side [of the A3 document] to support the project they had



given us,” explains Kallen, adding that it was important to her to know how the work she was doing would help the organization fulfill its mission. To justify the problem, Kallen says, “We talked to the people who reviewed the applications to see what they need and what they were looking at and what their process was. Then we got input from people who had filled out the applications, the puppy raisers, and then we were given all of the data of every application from the last four years.”

Shore adds that the A3 thinking “definitely helped with understanding and then solving it,” he says, adding that it clarified “this is why we’re doing this, and this is the kind of impact we’ll see,” once they make the changes and determine how they would work to resolve it.

With the justification clear, the interns started researching how to make the online application more concise and easier to complete so that more applicants would finish the application and get a favorable first impression of the organization. Ultimately, they reasoned, these outcomes would yield more puppy raisers and, in turn, more puppies ready to be trained as service dogs and, therefore, more clients helped. They also noted that a streamlined application would save time for Leader Dog staff because it would reduce the time they spend reviewing completed applications.

“They have all these dogs and all these people that need these dogs. So it was good to see how all those [parts of the value stream] intertwined,” says Kallen, adding: “It almost seems silly that an application being miswritten or not formatted correctly would be the reason these people wouldn’t get a leader dog.”

With the decision on what to improve, lean thinking calls for the students to go to the gemba to see and experience the process firsthand. But they had no physical place to visit. So, instead, says Eric, “We encouraged them to treat it [computer screen] as their gemba.”

So, the students personally filled out the application, and each watched another person completing it, noting where they seemed to have difficulty. They also surveyed puppy raisers who had completed the survey to understand their thoughts about how it could be improved and interviewed

## ‘Seeing’ the Work

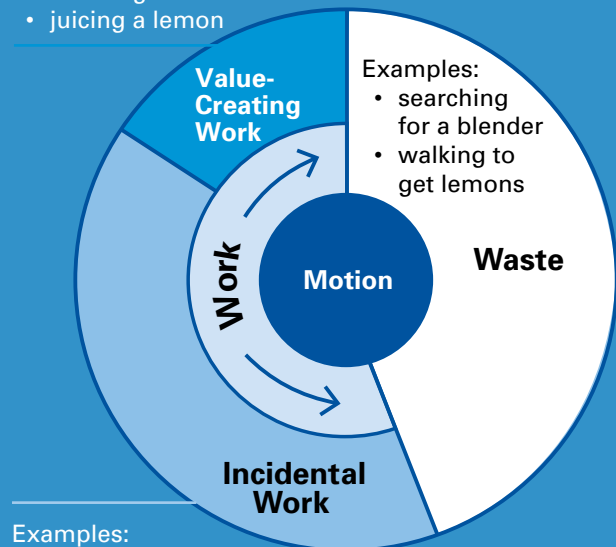
Lean thinking defines work as human actions (motions) involved in producing something of value — products or services. These actions can be divided into three categories.

1. **Value-Creating:** Movements directly necessary for making products, such as welding, drilling, and painting (e.g., chopping garlic, seasoning a tuna steak).
2. **Incidental Work:** Motions that operators must perform to make products but that do not create value from the standpoint of the customer, such as reaching for a tool or clamping a fixture (e.g., picking up a knife, opening a drawer to get a tuna steak).
3. **Waste:** Motions that create no value and can be eliminated, such as walking to get parts or tools that could be positioned within reach (e.g., searching for a knife, walking to a cooler to get tuna)

### Categories of Work Motion

Examples:

- sautéing onions
- juicing a lemon



Examples:

- picking up a knife
- opening a refrigerated drawer

Source: *Lean Lexicon, Fifth Edition*

the volunteer engagement and puppy raiser department staffers to gauge the relative importance of each question on the application.

Notably, as the interns reviewed the application, they viewed it as a process map. Among other things, they evaluated whether the flow of topics made sense, eliminated unnecessary questions, grouped others, and indicated the “branching questions” — those that applicants could skip when they didn’t apply to their situation.

With this specific information guiding their work, they reduced the number of questions from 77 to 47, including 17 branched questions, and the estimated time to complete from 30 to 18 minutes.

### **Coaching, not Directing**

Overall, the interns agree that the JPW internship design and their coaches’ approach were structured yet gave them the encouragement and authority to drive their improvement efforts. By design, the structure ensures accountability while allowing the employee to experiment to learn while improving a work process — which most lean practitioners would consider an ideal supervisor-employee relationship.

Shore particularly appreciated the cadenced coaching check-ins. “Having the weekly meetings with our mentors was nice to keep us on track,” he says. At one of his other internships, he says he had fewer check-ins, giving him more independence. However, “If I had a project I wanted to get done tomorrow but couldn’t get it done, I didn’t have a meeting to talk to anybody about it, so I had to hold myself accountable. He adds that having two interns working together created a situation where they held each other accountable.

The type of guidance was also a plus for Shore. “Having more mentorship in this internship was nice,” he says, recalling that the coaches’ approach leaned more toward having the interns “do the critical thinking for ourselves rather than have them [the coaches] do it.” Instead, he says the coaches asked: “What do you think is the next step here? What do you guys think should be done?”

Kallen also appreciated the weekly cadenced meetings with the coaches and their availability. “If I ever got confused or stuck throughout the week, they would usually jump on a call with me,” she says, recalling that she’d reached out to Ethington to clear up her confusion about value-stream mapping and A3 thinking. “[Ethington] explained [value-stream mapping] to me in our weekly meeting, and then the next weekly meeting we went over it again,” she recalls. “Then he met with me one-on-one, [using] PowerPoint, and talked me through it and how it would be beneficial.” He similarly tutored her to “get her up to speed” about the A3 process.

Overall, for Kallen, the JPW Fund internships at “both Humble Design and Leader Dog were way more structured and coached than my other internships. I felt like I wasn’t ever alone in my decisions. With my other internships, it wasn’t like I didn’t have any support, but [they weren’t] as structured.”

### **Focusing on Leading Change**

One realization that the coaches and interns note upon reflection: the JPW Fund learning emphasizes lean management to a greater degree than they initially thought it would. “These are student-led projects,” Edwards emphasizes. “These internships are not where the advisor or coach is going to take the reins and drive the project.” Instead, he adds that just as lean supervisors would with a junior engineer, the coaches drive results by asking Socratic questions and helping interns evaluate — again through questioning — what they think is going to be the best path. In contrast with the traditional “I’ll tell you what to do” management style, “the students tell us, then we ask ‘what other ideas have you considered? Can you walk me through your thinking on that?’” Edwards explains. “Hopefully, we give them confidence in their decisions by serving as sounding boards.” This approach enables the interns to enhance their skills while significantly improving the work process.

Zayko muses that the JPW interns’ work is much like a lean consultant’s because the students are working with — and even becoming coaches for — people who have little or no experience using lean thinking and practices. “I obviously

interacted with the Humble Design team, but I tried to spend most of my efforts with the interns,” Zayko explains. “That was their opportunity to grow and make low-cost, low-risk mistakes, and that’s the best way to learn.”

He adds: “You’re, coaching interns who are not employees — and they’re students. So that was unique in [that] they are an extension of Humble Design. So, you’re trying to mentor and influence them, and then they, in turn, have to do the same thing for the people at Humble Design. “They were essentially consultants.”

The interns’ situation is “probably even a little tougher than if they were an inside person doing the work, because they’re kind of third-party help for the organization,” Ethington says. “We’re having to do some coaching about how to get people engaged — you’re almost coaching them to be coaches themselves, to a degree.”

The interns agree with those characterizations. Comparing her JPW Fund internship experience with her other four internships, Woolford notes, “In my other internships, my manager was the one who had all the connections with the company, so I’d go through them to get those connections,” she explains. “But in this role, we were the ones who had the direct connections.”

She adds: “I would say for the JPW, it seemed like it was more our project, and we would go to our mentors for occasional help. [In my] other internships, it felt like it was the manager’s project that I’m just helping out.”

Kallen agrees, recalling that during her and Woolford’s Humble Design internship, for example, “after that initial meeting, there wasn’t [much] communication between Humble Design [staff] and our mentors, I don’t think.” Also, she adds, “we pretty much ran the mentor meetings; we would just come with questions and what we wanted to do. Sometimes Lauren and I would be on the phone with them [the coaches] for like five minutes for our weekly meeting, because we didn’t really need any help. We had it under control. So yeah, they were our consultant, and we were their consultant.”

Woolford recalls a similar experience: “We pretty much ran the mentor meetings; we would just come with questions and what we wanted to do,” she says. She noted

that, compared to her other internships, where she had a manager “walking through everything with her, this one was “here’s your mentor that you’ll meet with once a week, but the rest will be you working.”

## **Developing Future Lean Leaders**

Either way it’s characterized — whether a supervisor-junior engineer, consultant-client, or coach-learner relationship — the JPW Fund internships, to date, have provided students with hands-on experience in leading a lean transformation. Being 100% focused on lean learning, led by professional coaches, and putting students in a role where they’re introducing lean thinking and practice concepts to others and resolving real issues, the internship offers a learn-by-doing lean management experience.

With this internship, “we’re setting the students up for success in their professional careers — I think, [with] the tools and experiences, many of these students are going to be tomorrow’s leaders,” Edwards asserts. “One of the things I think it does is give them confidence, with this background, to speak up or be a bit more forward in voicing their thoughts or concerns, because of this hands-on experience,” he adds. “They can draw upon it and say, ‘when we were doing this at Humble Design, we found it effective to do this.’ It’s no longer theoretical.”

The students agree. “I just feel like it was a lot of learning, and I gained a lot out of it. It worked really well with my school schedule; it wasn’t overwhelming,” Kallen says. I really enjoyed it, and it helped me a lot.” She adds that her experience prompted her to write her honors college senior thesis on lean in nonprofits versus manufacturing.

Woolford concurs, noting that the 10-hour commitment was manageable as a student taking other classes while “still giving you experience, not a nine-to-five experience, but still pretty realistic experience.”

Shore liked having the opportunity to see how lean thinking and practices work in a non-manufacturing-oriented, noting that seeing how lean applies to improving the online application “gave me some good experience with working on that sort of [project]. And I think that will definitely help with future projects that I do.” ■





## About The Lean Enterprise Institute

The Lean Enterprise Institute, Inc, was founded in 1997 by management expert James P. Womack, PhD, as a nonprofit research, education, publishing, and conferencing company. As part of its mission to advance lean thinking around the world, LEI supports the Lean Global Network ([leanglobal.org](http://leanglobal.org)), the Lean Education Academic Network ([teachinglean.org](http://teachinglean.org)), and the Healthcare Value Network ([healthcarevalueleaders.org](http://healthcarevalueleaders.org)).

## Continue Your Learning

The Lean Enterprise Institute (LEI) offers a wide range of learning resources, all with the practical knowledge you need to sustain a lean transformation:

### Learning Materials

Our plain-language books, workbooks, leadership guides, and training materials reflect the essence of lean thinking — doing. They draw on years of research and real-world experiences from lean transformations in manufacturing and service organizations to provide tools that you can put to work immediately.

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### Events

Every March, the Lean Summit explores the latest lean concepts and case studies, presented by executives and implementers. Other events focus on an issue or industry, such as starting a lean transformation or implementing lean in healthcare. Check [lean.org](http://lean.org) for details and to get first notice of these limited-attendance events.

### [lean.org](http://lean.org)

A quick and secure sign-up delivers these online learning resources:

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