

7-7-2022

A Blueprint for a Collaborative Learning Organization: Lean Methodology as a Framework for Secondary Teacher Teams

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A Blueprint for a Collaborative Learning Organization:
Lean Methodology as a Framework for Secondary Teacher Teams

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Master of Arts in Educational Leadership

ED 590: Research & Complete Capstone Cohort # 3097

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June 18, 2022

DEDICATION

Emily, Warren, Benjamin, Boomer

and our

2016 Toyota Sienna

ACKNOWLEDGMENTS

Peggy Nayar, Christina Babadjanian, Heidi Dunlap, Dawn Ransom, Shane O'Reilly, LaNisha Paddock, Ishmael Robinson, Kristin Carlson, Elizabeth Schmit, Toni Radcliff, Abbie Leier-Murphy, Molly Sanders, Samantha Emmons, Samantha Olson, Joe Gwin, Andrew Lindberg, Mark Thomsen, Jodi Grote-Stumpf, Marea Merrill, Hamilton Bell, Oulia Yang, Wendy Aro, Lynn Bourgoyne, Amanda Herrera-Gundale, Debbie Bell, Lesly Gamez, Ronald Goldstein, Nancy Westbrook, Mary Green, Rebekah Doyle, Sharon Meyerring, Cedric Baker, Dr. Joe Gothard, and anyone else who said "Yes!"

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Abstract

Teacher teams such as Professional Learning Communities (PLCs), and similar cooperative teams, have been identified as instrumental in improving student outcomes. At the same time, the importance of a collaborative approach to evaluating data and refining practice has been recognized (Graham, 2007; Sigurðardóttir, 2010). Often however, teacher teams do not have the resources available to them to ensure their success. This paper examined current research regarding several internal and external factors that impact the success of teacher teams such as PLCs. A review of the literature suggested that within teams, trust amongst team members is a predominant indicator of the team's likelihood of success. Studies further suggest that external systems and structures must be in place so that teams have adequate, undistracted time to meet and complete their work. Lean Methodology as pioneered by Toyota (2019) and Womack & Jones (2003) is a framework for continuous improvement that has been in place for decades in fields such as manufacturing and healthcare, and that may offer a way for teacher teams and the systems and structures that support them to thrive in a resource constrained environment.

Keywords: Lean Methodology, Secondary Education, Teacher Teams, Collaborative Learning Organization, Collective Efficacy, Professional Learning Communities (PLCs), Professional Development

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Chapter One: Introduction

Ancient Egypt produced two iconic symbols with remarkably oppositional symbolism: the pyramid and the ouroboros; the ancient symbol of a snake consuming its own tail. The pyramid to ancient Egyptians symbolized a conduit between the pharaoh and the gods. The tips of the Egyptian pyramids were covered in gold and reflected the sun. They were a symbol of the pharaoh's power and divinity on Earth (Lightbody, 2020). The fact that many modern organizations, including numerous school districts, use the pyramid as an organizational structure is telling. The symbolism has changed little. Although the pyramid structure is useful as a scheme for organizing ideas, the ouroboros may offer in terms of its symbolism, a more relevant concept for a contemporary school district that identifies as a collaborative learning organization. The ouroboros represents a never-ending cycle of birth, life, death, and renewal. It symbolizes knowledge passed through a continuous feedback loop, forever sustaining with no beginning, no end, and no central authority figure.

The ouroboric school is conceived of as a collaborative learning institution in which all stakeholders in the K-12 school organization regularly participate. In this model, teacher teams such as Professional Learning Communities (PLCs) collectively share professional knowledge in pursuit of improving student outcomes, determining organizational needs, and designing bespoke solutions and innovations tailored to the unique school culture and community.

K-12 schools that incorporate collaborative structures and practices in their day-to-day operation and embrace a disposition of collaborative leadership thrive compared to schools that do not (Green, 2017). However, the increasing cognitive, emotional, and physical workload

placed on teachers in addition to the typical duties of teaching, can be more than any teacher can bear. Raducu and Stanculescu note that teacher burnout is highly impacted by relationships between resources and demands. Furthermore, the authors note that burnout symptoms have increased during the COVID-19 pandemic (2022). Teacher teams, such as PLC teams as envisioned by DuFour (2004), as well as other teacher teams commonly found in secondary public schools such as Positive Behavior Intervention (PBIS), Leadership, Equity, Restorative Practice, Trauma Stewardship, Parent and Community Involvement, Climate and Culture Professional Development are necessary for the day-to-day functioning of a school and can improve student achievement, but few teacher teams have the resources necessary for the teams to be highly functional. Because of this reality, the following question arises: Which internal and external factors are most effective in creating highly functional teams in schools? This review explores both internal and external factors that influence teacher teams in a secondary setting and examines Lean Methodology, a collaborative continuous improvement method long utilized in manufacturing and service industries, as a possible framework for implementing consistently effective teacher teams that embrace collective efficacy, collaborative leadership, and continuous improvement as core values.

Scope of Research

Teacher teams in secondary schools are assembled for many purposes. For this paper, the scope included PLC teams and other teams involved in continuous improvement in K-12 education. These two types of teams are highly ubiquitous in public secondary schools and therefore may offer the most relevance to educators. They also meet regularly throughout the school year. This research is not likely to be applicable to ad hoc teams created for specific task completion purposes, such as a team assembled to plan a field trip or a school dance. While ad

hoc teams may contribute to school climate and culture, they do not typically engage in data analysis in the pursuit of improving outcomes of students or continuous improvement of the learning organization.

Importance of the Research

As schools and teachers are continually being asked to do more with fewer resources, it is more important than ever that methods to streamline vital processes are explored. Additionally, the COVID pandemic and resulting labor shortage have stressed systems in schools often past the breaking point, resulting in unprecedented staffing problems and some of the lowest teacher morale in decades. Schools that hold collaborative leadership and collective efficacy as core values and organizing principles often find themselves short on resources to implement the supporting systems and structures to operationalize those values effectively. This research aims to find methods of effective teaming, collaborative leadership, and collective efficacy within the extreme limitations of a contemporary, post COVID pandemic school to ensure that a return to ineffective, top down, siloed schools does not happen.

Research Questions

If educational leaders strive to create equitable and inclusive environments for students, they must first create systems and structures that enable stakeholders to engage in equitable and inclusive practices. Educational leaders must also actively promote and support dispositions among stakeholders that allow for meaningful collaborative work to happen. Unfortunately, the word *collaboration* has been buzz-worded and edu-spoke into near meaninglessness. This paper intends to rebirth the word *collaboration* into something concrete and actionable by asking: What are the characteristics of a collaborative learning organization? Additionally, which internal and external factors are most effective in creating highly functional teams in schools?

This paper also explores Lean Methodology as a possible framework for the creation, maintenance and proliferation of effective teacher teams fostering collaborative learning organizations.

Definition of Terms

Collaborative Learning Organization: A “place where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together” (Senge, 2010, p.3; as cited in Green, 2017).

Lean Methodology: Evolved from the Toyota Production System created by Kiichiro Toyoda, (Toyota, 2019) Lean Methodology, Lean Thinking or Lean is “is aimed at creating and delivering the greatest value to the clients or “customers” in education systems while consuming the fewest resources and eliminating waste. Simultaneously, the method engages the organization in continuous problem solving, learning, and making quality improvements with Plan-Do-Study-Act cycles. The core concepts that organize the Lean for Education approach are: continuous improvement and respect for people” (Emiliani, 2005).

Professional Learning Community: “An ongoing process in which educators work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for the students they serve” (DuFour et al., 2010, p. 11; as cited in Dufour et al., 2016).

Summary

In summary, it is widely recognized that K-12 schools that adopt the disposition of a collaborative learning organization have better outcomes, but the internal and external systems, structures, and practices to operationalize collaborative leadership are often elusive. In the following chapters, the term *Ouroboric School* will be used as a catch-all term to describe a

school that embraces the disposition and operationalizes cyclic, improvement focused collaborative structures and practices in all its various types of teams that meet regularly and impact day to day operations and continuous improvement.

In Chapter Two, a review of current literature concerning both the internal factors and external factors contributing to the success of collaborative teacher teams will be explored. In addition, the literature concerning the ways in which Lean Methodology might be utilized in K-12 schools to better operationalize successful collaborative structures will be assessed. Chapter three will identify themes that emerged from the reviewed literature and discuss implications for further research.

Chapter Two: Literature Review

Internal Factors: Trust as a Predominant Trait in Highly Functional PLC Teams

PLC teams in K-12 schools are conceived of as teams with the specific purpose of implementing changes in practice based upon team learning. PLCs are therefore a natural starting place with which to begin exploration of the questions: what are the characteristics of a collaborative learning organization, and which internal and external factors are most effective in creating highly functional teams in schools? Teams are extraordinarily complex with many factors influencing the teams' effectiveness. PLC teams require that participants share student data and teaching strategies with each other. Teachers engaging in this activity become vulnerable to negative criticism and judgment of their work by their peers. Thus, to effectively engage in a PLC, participants must be satisfied that a mutual feeling of trust amongst team members will be assured as a condition of membership. Hallam et al. (2015) found that trust among team members was one of the most significant factors influencing team success and effectiveness.

Trust is established among team members in many ways over time. It does not suffice to implement one or two team building activities during a single team meeting and conclude that trust has been established and true collaboration is taking place. Hallam et al. (2015) conducted a qualitative matched cases case study from which they developed two cases from a mix of elementary and intermediate schools in the U.S. One entire school was struggling to effectively implement the PLC model; the other school experienced successful PLC implementation. The researchers concluded that formal collaboration is cultivated from informal beginnings. Effective teams that trust one another enough to be vulnerable grow those relationships long before the team arrives at the PLC meeting. Collaboration and trust begin in an informal hallway

conversation between classes, an email asking for help in creating a sub plan, a “like” on a Facebook post, or even a mutual eye roll at a staff meeting.

Askel-Williams and Koh (2020) found as part of their work in identifying factors that contribute to sustainable school improvement efforts that relationships were one of the major factors contributing to the success of school improvement initiatives such as PLCs. Positive relationships in which team members build trust in each other are instrumental to maintaining a highly functional team.

Cranston (2009) conducted a research study that examined 12 Manitoba principals’ conceptions of professional learning communities. The study utilized a naturalistic inquiry approach and thematic analysis. Cranston (2009) found that the principals participating in the study consider the development of professional learning communities to be a normative imperative within the culture of their schools. Cranston (2009) also noted *trust* as one of eight themes prevalent in highly functional PLC teams.

Cranston (2009) collaborated primarily with principals in identifying factors that contribute to highly functional PLC teams. In this study, trust between the PLC teams and the principal was identified as a contributing factor in the team’s performance. Principals who took part in the study reported that building trust between themselves and the PLC teams was a necessary first step toward-effective PLC team development. Furthermore, members of communities of practice such as a PLC must feel safe in openly addressing improvement in their practice, not only among themselves but also in relationship to their administrators.

A mixed methods study conducted by Prenger et al. (2017) sought to identify factors influencing teachers’ professional development in networked professional learning communities. Surveys and interviews were conducted with 23 PLCs from different regions in the Netherlands.

The authors found that geographical differences in the PLC teams had little influence on team success, but they were able to identify traits that lead to successful PLC work in a general sense. For example, motivation was found to be a significant factor for successful PLCs, especially in the early stages of the team's formation. In the researcher's view, motivation should be directly addressed during PLC meetings. Additionally, a shared goal, leadership by an external coach, and the implementation of structured activities during team meetings all contributed to the prediction of a successful PLC team. PLC teams that demonstrated a collective focus on student learning was also a predictor of success. Finally, Prenger et al. (2017) noted that the study of the influences affecting professional development is an area with limited scholarship and should be researched further.

Fred et al. (2019) conducted a multi-case study in which the development of seven PLCs in Dutch Secondary Schools was investigated. The researchers used design-based methodology to create the instruments for analysis of the data. The researchers sought to examine current literature regarding characteristics of effective PLCs and then to align the common themes showcased in the studies with the experiences of practitioners in the field. The aim was to gain knowledge about the most effective ways in which highly functioning PLCs may be developed. The researchers found 11 characteristics of successful teams that aligned both in literature and practice. The teaching practitioners provided 43 indicators to serve as real world examples of each of the 11 characteristics in action. Among the characteristics, teachers indicated that PLC members must "trust and appreciate each other; display openness to each other; and discuss different attitudes, opinions, and problems with each other" to be successful. (Fred et al., 2019, p.767). This finding aligns with other literature discussed previously as a primary characteristic of an internal condition that must be met for effective PLC teaming. Other

indicators such as whether “teachers develop and adjust a shared vision on teaching” and if they “reflect on their own professional development as a teacher” (Fred et al., 2019) also support the view that motivation to participate in a PLC is intrinsic and tied to internal conditions that allow for collective efficacy and agency among the team members. As Caprara et al. (2006) found in a qualitative study utilizing structural equation modeling analyses, teacher’s beliefs about their efficacy in the school organization is an indicator of the level of functioning of the organization as a whole. The more that teachers believed they had a voice, the better the outcomes for the team, the administrators, the students, and the school.

Akinyemi et al. (2020) conducted a mixed methods study to further pinpoint how trust is developed in communities of practice (such as PLCs) within educational institutions. Three factors emerged from interviews conducted with teacher teams in South Africa. The factors were *willingness to assist others, supporting group members* and *confiding in their colleagues*. When these factors were present and dynamic in the communities of practice, student outcomes improved as well. It was not clear from this study what specific practices must be implemented to ensure the three aforementioned factors flourish. The researchers also found that trust levels were higher in informal communities of practice, that is, communities in which teachers opt in voluntarily, as opposed to formal communities of practice, such as an administrator assigned PLC group (Akinyemi et al., 2020). The conditions of semi-autonomy and self-guidance, however, are not factors that arise from inside the team, but rather are those that are imposed on the team by structures and systems of the organization in which PLC teams operate. Based on these findings, the logical next step is determining what conditions need to exist externally to set the stage for teams to foster trusting, positive relationships among the members while operating in a semi-autonomous, self-motivated fashion.

External Factors: Setting the Stage for Highly Functional Teams

If communities of practice such as PLC teams are encouraged to develop trust among members to be effective, then the systems and structures that support those teams must set the stage for developing trusting relationships. Principals, superintendents, and others in leadership roles are obliged to integrate PLC work into a systems-thinking approach to managing schools and districts. Using a mixed methods study, Askel-Williams and Koh (2020) analyzed the effectiveness of school improvement efforts such as PLCs and identified several factors that from a systems-thinking perspective must be in place to engender successful and sustainable school improvement efforts such as highly functioning PLC teams.

Askel-Williams and Koh (2020) began the qualitative portion of their work by interviewing teachers and other school community stakeholders regarding the factors they believed impacted the efficacy of school improvement efforts. The researchers attempted to examine correlation between the participants' feelings about the efficacy of their institution on a range of factors the researchers identified from available literature that contributed to effective sustainability of improvement programs. Askel-Williams and Koh (2020) developed a research tool called the self-assessment site improvement tool (SITE) where each component is represented by four to six attitude questions scored on a Likert scale. Similar to the findings regarding the data collected about dynamics within teams, Askel-Williams and Koh (2020) were able to identify *relationships* and *time* as two key external factors impacting the effectiveness of the teams.

A qualitative case study conducted by Sims and Penny (2014) investigated the perceptions of teachers participating in a PLC labeled a Data Team. The study took place at a high school in a suburb of a large city in Texas. The researchers interviewed PLC participants

regarding the effectiveness of their PLC. The findings indicated that the participants perceived the PLC as ineffective due to a lack of time, collaboration, and support (Sims & Penny, 2014). The researchers also noted that “the members of the administration appeared disengaged from the PLC process and unsupportive of its goals” (Sims & Penny, 2014, p. 1). The PLC in the study was indeed a failure according to several measures: student outcomes did not improve, teachers felt it was too much work and a waste of time, and few teaching practices were improved by the work. The failure of leadership to set the stage for success of the PLC was the most significant contributing factor to the failure of the PLC team.

The principals who Cranston (2009) studied reported that of several structural elements supporting the highly effective professional learning communities, the element of time was central. Like the Askill-Williams and Koh (2020) study, time was a key factor in maintaining high functioning PLC teams from a systems thinking perspective.

The findings of Askill-Williams and Koh (2020), Sims and Penny (2014), and Cranston (2009) suggest that for PLC teams to form strong, trusting relationships among members and with their building and district leadership, participants must be given the time to do so. Job embedded PLC time is a system component that could satisfy these needs. Even with an embedded PLC, however, other teacher duties and conditions impact the ability of teams to conduct the time-consuming work of building a highly effective team.

A further study on the theme of time as highly influential in predicting the effectiveness of a PLC was conducted by Van der Klink et al. (2016). The researchers engaged in a qualitative exploration consisting of 25 structured interviews with experienced teacher educators who each had at least five years of teaching experience. Participants were from the Netherlands, Israel, Japan, Australia, The Czech Republic, Belgium, Slovenia, Spain, Turkey and the United

Kingdom. The study revealed that a lack of time to engage in small professional development teams (similar to a PLC) was identified as a major hindrance to professional growth. This finding was universal to all educators in the study, regardless of the participants' geographical location. Participants in the study also revealed that an intrinsic motivation to engage in professional learning and growth was paramount in their continued engagement, mainly due to the lack of support from the larger systems and structures in their respective school systems. These findings suggest that the lack of external structures supporting teacher professional learning are indeed a major hindrance to meaningful participation. The teachers in the study engaged in professional learning despite systems-level interference. Therefore, it is apparent that educators would be engaged in professional learning if the systems that they operated in were designed to support it (Van der Klink et al., 2016).

As research specific to K-12 teacher teams in learning organizations is somewhat sparse, analogues in the post-secondary education and private sector can be useful in furthering understanding. A case study by Akella (2020) focused on an historically Black university located in a rural town in the southern part of the USA. The university was described as small. The staff had heavy teaching loads, along with committee work, student advisory and volunteer work; all of which were similar to the load of a K-12 teacher.

The university engaged in a project in which it asked staff members to create a collaborative dialogic space with the goal of using the space to reflect, discuss their perspectives and ideas, and consider their strengths as advisors, instructors, community service volunteers and study abroad facilitators. The groups had a regular monthly meeting time. Over the course of several meetings, the members shifted their focus from themselves as learners and employees of the university, to their students. They created documents to collect data about the effectiveness of

various pedagogies in their classrooms. Subsequently, these data eventually became the basis of a research paper itself. Though just one example, this project demonstrates how members of a learning organization can autonomously engage in meaningful professional development, organizational learning, and growth when the appropriate amount of external support is provided. In this case, the university protected the time and provided a purpose for the team. The team experienced agency and opportunity to contribute to the greater knowledge base of their organization without a heavy handed, top-down approach from the university leadership (Akella 2020).

Lean Thinking as a Framework for Structuring School Improvement Efforts

Lean Thinking, a term coined by Womack and Jones (2003) describes the dispositional mindset behind Lean Methodology, the production method pioneered in the 1960's by Toyota as a way for manufacturers to streamline production and maximize profits while maintaining a positive, and healthy workforce. Lean Methodology has found its way into many varying fields including, for example, software development and healthcare. Although Lean Methodology has made small headway into the field of education, it offers a possible framework for implementing school improvement efforts such as PLC teams. Lean Methodology is a structural framework while Lean Thinking is a dispositional shift in attitude and approach regarding the ways in which organizations approach work to implement Lean Methodology (Womack & Jones, 2003). For the purposes of this paper, the two terms will be used interchangeably.

A qualitative action research study conducted by Narayanamurthy et al. (2017) explored how Lean Thinking might be applied in an educational setting. Lean Thinking has been implemented in various manufacturing and service sectors, but very few published research articles have developed a framework describing the procedure for implementing Lean Thinking

in an educational institute. The purpose of the study was to develop and demonstrate a framework that can provide a structured procedure for the implementation of Lean Thinking in an educational institute (Narayanamurthy et al., 2017).

Narayanamurthy, et al. (2017) utilized Action Research Methodology (ARM) to conduct their research. The key findings of the study suggest that there are several viable avenues for implementing Lean Thinking in an educational institute. The researchers developed a comprehensive framework for assisting practitioners in implementing Lean Thinking in an educational institute which is based on the data collected in the study. The framework aligns with the five tenets of Lean Thinking as conceived by Womack & Jones, including:

1. Identify customers and specify value.
2. Identify and map the value stream.
3. Create flow by eliminating waste.
4. Respond to customer pull.
5. Pursue perfection (Womack & Jones 2003).

Beyond that, Narayanamurthy et al. (2017) have adapted the five tenets of Lean Thinking for educational institutes as follows:

1. Construct process flow diagram of the entire organization.
2. Construct process flow diagram of a specific process to be studied.
3. Identify different types of wastes present in the final process constructed, identify solutions, and apply lean practices and tools to eliminate the wastes identified.
4. Compare the change in performance measures.
5. Pursue continuous improvement (Narayanamurthy et al., 2017).

The implementation experience is expected to help other educational institutions implement Lean Thinking and Lean Methodologies in the future.

Narayanamurthy et al. (2017) provided sufficient specific qualitative information in the results section of the research to determine that this was a useful study. The authors included charts outlining all areas of operation of the institution in which Lean Thinking was implemented. Wastes were identified that lead to time and effort saved thus enabling participants to carry out various aspects of work in the educational institution. These data led to the creation of a framework that other educational institutions may adapt and use to implement Lean Thinking into their own work. The use of a framework such as the one prescribed above could be useful in the propagation of systems and structures that support successful PLC, PD, and other continuous improvement work in a learning organization. Literature suggests that time is a key external factor influencing successful PLC work. An adoption of a Lean Methodology tool such as Value Stream Mapping (VSM) enables users to visualize processes that add value and those that do not add value in the pursuit of producing a product or desired outcome. VSM helps organizations to identify bottlenecks, and inefficiencies (Martínez Sanahuja, 2020). Integrating VSM into the planning of a school's schedule or creation of procedures for how, where and when PLC's meet, for example, may eliminate waste in an organization that is resource poor in time. Riezebos and Huisman (2020) conducted an action research study of the use of VSM in K-12 educational settings as a method to identify processes that generated stress. The researchers found that value stream mapping is useful in professional service environments such as education (Riezebos & Huisman, 2020). Their research supported the idea that practical, short-term solutions generated by the team members themselves were useful in lowering stress and reducing waste in their day-to-day work. As noted in Narayanamurthy et al. (2017), Van der Klink et al. (2016), Cranston (2009), and Askel-Williams and Koh (2020), a lack of time is a major obstacle to effective PLC work. The Implementation of Lean Methodology could create

more time for meaningful PLC work by eliminating practices that do not add value to the team's mission and vision.

Plan, Do, Study, Act Cycles

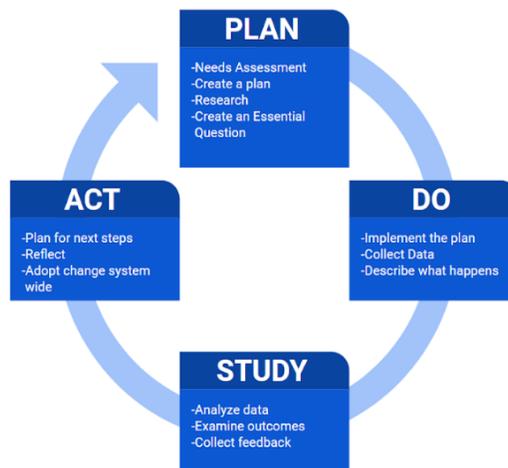
Another component of Lean Methodology that might be useful in completing PLC, PD and Continuous Improvement work is the *Plan, Do, Study, Act* (PDSA) cycle. PDSA as conceived of by Deming (1985) is a “flow diagram for learning and improvement of a product or process” (Moen, 2010, p. 7). The PDSA cycle, derived from the scientific method, offers a quality improvement and control approach to both production in an industrial type setting and processes in a service type setting such as education or healthcare. Deming based his model on the work of Shewhart (Shewhart & Deming, 1940) and referred to his work in public lectures as the *Shewhart Cycle for Learning and Improvement* (Moen, 2010). PDSA cycles have found limited use in K-12 education but show promise as ready-made tools with a long history of application in other service industries that could fulfill the needs of teacher teams involved in continuous improvement efforts in K-12 education.

The PDSA cycle (as shown in Figure 1 below) is conceived of as a process that is the core of an ouroboric learning organization. It is collaborative. All stakeholders have a voice in the needs analysis, planning for a change or improvement in a practice, policy, structure, prototyping of the change, and the ultimate organizational adoption and implementation of the change (Moen, 2010). PDSA, therefore has the potential to increase motivation through the promotion of efficacy and agency amongst members of the learning organization. One PDSA cycle feeds into the next in a never-ending chain of cycles focused on the real and immediate needs in the organization. Consequently, employment of the PSDA cycle empowers participants by making them the architects of change and improvement in their own organization. It does not

depend on a central office or central authority figure to arbitrarily decide the focus of the PLC, professional development, and other improvement efforts in the organization; and it supports the findings in the aforementioned literature that systems, practices and structures that allow for some degree of autonomy can help PLC teams function more effectively. In fact, PDSA cycles are fueled by collective efficacy as well as the notion that each member of the organization, no matter their role, is an agent of change and an expert in their role. PDSA cycles fit quite well with the purpose and function of a PLC team. The adoption of PDSA as a tool to accomplish PLC work may in turn eliminate wastes in other areas of K-12 school functioning as well. Teacher teams would become quite familiar with the process. If those teachers, for example, suddenly found themselves on a professional development team, or leadership team, they would already be familiar with PDSA cycles and be able to step into the work without a lengthy onboarding and training process.

Figure 1

Primary Steps in the PDSA Process, Including Details Within Each Step



Note. Each quadrant of the diagram contains a generalized description of activities that may happen during each stage of the PDSA cycle, but they are not exhaustive.

Several studies have been conducted investigating the use of PDSA cycles in professional development and continuous improvement efforts in K-12 schools. In a comparative case study conducted by Tichnor-Wagner et al., (2017) two urban high schools in Texas investigated how innovation design teams (similar to a PLC in their composition) implemented PDSA cycles into their work. The researchers collected data regarding perceptions of PDSA as an approach to innovation in improvement efforts (Tichnor-Wagner et al., 2017).

The results of the study revealed that in one school, “100% of participants reported that they saw the value in PDSA as an approach for improvement” (Tichnor-Wagner et al., 2017, p. 478). Participants reported that “they valued the results of data collection as a way to validate what they had already been doing, evaluate changes that needed to be made, and see the process and actual product [innovation] working” (Tichnor-Wagner et al., 2017, p.478). Participants also relayed that the potential of PDSA to “give teachers a voice” (Tichnor-Wagner et al., 2017, p.478) was highly valued.

In the other school in the Tichnor-Wagner et al. (2017) study, 13 of the 15 participants valued the experience of utilizing PDSA. Two participants felt it was either simply a repackaging of knowledge they already had, or overly burdensome. Researchers concluded that those training staff in the implementation of PDSA should introduce PDSA should work to address concerns such as those mentioned above as part of the training process. One could imagine that VSM might make implementation of PDSA easier for participants.

In another example of a K-12 organization implementing Lean Methodology, LeMahieu et al. (2017) conducted a qualitative case study of the Menomonee Falls School District (SDMF) in Wisconsin. At the time of the study, SDMF had spent four years implementing Lean Methodology into its continuous improvement efforts. Unlike the Tichnor-Wagner studies, the

schools in SDMF implemented Lean into their classroom work with students, as well as the systems and structures that support that work. Every member of the organization from the district office to classroom teachers embraced Lean Methodology in their work. SDMF regularly engaged in VSM to eliminate waste in their process and teachers used short 10–15-day PDSA cycles to improve their classroom outcomes. In SDMF Kindergarten classes, early literacy skills, vocabulary development and math skills were found to be significantly higher after implementing Lean Methodology (LeMahieu et al., 2017). The quick turnaround and scientific approach to problem solving offered by PDSA cycles allowed the district’s kindergarten teachers to rapidly address shortcomings in curriculum, modify curriculum, implement new curriculum, and check for effectiveness. More positive outcomes resulted when the entire organization moved towards implementing Lean Methodology in both internal team practices and external supporting systems.

Barriers to Implementation of Lean in K-12 Settings

The implementation of Lean Thinking in educational settings is not without its drawbacks. Children, after all, are not Toyotas. Teachers are not production line workers. A general resistance by educators to adopt practices seen as corporate or industrial in nature could negatively impact implementation efforts. Additionally, there are few instruments available to measure the effectiveness of Lean Methodology in K-12 contexts such as PLCs. Woodland (2016) offers an instrument called the Teacher Collaboration Assessment Rubric (TCAR) in a qualitative study of methods of evaluating the effectiveness of a PLC team’s collaboration. Woodland found the instrument to be useful not only for measuring the effectiveness of PLC teams, but also useful for evaluating a team’s effectiveness in implementing Lean tools such as plan, do, study, act cycles (PDSA). While the TCAR shows promise, it may be the only tool of

its type at the moment. There is clearly a gap in research and available tools for educators and researchers. Lean has also been shown in some research to limit innovation in workplace teams by creating prescriptive workflows of tasks that impede team learning and innovation (Parker, 2003).

Like many school improvement initiatives, the success of implementation hinges on how the strategy is utilized and understood by both practitioners and administrators/managers. Lantz Friedrich et al. (2016) conducted a longitudinal study investigating Lean Thinking's impact on team innovation at a plant producing axles and transmissions for wheel-loaders. The researchers found that although complex tasks by themselves did not lead to more innovation or team learning, when innovation and learning were included in the tasks to be completed and were a specified focus of the team as part of their work, innovation did indeed increase and team learning improved. The researchers concluded that task completion and innovation are compatible with Lean Thinking when the team's workflows are specifically designed to allow that outcome to take place. (Lantz Friedrich et al., 2016). The authors of the study note that "continuous team learning can challenge team knowledge that guides the present way of working, stimulate the team to renegotiate habitual routines, [and help] form a team climate, and a 'team mission' to be proactive and initiate change" (Lantz Friedrich et al., 2016 p.10). The duality of purpose in a team when members are required to both complete tasks that satisfy the requirements of a job while they also engage in team metacognition and innovation, certainly fits with the purpose and general disposition of participants in a PLC or other school improvement endeavor.

Autonomy, agency, and trust among team members stand out as key characteristics of teams within a collaborative learning organization. Autonomy, agency, and trust do not manifest

among team members without influence from the systems and structures in which they operate. Learning organizations must be structured in a manner that allow those team characteristics to flourish. If implemented with fidelity, Lean Thinking could be a useful framework to satisfy both the internal and external needs of teams in a learning organization to be both efficient task completers and thoughtful, innovative practitioners. Chapter three will elaborate on this line of thinking and discuss the themes in more detail. Immediate applications of this research will also be discussed as well as the need for future research.

Chapter Three: Summary

In the pursuit of delineating best practices of a K-12 collaborative learning organization through a detailed study of available literature, several themes emerged. Firstly, teacher teams need some degree of autonomy and agency to be effective. Top-down directives from leaders who occupy the top of a pyramidal organizational structure do not inspire motivation among team members. Leadership should seek to find ways to flatten pyramidal structures and adopt an ouroboric mindset that promotes organization wide mission and vision, while also enabling team autonomy and agency in the implementation of that mission and vision. One of the main tenets of Lean Thinking is that processes and outcomes are improved when leadership looks to the members of the organization who will be directly engaged in the work as the primary source of knowledge in best practices for implementation of work processes. K-12 schools are organizations that are typically well suited to Lean Thinking, though few have explored its use.

A second theme that emerged from the literature reviewed centered on trust among team members as the major factor determining whether a teacher team such as a PLC was highly functional or not. Description of concrete methods showing how teams develop trust among team members were rarely included and remain a gap in the research. The research includes ample information about distinct aspects of trust present among team members in highly effective teams, but there is very little empirical evidence to support which practices work best to build and sustain trust. On the other hand, due to the complexities of human relationships, there may not be a formula to fit all teams.

Lean Thinking and Methodology seem particularly well suited to serve as a guiding framework for K-12 organizations that conceive of themselves as learning organizations. Lean

Methodology and its associated tools such as the PDSA cycle and VSM fit quite well with the values, needs and resource constraints of a post COVID pandemic K-12 organization.

Research Insights

Speaking broadly, most K-12 school districts and schools in the United States have pyramidal organizational structures and related systems and practices that are rooted in 18th century Eurocentric viewpoints. Adam Smith's ideas as presented in his seminal 1776 publication *Wealth of Nations* regarding a division of labor and the necessity of a management class of people to direct a rank-and-file class of people still accurately describes the structure of most K-12 school organizations in the U.S. If contemporary educational leaders wish to lead equitably, and dismantle oppressive institutional structures that promote discrimination, it stands to reason that a flattening of pyramidal organizational structures is in order.

Since at least the end of WWII many for-profit organizations have implemented flatter organizational structures that draw input from members across the organization (*Four Types of Management Theory*, 2018). Leaders of organizations discovered that organizations became more innovative and efficient, and thus more profitable when members of the organization were granted autonomy and agency. Kiichiro Toyoda recognized this phenomenon as early as the 1950's and 60's. The resulting Toyota Production System that ultimately evolved into Lean Methodology, fundamentally changed how stakeholders think about organizational structures and the relationships between members of organizations. K-12 schools in the U.S. seem woefully in retrograde in this regard. Equity cannot be present in a system in which only a few people have agency and autonomy. All voices must be heard and present at the table; and members should not only have a voice, but also a stake in shaping the systems and practices of the organization itself. This fundamental shift in thinking and disposition is necessary in the

operationalization of equity. Ironically, the framework presented in this paper to achieve equity is born of the aggressively capitalist notion of increasing profits by making a better, cheaper Toyota. At the same time, the success of Toyota cannot be denied. If we, as educational leaders, were as capable of turning out highly functional, well-educated students as Toyota is at producing high quality automobiles, the gains in civic well-being for society in general would be as great or greater than the financial gains of a fortune 500 company.

Application

This research could readily be applied to the formation and management of teacher teams such as PLCs. In addition, this research could be applied to other regularly occurring operational activities that take place in K-12 schools such as the creation of building schedules, building and district professional development plans, organizational goal setting, team facilitation, and continuous improvement efforts. The research discussed in this paper regarding teacher teams and Lean Methodology could be applied within existing K-12 structures and systems and, indeed, many districts have already implemented some of these ideas albeit in piecemeal ways. On a broader scale and longer timeline, systems and structures such as widespread district reorganizations to implement Lean Methodology as a core disposition could be achieved but would likely require a wholesale rethinking of structures at state and federal levels. Many educational funding and policy structures are built around the presupposition that school districts are pyramidal, i.e., they have a school board, a superintendent, a level of upper management, middle management, principals, and teachers that fall into a near paramilitary rank and file structure. The undoing, rethinking and reformation of those structures may indeed come to pass, but on a timeline, realistically, of decades. Still with the current market forces and the increasing social movements towards localism and equity, coupled with a disgruntled workforce and

increasingly stressed systems, large-scale changes could come quickly. The COVID pandemic has normalized catastrophism among the educational workforce and whetted its appetite for drastic, fundamental change.

Future Studies

Based on the foregoing review of the literature concerning PDSAs and Lean Methodology, clearly *trust* is a fundamental component of a highly functioning teacher team in a learning organization. Even so, it was not immediately clear how teams and their supporting structures might best ensure that trust develops among team members, or how the effectiveness of teams in building trust can be measured. There is much written about trust in teams, but few formal studies focusing specifically on K-12 teacher teams. And while much has been written regarding the benefits of Lean Methodology in organizations, there is a gap in the research in relation to its use in K-12 settings. The research currently available shows much promise for teacher teams, but further qualitative studies should be conducted.

K-12 education in the United States is at the tipping point of a major shift. What the future holds is uncertain. What is certain is that current structures, systems, and practices are unfit for the purpose. Just as consumers would be unsatisfied buying a new Toyota with antiquated technology, citizens are becoming less and less satisfied with school systems unable to modernize.

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