

DOING MORE WITH LESS – GOING LEAN IN EDUCATION

**Applying Process Improvement
to K-12 Education**

**Betty Ziskovsky, MAT
Joe Ziskovsky, MBA, CLM**



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ABSTRACT

Today's American educators face unprecedented challenges. Formerly setting the standard for excellence, American schools now chase it with sobering implications for the future. Amid societal calls and government mandates for improved student performance, educators find themselves tasked with meeting annually increased performance expectations but doing so with diminishing financial and political influence – essentially, doing more with less. Concerned educators and community leaders searching for an answer will be interested in a highly successful management approach that has been newly revised for education. The approach is based on the work of quality guru W. Edwards Deming who repeatedly demonstrated that excellence can be achieved at the least cost through process improvement.

While originally studied in manufacturing, Deming's principles have proven equally applicable to service industries, including education. Schools and school systems are organizations in which workers must rely on multiple complex processes to accomplish their tasks and provide value to the customer. These processes occur at the administrative, instructional, and student learning levels. Deming's approach, dubbed "Lean Thinking" for its ability to do more with less, focuses on removing steps within these processes that are not necessary and do not add value.

This paper presents a brief overview of Lean management principles and their applicability to education. It also presents a case study demonstrating how Lean Process Improvement has been used to improve education delivery and student performance while simultaneously saving costs.

TODAY'S EDUCATORS ARE EXPECTED TO DO MORE WITH LESS

American educators are faced with seemingly impossible challenges in the 21st century. They are expected to prepare today's youth for work in the international companies that make up our global society using an education system that was developed over 100 years ago to train factory workers to follow directions in American assembly line jobs.

EXPAND SERVICES

In addition to teaching skills in reading, writing, and arithmetic to school-aged youth as they did a century and a half ago, today's educators are expected to provide a laundry list of additional deliverables using that same original system. These deliverables include technical computer skills, often without the benefit of sufficient equipment to accomplish the task, before-and-after school daycare, early childhood and family training programs, expanded curriculum offerings, counseling services, diversity training, post secondary experiences, enrichment and sports programs (and these equitably to both sexes.) Additionally, they must provide federally mandated special education services that are non- or under-funded as well as English as a Second Language services to new immigrants. These language services are expected to overcome all barriers for new English Language Learners so that within one year they can perform at the same level of government-mandated competency in all subject areas as those students whose primary language is English. Our education professionals are expected to provide transportation to and from school as well as community ed programs for adult learners. They must be certified in every area for which they are responsible and maintain that certification by taking ongoing professional development courses. They are also held accountable by federal, state and local governments both for student performance achievement as well as for operating within a budget that must be finalized before government funding allocations have even been determined. Our once simple public education system has become a complex bureaucratic monolith that is often truly beyond the authority of our educators to control.

IMPROVE STUDENT PERFORMANCE

This scenario should provide more than enough stress and pressure for educators. Unfortunately, the challenges do not end there. America spends \$50 billion annually on education (3rd in the world at the primary level and 5th at the secondary level). In spite of our educators' best efforts, the National Assessment of Educational Progress (NAEP) results show that between 67% and 87% of American students cannot perform at the government-mandated competency levels.

MEET GOALS

Educators themselves are frustrated with the system and how it hampers them in achieving desired results. "It's time to admit that public education operates like a planned economy, a bureaucratic system in which everybody's role is spelled out in advance and there are few incentives for innovation and productivity. It's no surprise that our school system doesn't improve," states American Federation of Teachers President Albert Shanker. The system discourages and burns out educators rapidly. American teachers, on average, leave their profession after only three years. Their departure is purely a job dissatisfaction issue - none entered the profession to make money.

KEEP STUDENTS IN SCHOOL

Students, too, are struggling with a system that no longer serves their needs. American high school dropout rates are among the highest in the world with estimates that 2,500 students drop out of secondary school per minute. In some urban metropolitan districts, dropout rates for minority students approach 60%. Only 40% of those students who drop out of high school have jobs, and those jobs don't pay a living wage. One in four who drops out will likely be arrested for crime. These dropout rates have already begun a financial drain on the American economy in such areas as welfare and government assistance, a drain that will only increase significantly over time.

MEET WORKPLACE REQUIREMENTS

Another facet of this economic drain is the loss to the American economy of the potential social and financial contributions these young people would have made had they stayed in school to fully develop their recognized capabilities. Experienced educators and dropouts themselves agree that students who leave the school system do so not because of insufficient intellectual capability, but because they feel the

system/program is boring, out of touch with the real world, and a waste of their time. American business leaders who depend on our education system for their labor resources clamor for better prepared entry-level workers than our system is turning out, including those who do indeed graduate from high school.

DIMINISHING FUNDING

Unfortunately, the situation gets even worse. American society has had a long history of supporting public education. That support began with the indirect authorization in the U.S. Constitution of a public education to "promote the general welfare." Taxpayers, whose money is collected at federal, state, and local levels to fund public education, have routinely and generously approved funding to generation after generation of American learners. Yet even these loyal investors are losing confidence. Overburdened taxpayers across the country have recently demonstrated through failed school levies their disenchantment with the ineffective existing system.

"Training the workforce of tomorrow with the high schools of today is like trying to teach kids about today's computers on a 50 year old mainframe. It's the wrong tool for the times."

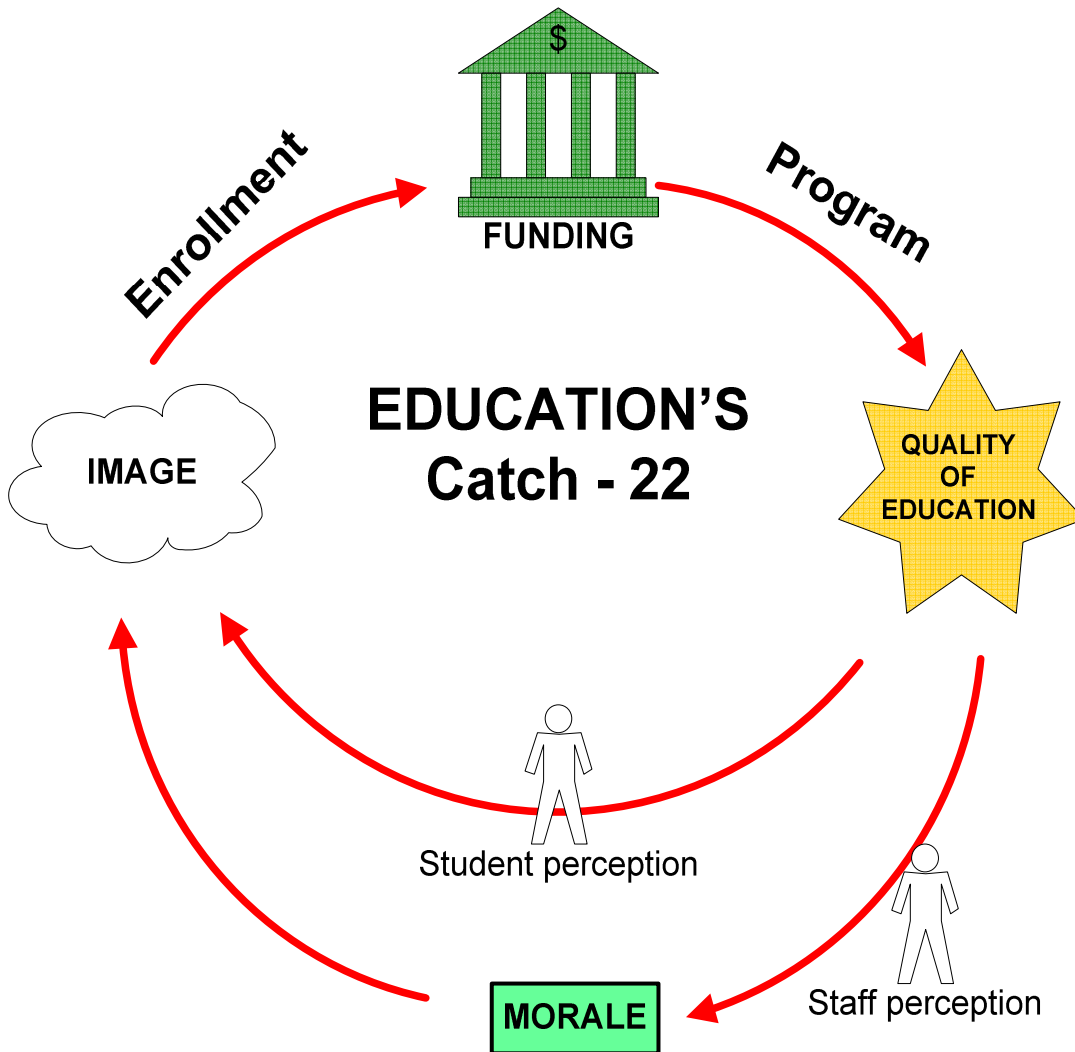
Bill Gates, keynote speech at the 2005 National Summit on High Schools held by the National Governors Association and Achieve, Inc.

"Insufficient academic skills among entry-level workers as well as inadequate abilities to work in teams, think critically and communicate could imperil the success of America's youth and the competitiveness of the U.S. economy."

October 3, 2006 report issued from the following business research consortium partners: The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Research Management.

DWINDLING ENROLLMENT

That perceived loss of a quality education offering in public schools is directly responsible for the introduction and phenomenal mushrooming of both the Home School and Charter School movements. Both are seen by participants as better, more effective, and more controllable delivery systems for quality education. Millions of parents across America have lost faith and/or patience in the traditional public school system. They have transferred their children into home, charter, or private school programs resulting in reduced enrollment and diminished funding. The classic system response to that loss of funding coupled with the aging of communities has been cuts. For many districts this results in school closings, mergers with ensuing loss of identity, staff cuts leading to increased class size, and dropped programs. These actions perpetuate the downward spiral of public education.



THE SOBERING REALITY

The perception of the downward spiral in public education is pervasive. In its 2004 public opinion research, “Equity and Adequacy: Americans Speak Out on Public School Funding,” the Educational Testing Service (ETS) reported that the public “widely perceives waste in education spending and has doubts that additional funding necessarily would lead to a tangible improvement in education quality.” This is sobering news. No longer can educators count on unquestioned community support, either political or financial.

Educators above all other groups understand the consequences to society of not providing expanded services, not meeting performance goals, and not preparing today's youth to succeed in tomorrow's world – they deal with those consequences every day.

Truly, the challenge today's educators face seems impossible. They must provide education services that meet increasing global societal and business demands with diminishing funding and support. In essence, **our 21st century educators are tasked with doing more with less.** Fortunately, others have traveled this road and charted a successful course for educators to follow.

DOING MORE WITH LESS

Many organizations in today's world have faced a similar do-more-with-less challenge. Interestingly, those who have successfully met it, regardless of industry, share a commonality - the focus on process improvement. This approach to improving performance (**doing more**) while using the minimum amount of precious resources (**with less**) has been nicknamed “Lean” by researchers at Massachusetts Institute of Technology (MIT) for its ability to do just that. Lean Process Improvement does NOT equate to layoffs nor downsizing. Rather, the Lean Approach focuses on doing more with existing resources.

NEW RESEARCH POINTS EDUCATORS TO LEAN

In its landmark 2004 study, “Organizational Improvement & Accountability – Lessons for Education From Other Sectors”, the Rand Corporation concluded that Lean Process Improvement offers educators the most powerful improvement and accountability model available to meet the challenges of the 21st century.

LEAN IN EDUCATION

The Rand Study called for the Education Industry to adapt Lean Process Improvement Principles to meet its unique needs. It concluded that schools and school systems could also reap the benefits of Lean that other industries have realized.

WHAT IS LEAN?

Lean is a program of organizational improvement that empowers each and every worker in a school system – from student through superintendent – to increase their personal performance and job satisfaction through process improvement. Lean engages everyone in streamlining their work processes by identifying and eliminating the steps within the process that are wasteful,

unnecessary, or may even prevent them from doing their job. In Lean, the focus of each process step is adding value.

LEAN VIEW OF PROCESS

Everything we do, whether in our personal life or work life, is a function of process - making a sandwich, conducting a meeting, preparing a report – they all are processes. Each process is made up of a series of discrete steps that include a defined beginning step, a defined end step, and multiple steps between the two. This series of process steps yields an intended result (product or service) that is desired (valued) by someone (customer.) The important relationship among customer, value, and process distinguishes the Lean philosophy:

Lean views a process as a function of the value added in each process step as it is perceived by the customer.

In Lean, “Value” is defined as **the worth of something to the customer/end-user as measured by his/her willingness to pay for it in time or money.**

It follows, then, that if a process step doesn’t add value, it shouldn’t be done. Stated another way:

If the customer/end-user doesn’t value what’s done in a process step enough to wait or pay for it, why waste the time, money, and effort to do it?

The answer is you don’t, unless it’s necessary to meet government mandates.

HOW DOES LEAN WORK?

Lean partners school workers from every department and at every level to improve the processes that make up and facilitate the delivery of the education service. It enables and supports those who perform each process and know it most intimately to streamline and cut the wastes of time and resources from the process itself, a little at a time.

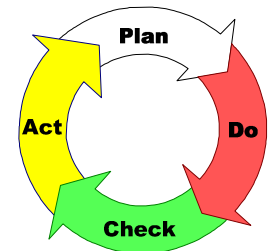
The Lean program is not accomplished by creating more work for already overburdened school employees. Rather, it is a liberating program. It simply allows workers to use their creative genius to do their jobs more effectively and more efficiently.

Lean is a respect-based improvement program. It respects each worker as a human person. It respects each individual's knowledge and contribution. It promotes growth in both areas so workers as well as students learn and improve.

Lean also recognizes the importance of each process and person to the overall success of the organization's mission. With respect as a core value, Lean improves essential trust relationships at the same time it improves processes - worker to worker, worker to company, and company to worker. The health of these relationships directly shapes the image of the organization, both internal and external.

Lean is a dynamic and authentic continuous improvement process. It promotes a constant state of re-evaluation that asks, Can this be done in a better way or with a better outcome? What can be eliminated in the process without reducing value to the customer/end-user? Lean is proactive rather than reactive. It seeks to anticipate and prevent rather than fix and resolve.

Once begun, Lean never ends. Improvements are built upon one another in a recurrent cycle of Plan-Do-Check-Act. Lean is simply the scientific method applied to every facet of operation in a school. People who know their work processes intimately theorize what they can do differently to improve those processes. They test their theory. If the theory works, they implement the improvement and then search for a new improvement theory to test. If the theory doesn't work, they don't implement the change. They then search for another change theory to test. In each case the cycle starts again. Lean is a never ending quest for perfection.



Implementing Lean does not create chaotic anarchy. While workers can independently improve the processes they own, many processes are not wholly owned by one person, but are shared. They may cross departments. In processes that have multiple owners, the proposed change is first reviewed to ensure it is positive for all owners, is in line with vision goals, and meets essential requirements.

The net effect of Lean Process Improvement at both the personal and organizational levels is increased performance, improved satisfaction, and better stewardship of resources (**cost savings.**)

LEAN REQUIREMENTS

A pre-requisite for Lean to be effective and sustainable is strong leadership. Leaders must have a vision for the future and clearly defined goals to achieve it. They must be able to articulate the vision and goals in a way that inspires others to embrace both. All school leaders must be absolutely committed to the program and consistently demonstrate this through their own personal involvement in the continuous improvement process. Lean will always result in improvement. But without the active, ongoing participation and promotion of Lean efforts throughout the organization by top and middle managers/leaders, the program of improvement will not be sustainable.

A second requirement is the development of a Lean Culture. An organization's culture is frequently described as "the way we do things". Often that defines how to stay out of trouble. In organizations with traditional cultures, "staying out of trouble" means not questioning the status quo. Lean can not be supported in a traditional culture **because its essence is to challenge the status quo**. Schools with traditional cultures must transition to a Lean Culture. While challenging, this is not impossible. Cultures, after all, are merely learned habits. Habits can be unlearned and new habits formed. Similarly, new cultures can be cultivated and successfully established. It is not necessary nor is it possible for this transition to happen overnight. Leadership springboards the transformation by showing through action that challenging the status quo will not only be allowed and encouraged, but receive their full support.

RESEARCH SHOWS ALL PROCESSES CAN BE IMPROVED

A core Lean belief is that all processes can be improved. This belief is supported by research findings that suggest **up to 80% of the steps in any process are unnecessary** to achieve the desired process output.

That means the time and resources used in those unnecessary steps could be saved and used elsewhere, to accomplish even more.

The Lean Approach seeks to improve processes by streamlining them. This is accomplished by looking at individual process steps from the end-user's viewpoint to identify, reduce and eventually eliminate anything that does not add value. Anything that does not add value is looked upon as waste. When waste is eliminated, only value remains.

WASTE IS NOBODY'S FRIEND

Waste in any form is never planned. It just happens. Look no further than your own refrigerator to see evidence of this. Leftovers that were intended to be consumed soon somehow are overlooked until they must be discarded because they are no longer fit to eat. The average person does not intend to waste time, motion, effort, talent, assets, nor do they purposefully make errors. But all of these forms of waste happen routinely, accidentally, and to everyone at home and at work.

Waste is not an easy thing for anyone to talk about. It's even more difficult – sometimes outright dangerous - to admit responsibility for waste. While people readily acknowledge that no one is perfect, it is very difficult for them to acknowledge that they could improve. That is often viewed as an admission of deficiency, or that their contributions aren't valuable. The reality, however, is that no one is perfect and everyone can improve. Lean approaches waste identification on a strictly **impersonal** basis – the waste is found in the **process**, not in the people.

Lean also acknowledges that because this is not a perfect world, **there will never be a time when some waste doesn't exist. Not acknowledging that waste can and does exist in every process is essentially being unrealistic.** It will also prohibit the possibility for improvement.

ORIGINS OF LEAN

The concept of “Lean” is most commonly associated with Japanese manufacturing, particularly the Toyota Production System (TPS). But Lean foundations lie in the Socratic Method of questioning, the development of hypothesis and data driven analysis in the Scientific Method, Henry Ford’s empowerment of people to improve the processes they perform, and the principles of creating a world class organization through continuous improvement developed by quality expert W. Edwards Deming. Toyota recognized the implications and applied the collective genius of these predecessors to its small manufacturing operation. It then refined and expanded its process-improvement-through-waste-elimination focus to include enterprise-wide operations. Today, the TPS philosophy and methodology – commonly known as LEAN and also referred to as The Problem Solving Approach - has become synonymous with the dedicated pursuit of excellence.

LEAN PRODUCES THE SAME RESULTS FOR EVERY INDUSTRY

Lean thinking is NOT a manufacturing tactic nor is it a cost reduction program. It is a continuous improvement strategy with universal application because its emphasis is on improving processes. The Lean Approach puts the customer first, develops thinking people, and creates a workplace that actively supports and nurtures real ongoing improvement. Lean applications have been effective and successful in every industry in which they have been applied including service industries such as banking, law enforcement, insurance, uniformed services, city and state government agencies, service bureaus, and most recently, health care. When tailored to the individual organization’s specific needs and systemically applied, Lean Process Improvement has produced the same outcomes, regardless of industry:

- Increased performance
- Increased delivery/effectiveness
- Cost savings
- Increased employee satisfaction
- Increased customer satisfaction/quality

THE IMPACT OF APPLYING LEAN PRINCIPLES IN INDUSTRY

Industry Averages	
Direct Labor /Productivity Improvement	45 – 75%
Cost Savings	25 – 55 %
Space Reduced	35 – 50%
Inventory Reduced	60 – 90%
Rework time reduced (redundant)	50 – 90%
Delivery Improvement	60 – 90%

Summarized results, subsequent to a 5 year evaluation from numerous companies. Companies ranged from 1 – 7 years in lean principles application/execution.

Source: Virginia Mason Medical Center

LAW ENFORCEMENT

In 2005, the Los Angeles Police Department, a pioneer in introducing Lean to the law enforcement industry, saved 2083 personnel hours in the jail booking process alone.

BANKING AND FINANCE

In 2000, Jefferson Pilot Financial streamlined its insurance and annuities processes, thereby reducing workload by 45%.

AEROSPACE / MILITARY

Using Lean principles and tools, Letterkenny Army Maintenance Depot transformed its operation in 3 years from the U.S. Army's worst to its best performing depot in terms of productivity and cost efficiency.

- Won the Public Sector Shingo Prize
- Increased its productivity by 312%
- Achieved a quality rating of 99.993%
- Expanded capacity without increasing personnel
- Accomplishments spared it from de-activation, saving over 1,800 jobs

HEALTHCARE

Lean has been selectively used in the healthcare industry since 2003. While utilized for only a short time, the results have been dramatic:

- In 2004, Park Nicollet in Minnesota achieved a \$7.5 million savings in just one year.
- Pittsburgh Veterans Administration Healthcare System reduced hospital-acquired, bacteria-resistant life threatening infections by 85%.
- Virginia Mason Medical Center in Washington maximized its existing resources thus rendering unnecessary a \$10 million capital expansion plan while still meeting the demand for increased services.

There is no question that these same outcomes can benefit the education industry.

LEAN PROCESS IMPROVEMENT IS APPLICABLE TO EDUCATION

“Education” is the term used to collectively describe the **SYSTEM OF PROCESSES** involved in providing and supporting the development of knowledge, skill, and reasoning in a student or student community. In fact, every job in education from student through superintendent is defined by the processes of that individual's responsibilities. Processes make up the education service.

EXAMPLES OF REPRESENTATIVE SCHOOL PROCESSES

Accounting/Business Management/Payroll	Mentor
Budgeting	Negotiations
Certification	Office
Communications	Parent/Community Involvement
Community Education	Personnel/Human Resources
Conferences	Referrals/ Child Study
Custodial/Maintenance	Report cards/student data management
Due Process	Reporting
Emergency Procedures	Special Education
Field Trips/Activities	Student Registration
Food Service	Teaching and Instruction
Fundraisers	Technology
Grade Level/Team/Classroom	Testing
Learning	Transportation

Education is a system full of processes. That means that every school and school district abounds with process improvement opportunities, opportunities not only to improve service and performance, but to reduce the associated costs of waste. And, yes, waste is incredibly costly.

Process waste directly causes:

IN AMERICAN INDUSTRY	IN AMERICAN EDUCATION (EXAMPLES)
inefficiency	1 st and 3 rd in the world in education spending (\$50 billion annually) to rank lower in achievement than some third world countries
diminished performance	67% + of students tested on NAEP cannot perform at required “proficient” level
process delays	Number of meetings, committees, task forces, advisory boards; re-scheduled IEP meetings
variation in the quality of the process outcome	unmet AYP
increased costs	greater % of budget needed just to maintain status quo
Unnecessary consumption of resources	communication redundancies and inefficiencies

Process Improvement offers schools the opportunity to realize their full potential, to maximize education service delivery and support.

LEAN EDUCATION – A VISION FOR EDUCATORS

The concept of continuous improvement is not an unfamiliar one to educators. It is the rare school or district that does not employ some form of Total Quality Management (TQM) or Continuous Improvement Plan (CIP). These strategic models often guide the development of achievement goals for schools and districts that employ them but offer no real practical means to achieve these goals. In many schools and districts, the tactical means to achieving strategic process goals are ultimately determined by people far removed from the actual process itself. This situation actually inhibits or prevents TQM and CIP since plans are often dictated and not owned. That frequently leads to resistance both by individuals and groups, ultimately resulting in incomplete or failed implementation of the plan.

Lean, on the other hand, offers the missing tactical piece – the plan, the tools, the methodologies, and the respect for the untapped expertise of process owners – to achieve strategic goals. Lean is fully compatible with existing TQM and CIP models. It can also be used as a stand-alone CIP.

IMAGINE YOUR LEAN SCHOOL

Any system based on Lean is ultimately a creative operation. It is a system that creates value for its customers, both internal and external, and for society as a whole. A Lean school system respects, involves, and serves all of its people, its community, and the environment. A CORE TENET OF LEAN IS IMPROVING PEOPLE FIRST – it values growth and satisfaction. Every person – not just students - learns and improves every day in an environment of trust and stability, thus promoting high performance. A Lean School is a place that everyone wants to be part of and support – students, staff, parents, and community members alike.

A Lean School System pursues a common vision and clear goals that everyone both owns and understands. It anticipates, identifies and solves problems throughout the workplace. It effectively and efficiently produces and delivers quality education goods and services to meet customer demand.

A Lean school system is stable yet flexible. It is responsive. It facilitates open and multi-directional communication. It engenders positive image, cooperation, teamwork, and success. A Lean school demonstrates a CAN-DO attitude and a track record of improvement. It promotes not only the use of best practices, but their discovery and development.

IMAGINE THE IMPACT LEAN COULD MAKE

The goal of a Lean education system is to allow educators to perform the work they went into education to do. To get an idea of what this could mean, answer the following questions with regard to your own job:

- What things keep you from doing your work?
- What is something you should not have to do?
- What would make your work easier?
- What would make your work more satisfying?
- What would improve the skills and capabilities of those who work for you?
- What would improve your work environment?
- What would make you more successful in your job?

Imagine you could resolve those issues. What difference would that change make in your attitude, your available time, your achievements, your performance, your feeling of fulfillment, your enthusiasm, and your level of stress and frustration? Now expand that thought outward throughout the organization. What cumulative difference would it make if all your co-workers could resolve their own version of those issues? Imagine the possibilities for individuals and your organization as a whole – how much more could be accomplished? That is the focus, power, and ultimate purpose of Lean.

SUCCESS STORY – A REPRESENTATIVE CASE STUDY OF LEAN APPLICATION TO IMPROVE STUDENT LEARNING

While Lean Process Improvement is a relatively new concept for the education industry as a whole, some forward thinking educators have applied this powerful approach specifically to discover ways to improve student learning. The results of these pioneering efforts to identify and eliminate waste in the teaching and learning processes are consistent with the results experienced by other Lean organizations – improved performance with cost savings.

STUDY SUMMARY

Facility:

Small private middle school in a suburban metropolitan area.

The Problem:

Several teaching staff observed their ability to meet curriculum delivery goals diminished annually. These staff members were seasoned teachers. They could not attribute their failure to complete the curriculum to any student-related challenges. All were highly organized individuals who developed and faithfully followed a curriculum delivery plan that had provided for successful completion of the goals in prior years. Yet several remarked that over the past three years they had had to cut out more and more of the enrichment and extension activities that were part of their curriculum in order to just cover basic material superficially. Each also expressed concern that in the current state, they were unable to provide students with enough applied practice to facilitate mastery of the skills taught.

Lean Application (What was done):

After an analytic discussion of potential causes by the grade level teaching team, one teacher questioned whether invasion of instructional time was responsible for the situation. This teacher persuaded the team to track and record all invasions to their scheduled instructional time. A log-type metric was determined as the best way to collect data for this purpose. A one page sheet was developed which recorded the teacher's name, affected class, starting and end times of the interruption, and the nature of the interruption. This sheet was distributed to team members prior to the first day of classes. All team members agreed to keep the detailed record of their lost time for the entire school year and participate in a collective examination of the gathered data immediately after students had been dismissed in the spring. Parameters for record keeping were standardized before data collection began at the end of August. All interruptions would be tracked. Teachers would document both their teaching class interruptions as well as lost

instructional time for their homeroom students. This data was collected for approximately nine months in this fashion. While team members informally commented to each other about the progression of the data collection during the school year, no formal review was planned until after school was dismissed in June. This delayed evaluation was done purposefully since many interruptions were seasonal.

Findings & Results:

Team members were astonished at what they found. Each data collection sheet had lines for 40 interruption events. It was anticipated that perhaps one sheet would be needed by each teacher to fully document the invasions. But as team members completed one, then two, then finally the sixth sheet, it became obvious how invisible the myriad of these invasive events had become within the daily school routines. The collected data showed a uniform loss of nearly 140 hours of instructional time – the equivalent of nearly five weeks of eight hour teaching days for each teacher. No wonder curricular goals weren't being met! It also represented an equivalent loss of student learning time.

Using the data collected, team members categorized and prioritized the types of invasions based on the value they added to meeting curricular goals for student learning. Four categories were identified under which all interruptions could be classified:

- 1) those that are completely aligned with and add value to the curriculum – e.g. some (but not all) field trips, curricular fairs (some dependent upon grade level);
- 2) necessary but non value-adding activities – e.g. government or district mandated achievement testing, fire and tornado drills;
- 3) activities that are unnecessary but somewhat support the curriculum – e.g. club competitions, some field trips and visiting speakers;
- 4) activities that may add value to the learning community but are not curricular in nature or do not directly support the curriculum – e.g. student pictures, fundraising events.

The teaching team found that the majority of interruptions fell within categories 3 and 4.

A cross functional team involving teachers, the Assistant Principal, and a volunteer coordinator was formed to review how such invasions were approved and scheduled. It was determined that the majority of the interruptions:

- were not scheduled at the beginning of the school year;
- affected multiple teachers rather than one person only
- were often scheduled at the convenience of the requestor rather than at the convenience of teaching staff
- were scheduled without consideration for the impact/timing of the interruption on the curricular program
- resulted from: 1) administration authorizing time for activities without input from affected staff, and 2) individual staff members scheduling extra time for curricular activities like field trips which affected other teachers' instructional time and without provision for making up the lost time.

Additionally, it was noted that a number of interruptions were scheduled with less than 24 hours notice to teaching staff.

While the motive for scheduling events during instructional time was always to enhance the school experience, the cross-functional team concluded that the lost instructional time resulting from these events actually detracted from the student learning component of the school mission. The team developed a strategic plan for protecting instructional time from unwarranted loss. An important goal of that plan was the preservation of scheduled instructional time. The team acknowledged that some invasions of instructional time could not be prevented, but could be controlled better by re-designing the authorization process and broadening its oversight. The tactical means to accomplish this was also determined. It involved the identification and selection of criteria by which requests for instructional time would be evaluated, higher levels of collaborative pre-planning of the schedule prior to the beginning of the school year, increased communication and cooperation among staff, drop dead dates for schedule changes throughout the year, and the involvement of every affected teacher in the decision to invade his/her instructional time. Teachers could no longer schedule field trips for their curriculum during another teacher's instructional time without first providing a reclamation plan to make up the lost instructional time to the affected teacher.

The team also sought alternative ways to offer the invasive activities without using instructional time. This turned out to be not as difficult as anticipated but involved the collaboration of additional staff including custodians and kitchen service. For example, school pictures had traditionally disrupted classes on three days during the school year – one for individual student and class photos, a second for re-takes, and a third for group photos. The solution was to have the photographer take individual student photos during the school Open House night. (This also eliminated paperwork and money collection and tracking by teachers later on.) Retakes were scheduled by appointment during one day of parent-teacher conferences, and class and group shots were accomplished during and immediately following one day's lunch periods. Toyota's Lean Supplier demands were implemented. When the photographer initially balked at meeting the school's time requirements, staff informed the photographer that if the requirements could not be met, another photographer that could meet them would be found. The original photographer was able to meet the requirements in order to keep the school's business.

Ultimately, the application of Lean Process Improvement tools and methodologies led to the possible recovery of nearly 120 hours instructional time for each middle school teacher and their ability to complete curricular goals. This, of course, would also translate into more comprehensive exposure and learning at the student level.

The cross-functional team presented the recommended strategic and tactical plans for improvement to administration for final approval and implementation.

Administration chose not to implement the recommendation plan. Two reasons were offered: "that's not the way we do things" and "it would take too much work." In spite of this decision, the team's Lean endeavor resulted in both valuable learned lessons and positive outcomes.

Lessons Learned:

Lesson 1: Having an administrative representative as a participating member of the cross functional team was insufficient. Even though this person bought into the process because she was part of it, saw the logic of all the perspectives presented, and was convinced of the certainty of the resulting improvements, she wasn't the final decision maker. Lean won't get off the ground at the organizational level if top leadership doesn't totally embrace the concept and isn't personally and actively involved in the improvement process.

Lesson 2: In spite of administration's lack of support, the individual participants learned a lot from the exercise, especially what each individual could accomplish in applying increased communication and pre-planning efforts into interactions with other team members. While they could not secure input in the Principal's scheduling of events that infringed on their instructional time, the teaching team could control the interruptions they themselves had caused. Accordingly, they met prior to the start of school the next fall for collaborative pre-planning. As a team, teachers evaluated each proposed special activity to ensure it actually added value to the curriculum before they included it in the schedule. Once non value-adding activities had been eliminated from consideration, the remaining activities were scheduled in a way that preserved every individual's instructional time. In some cases, this meant class time swaps or make-up classes on the invasive person's time to ensure each teacher's total number of instructional hours was preserved, at least by the team itself.

Lesson 3: A systemic lean attempt may be squashed from above, but there is the capability of an individual teacher or team of teachers to apply lean principles on a more limited basis within the sphere of their own influence and authority. The teachers implemented their classroom changes quietly. Making waves in a command and control environment in which the only good idea comes from the boss can sometimes be a risky endeavor. The team wondered whether they would have had a different outcome if they somehow could have made the Lean effort the Principal's idea.

Lesson 4: Lean can be effective in improving learning even if it is managed at the classroom level. Student performance did improve through the eliminate-the-non-value-added approach to curriculum design and delivery. Time previously spent on superfluous activities was then replaced with curriculum-related ones, resulting in students actually receiving instruction on more curriculum. Measured school performance scores on standardized tests did improve in varying degrees.

In the curricular area of geography, the school score went from "Needs Improvement" to "Area of Proficiency" in one year. The teacher of this class attributed the significant improvement to two Lean initiatives she had implemented in her classroom practice: 1) she load leveled her curriculum, and 2) she involved her students in applying lean principles to their own learning processes.

Other outcomes:

Teachers reported gaining a broadened understanding of what other team members were including in their curriculum. This bigger picture perspective enabled the team to make

additional connections to each other's work, thus reinforcing student learning. Several teachers expanded the application of lean methodologies to improve their individual teaching practices. They shared their experiences with other team members.

With better communication and collaborative planning, teachers were able to reclaim a good percentage of the lost instructional time, but certainly not as much as they could have with administrative cooperation. The amount of reclaimed hours varied by teacher due to whose class time was impacted by unanticipated interruptions. One teacher reported recovering 44 teaching hours. No team member felt they covered their curriculum in the depth they knew was possible, but most were able to add back in some of the lost enrichment activities.

All school processes are potential targets for improvement.

All school processes exist to support student learning.

Improve the processes –

improve the delivery of education services –

improve the learning.

IMPROVEMENT REQUIRES TIME

Toyota began its improvement journey immediately following World War II. Starting from scratch as a small postwar operation, Toyota spent the next 60 years developing and refining its process improvement model through trial and error, and expanding it from simple manufacturing to include enterprise-wide operations. In 2007, Toyota became the world's largest and most profitable automaker.

World-class organizations – those who want to be competitive in our global world – have adopted the Lean model to their own operations and begun similar improvement journeys. Improvement, as Toyota demonstrated, does not happen overnight. Improvement is indeed a journey.

It takes time to figure out what and how to improve. Thanks to Toyota, the model to accomplish improvement is done. It's called Lean.

The time to take the first step and begin your school's Lean improvement journey is NOW.

CONCLUSION

Lean Management is not a new concept, but it is new for the Education industry. There is no question that differences exist between the products of a manufacturing assembly line and those of an education service. But a huge similarity exists in the delivery systems of these organizations, delivery systems made up of thousands of complex processes. As such, many aspects of Toyota's process improvement methodologies and other Lean tools can and do apply to improving the processes of delivering education.

Forward thinking educators recognize both the application and the implications Lean has for improving their school operations and program outcomes. The consistency with which Lean has delivered such improvements in every industry that has applied them demonstrates the universality of its principles. Lean Process Improvement, even in its limited introduction within education, has resulted in increased performance with cost savings.

Lean school cultures promote a positive **CAN-DO** attitude, greater involvement and vested ownership in improving processes that support student learning. School leaders determined to meet today's challenge of doing more with less should give Lean Process Improvement close consideration. It is an effective way for schools to develop and deliver world-class education with currently available funding.

Lean experts can be found with impressive credentials and years of experience guiding process improvement efforts in manufacturing and service businesses. However, unlike products or services that are produced or delivered in assembly line fashion, students are not designed to be replicas of each other. Nor do they flow through a production or service line one at a time.

Only experienced educators can fully comprehend the numerous variables that affect an individual student's learning and how those variables affect the end product – an educated human being ready for work, higher education, and competition in a global economy. As the representative case study demonstrates, there are people experienced in applying Lean Principles to the processes inherent in Education. Successful educators in today's world, like successful business people, are those who determine how to meet its challenge by doing more with less.

For more information, contact:

Betty Ziskovsky
Lean Education Enterprises, Inc.
4800 Kent Street
Shoreview, Minnesota 55126
651/208-1293
bz@leaneducation.com
www.leaneducation.com

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