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**IMPROVING LEARNING  
AND LEARNING TO IMPROVE:  
A Decade of Applying  
Deming's System of Profound Knowledge  
to School Education in Australia**

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## Abstract

Since 1997, a number of Australian schools have been exposed to Dr. W. Edwards Deming's System of Profound Knowledge. The improvement theory and practical methods provide a HOW TO engage and empower classroom learners to continually improve their systems of learning. Recent research confirms that this leads to improved student outcomes and teacher morale.

## Introduction

### Our Purpose

We are delighted to have been offered the opportunity to share some of our experiences of working with Australian schools supporting their improvement efforts over the last 14 years.

The purposes of our paper are to:

- Discuss the need for school education improvement and the progress being made towards improving school outcomes over the past decade.
- Describe the application of W. Edwards Deming's *System of Profound Knowledge* to improve school education, and explain what this means for students, teachers and school education administrators.
- Share evidence provided by recent research showing the improvement achieved by schools and classrooms applying this approach.

### The Authors

Let us briefly introduce our experience of working with schools, to help provide some context.

Our backgrounds are in engineering, science and management. We came to work with school education through our interest in, and passion for, quality improvement. This led us both to work with the Australian Quality Council, where we began a translation of industry improvement philosophies and practices to the school education sector.

Our first major experience with schools was in Victoria, where we worked with the State education department on the *Quality in Schools* initiative from 1997 to 2002. This was followed by the South Australian *Quality and Improvement in Schools and Preschools* initiative from 2001 to 2003.

During this time we established a productive working relationship with David Langford. David, a student of Deming, was the first teacher we know of to apply the Quality approach as a way of life in his classroom at Mount Edgecumbe High School in Sitka, Alaska. David is now a consultant based in Montana. He has visited Australia annually for the last 12 years, to facilitate his four-day Quality Learning seminar. We have learned a great deal from one another.

In 2002, we established Quality Learning Australia (QLA) to continue to support school's with their improvement efforts. We have worked with hundreds of schools in the south-eastern states of Australia, and feel most privileged to have experienced first-hand, the enormous potential Quality Improvement has to offer students, teachers and educational leaders.

## The Need to Improve School Education

Whichever way we look, there are signs of rapid change, for which our students must be prepared if they are to be contributing citizens of the future. They need to be equipped to address significant and unprecedented global issues.

Our systems of education are failing to keep up.

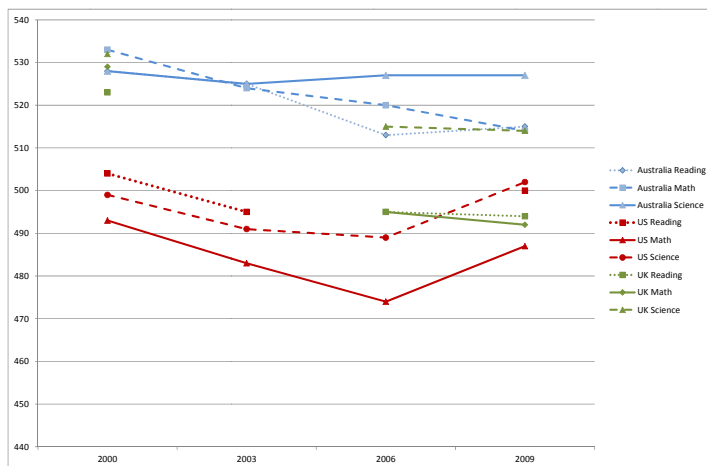
*"The problem is not the 'failure' of our public schools. They haven't really changed for better or worse. The world has. That's the real problem. Our system of education has become obsolete"*(Wagner, 2003).

## Symptoms of an Ailing System

Let us reflect briefly upon several key indicators that reveal less than satisfactory performance of the Australian, United Kingdom and American school education systems.

### Disturbing Trends in Student Learning Outcomes

The Organisation for Economic Cooperation and Development's (OECD) *Program for International Student Assessment (PISA)* is an international study that assesses the knowledge and skills of 15-year-old students in the areas of Math, Reading and Science literacy. The results show that Australian students are performing above the OECD average however they also reveal little improvement over the last decade. The US and UK show similar trends (see graph below).



PISA Results Australia, USA and UK 2000-2009

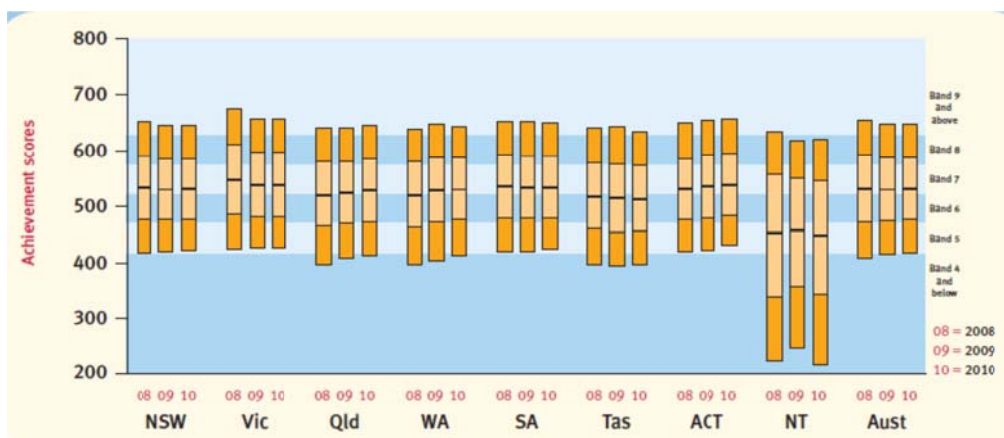
When the Australian data are examined more closely, they exhibit wide variation, with a higher proportion of students falling behind compared to other countries. 13% of Australian students (18% of US students) are failing to reach the PISA basic proficiency level, and are “*at serious risk of not achieving at levels sufficient to allow them to adequately participate in the 21st century workforce and contribute as productive citizens.*” (OECD 2010a and b, Thomson 2010).

This is of concern, not only for the individual but also for the wellbeing of our nation. Economic prosperity is increasingly dependent upon human capital and knowledge, and with industry automation, the demand for lower skilled workers is

decreasing rapidly, whilst the demand for highly skilled people is greater than supply (OECD 2010b).

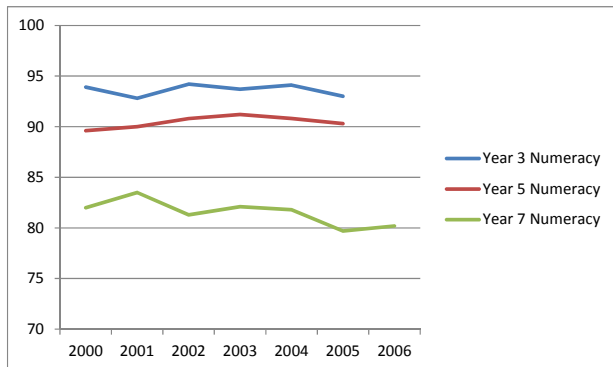
The performance of other countries including Canada, Finland, Japan, Korea, China, and Singapore is consistently high, with Germany, Poland and Brazil's performance showing significant improvement over the last decade (OECD 2010a).

In Australia, there is a general scarcity of other data to provide further insight into the performance of the system. The data that are available are dated or relate to a limited period, and reveal similar trends in performance. The plot below illustrates the typical stagnation observed in national testing literacy and numeracy data over the last three years (ACARA 2010).



Australian National Assessment Program – Literacy and Numeracy (NAPLAN)  
Data Year 7 Writing 2008-10 (DEST 2010)

This is supported by data relating to the assessment of the learning of students with respect to Australian national benchmarks (see diagram below) (MEECTYA 2007).



*Percentage of Year 3, 5 and 7 Students achieving Australian National Numeracy Benchmarks 2000-2006*  
 individual and communities in both economic and social terms. The earning capacity of those individuals who do not complete secondary school averages 15% less than those who do (Audas and Williams 2001, Lamb 2004, OECD 2010b, Productivity Commission 2005).

The high school completion rate for Australian schools in 2008 was 67%. It has averaged 70% over the last decade, with no sign of improvement. In the US the Graduation Rate in 2008 was 77%. This is well behind that of countries such as Denmark (96%), Japan (95%), and Poland (92%) (OECD 2010a, OECD 2010b). The major influencing factors for Australian students leaving school early are reported as *not liking school* (51%), *failing school* (40%), *not getting along with teachers* (35%) (Lamb 2004).

Recent studies also reveal the significant financial impact of school-based education on the wellbeing of a nation. A one per cent increase in literacy scores equates to a subsequent two to five per cent increase in labour productivity and a 1.5% rise in Gross Domestic Product. Improving the literacy and numeracy skills of people at the lower end of the skills distribution, is more important to economic growth than investment in producing more highly skilled graduates (Dorwick in Masters 2007, OECD 2010c).

#### *Parent Dissatisfaction*

In 2007 the Australian *Department of Education Science and Training* surveyed over 2000 parents of school students. The research revealed that 25% of parents were less than satisfied with the 'quality of their child's education', 57% indicated that improvement was needed, particularly in the areas of 'curriculum quality/content', 'standard of teaching' and 'school facilities and resources'. Nearly 40% believed students were leaving school with less than adequate skills in numeracy and literacy. These results were significantly worse than those reported in the previous (2003) survey (DEST 2007).

#### *Teacher Dissatisfaction*

The literature reports growing dissatisfaction amongst the teacher population due to deteriorating relationships with superiors and educational employers, increasing workload and the standing of teachers in society (NSW Public Education Inquiry 2005). Stress-related illness is currently reported to make up more than half of the *Workcover* claims lodged by teachers (Tomazin 2008).

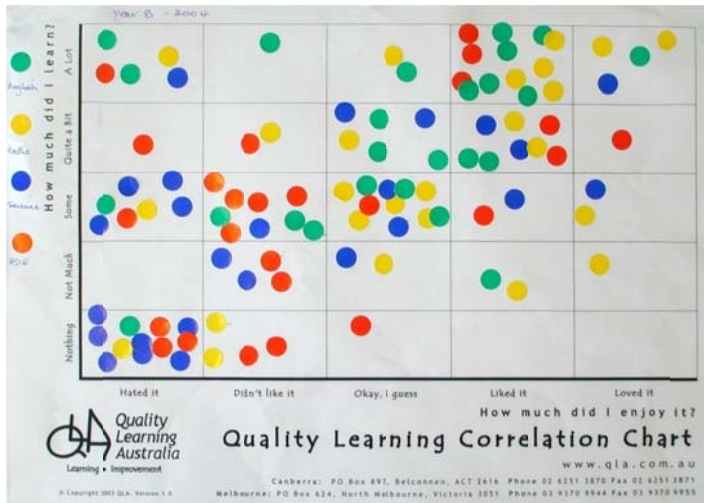
#### *Little Joy in Learning!*

We have developed a set of measures to help schools track their improvement and learning progress. One of the data sets relates to the perceptions of students, staff and families. Survey results from schools typically show that 50% of the student population report being bored at school. Approximately 30% report that they do not enjoy learning at school. These proportions are higher in secondary than primary school.

In summary, it appears that the current system of school education is delivering student learning outcomes that on average, are not improving. And, there is an increasing number of students who are not learning to a satisfactory degree.

#### *Poor Rates of Student Retention*

The OECD states that the baseline qualification for reasonable earnings and employment prospects is a high school diploma. Compared with students who complete high school; early leavers generally experience higher levels of unemployment, lower income, decreased career stability, higher levels of poverty, homelessness, drug and alcohol abuse, family breakdown and increased dependency on government welfare. This proves costly to the



*Correlation Chart Year 8 student perceptions of learning*

for enjoyment, and about 30% fall into the 'Nothing' or 'Not Much' rows for learning. This represents a significant degree of dissatisfaction, frustration, wasted effort and lost opportunity.

The review of school performance accords with our own observations of the system. While there are pockets of excellence – individual schools and classrooms that perform superbly well – overall, the system of education in our country is not a healthy one.

## The Current State of School Improvement

The improvement of school education continues to be a major strategic imperative of governments worldwide. Doing more of the same and working harder will not deliver the changes needed. Yet current improvement strategies continue to focus on demanding more of teachers and principals, increasing the rate and scope of student testing, reporting and accountability, ranking schools and teacher performance pay. All which have been tried in other countries and sectors, without success.

Despite endless activity, school performance is showing few signs of improvement.

*“Education is at the same place the automobile industry was several years ago. Every year a new model was introduced, but the car was essentially unchanged. A new chrome ornament - a redesigned taillight, pin striping, does not equal improvement. These are changes – maybe appealing changes – but nevertheless, merely changes. Likewise, education goes from change to change to change, with little evidence of improvement”* (Jenkins 2003).

### Fad Surfing – Drowning in Waves of Reform

At any one time, there are many and varied improvement initiatives being undertaken by schools. In much the same way as with the corporate world, schools have been subjected to the ongoing imposition of 'fad-like' activity involving considerable time and effort – and mounting frustration as improvement is seldom realised. As a result, many school principals and teachers feel change fatigued; exhausted from the endless waves of change, over which they have little input and even less control.

### Tampering by Focusing on 'Closing the Gaps'

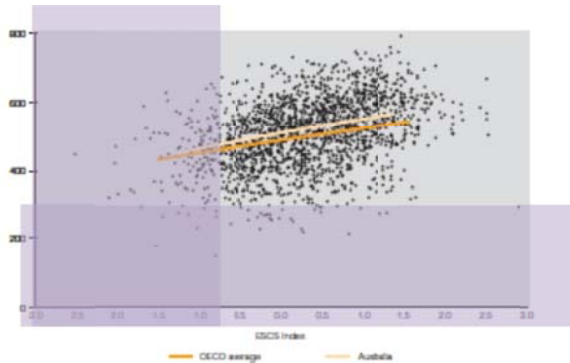
To date, much of the pressure to improve school performance is focussed upon 'Closing the Gaps' and doing so through remediation rather than 'just-in-time' intervention. Remedial programs are targeted at students of low socio-economic status or poor performance. Such programs are initiated for those students failing to meet the required standard at a fixed point in time, rather than an intervention initiated at the time they first experience difficulty with their learning (Defour et al 2009).

Another method we use to collect perception data involves the use of a Correlation Chart (left) (Burgard 2000). The example shows typical data from a group of year 8 students. Each student has applied a dot to the chart for key learning areas: English (green), Math (yellow), Science (blue) and Social Studies (red). The position of the dots indicate student perceptions of each area of learning with respect to the level of enjoyment experienced, and how much they feel they are learning.

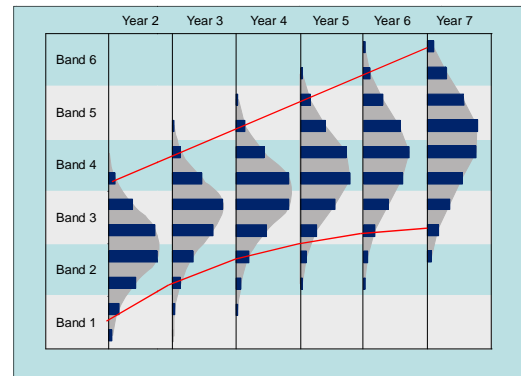
These charts typically reveal a correlation between perceptions of learning and enjoyment. Overall, the more students enjoy a learning experience the more they learn. However, usually about 50% of the dots fall in the 'Hated it' or 'Didn't like it' columns

This approach to improvement – targeting the ‘tail-ends of the distribution’ through remediation – increases variation, rather than delivering system-wide improvement, and does nothing to prevent the same poor performance recurring in future.

The Scatter Plot below shows the correlation between Australian student reading scores from PISA 2009, plotted against socio-economic status (SES), and the significant variation among the data points (Masters 2007 and Thomson et al 2010). The shaded areas show students from low SES families and the poor readers: the tails of the distribution usually targeted for ‘gap closing’ programs. The Histograms below illustrate the impact of such tampering on the system with variation in performance increasing with progression through the system (Masters 2007).



Scatter Plot showing the correlation between Australian student achievement and socio-economic status (ESCS Index) and typical targeted interventions



Australian Student Achievement in Math Year 3 to 7

## We need to know **HOW**, not just **WHAT**, to improve!

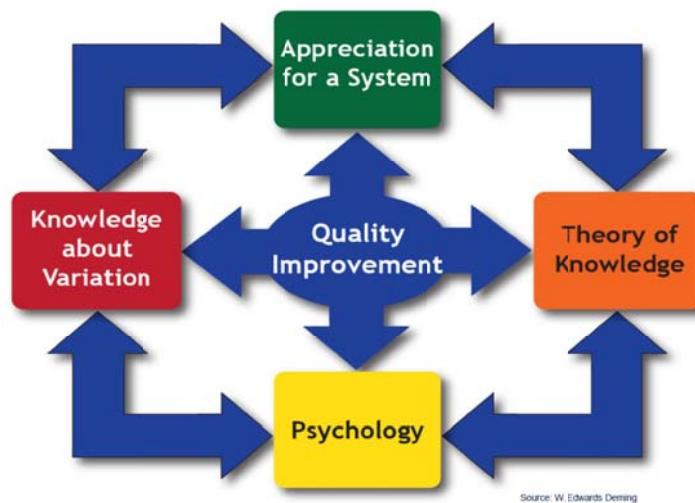
The outcomes required of schools are clearly articulated in numerous state, national and international policy documents. The means by which these outcomes are to be realised appear less well articulated. Schools are left to devise **HOW** these improvements might be achieved. It appears that there is an assumption that articulating the required outcomes will be sufficient to affect the change needed.

Every school is different. Every context is different. Approaches that work in one setting may not be appropriate for another setting. Therefore we cannot prescribe improvement programs. Deming’s theory for improvement is transferrable. The practices and tools can be adapted to different settings and situations. This allows schools to create their own theory for improvement, by “...systematically harness[ing] the power of collective intelligence that already resides in the school to solve problems... creating places of action, experimentation, and a willingness [and capacity] to test ideas that hold potential for improving student achievement” (Defour 2009).

## Transforming the (Education) System of Management

Deming’s *System of Profound Knowledge* (see diagram next page) provides a framework for applying best efforts to the right tasks, and provides a foundation for school education improvement (Deming 1993). Underpinning the framework are simple improvement strategies, methods and tools applicable from classroom to system levels. Many are in common use, for example, Brainstorming and Bar Charts. Others are not, such as Capacity Matrices to track depth and breadth of learning, and Force Field Analysis to understand systemic driving and restraining forces (Langford 2010).

We have translated our interpretation of Dr. Deming’s System of Profound Knowledge and crafted 12 Principles of Quality Learning (see next page). They encapsulate the comprehensive theory to support district, whole-of-school and classroom transformation (QLA 2007).



*W. Edwards Deming's System of 'Profound Knowledge'*

## The Principles of Quality Learning

### Systems

1. **Systems:** People work in a system. Systems determine how an organisation and its people perform
2. **Purpose:** Shared purpose and a clear vision of excellence align effort
3. **Processes:** Improving systems and processes improves performance, relationships and behaviour
4. **Clients:** Clients define quality and form perceptions
5. **Stakeholders:** Sustainability requires management of relationships with stakeholders

### Knowledge

6. **Planning:** Improvement is rarely achieved without the planned application of appropriate strategy and methods
7. **Learning:** Knowledge and improvement are derived from theory, prediction, observation and reflection

### Variation

8. **Data:** Facts and data are needed to measure progress and improve decision making
9. **Variation:** Systems and processes are subject to variation that affects predictability and performance

### Psychology

10. **Motivation:** Removing barriers to intrinsic motivation improves performance
11. **Relationships:** Strong relationships are built through caring, communication, trust and respect
12. **Leadership:** It is everybody's job to improve the systems and processes for which they are responsible by working with their people and role modelling these principles

We will now focus on the practical actions at a school and classroom level that bring Deming's theory to life...

## Appreciation for a System

### System Mapping - creating shared direction and aligning effort



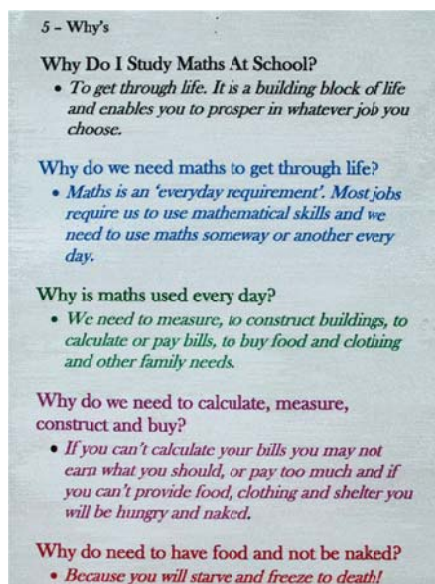
School System Map Palinyewah School, NSW

“A system of schools is not merely pupils, teachers, school boards, boards of regents, and parents working separately to achieve their own aims. It should be, instead, a system in which these groups work together to achieve the aims the community has for the school” (Deming 1993).

The System Map (see diagram left) is a tool to help consolidate collective understanding among key stakeholders (e.g. school, classroom, office, project etc.). Based upon Deming’s *Flow Diagram* (SIPOC Model), it allows for the identification and exploration of the specific elements that make up a system (Deming 1993, QLA 2009a). It helps to identify the complex interrelationships that exist within the system, and beyond with the containing systems. These are relationships that must be managed for the system to be aligned to its aim and operate most effectively.

System Mapping involves creating shared purpose, a desired future state (or vision) for the system, agreeing values and behaviours, identifying key stakeholders, processes that deliver the outputs and outcomes of the system, and measures of success.

The discussion that takes place between key stakeholders in creating a System Map is usually rich and engaging. The System Map is used in an ongoing way to guide action as it represents the mutual agreement about the system in, and upon, which people work. It informs planning, decision-making and highlights opportunities for improvement within the system.



Year 8 Five Whys - exploring the relevance of Math.  
Macleod College, Vic.

### Clarifying Purpose - providing meaning and engaging learners

“A system must have an aim. Without an aim, there is no system. The aim of the system must be clear to everyone in the system” (Deming, 1993).

“Most of the rapid learning of very young children is tied to purpose and vision. They learn to ride a bike to play with friends who have bikes. They learn new skills because they want them. But when children enter schools, the system often presents them with new purposes unrelated to their own desires and aspirations – to please teachers, to get good marks on assignments, to receive awards and to be ranked high. Older children complain about the irrelevance of schoolwork to their lives and future. What they don’t, or can’t, communicate in words, students often communicate through disruptive or disengaged behaviour” (Senge 2000).

At the school level, taking time to agree the purpose of the school, project, meeting, program (etc.) provides focus, builds ownership and commitment, and aligns effort. In the classroom, engaging students in dialogue about purpose clarifies meaning and relevance, and builds commitment. Teachers and students together discuss the purpose of learning; both at the overall level, ‘why do we come to school?’, and at the specific level, for example ‘why do we study text types?’

The ‘Five Whys?’ is an approach used to great effect in the classroom to uncover the personally relevant and compelling meaning (see example previous page) (Langford 2010).



### *Creating a shared Vision of Excellence - helping schools and students to improve quality*



*Students and staff collate input from all 1500 students to consolidate the College purpose, vision and values. Nazareth College SA*

Vision is ‘beginning with the end in mind’ (Covey 2004). It represents the place or state where we are headed, what we are striving to create. When commencing **any** worthwhile endeavour, it becomes habitual to ask ‘what would it look like to do this superbly well?’ This creates a vision of excellence for that endeavour. Without such a vision, what level of quality is likely?

Preparing a school vision consolidates a collective agreement that describes how the school will look, feel and what it will be doing within an agreed timeframe (usually 3-5 years). It describes the vision of excellence for the school and provides a foundation for planning, decision-making, improvement and resourcing. A class vision of excellence, developed collaboratively between teacher and students, provides clarity as to the learning community being created (QLA 2007).

Quality Criteria represent what Deming called an ‘operational definition’ of a standard of excellence (Deming 1993). Established through discussion between the teacher and students, they provide clarity regarding the agreed standards to be achieved in the execution of a learning task or activity. The criteria provide a vision of excellence and enable students to scaffold their own efforts towards meeting the criteria. Students use Quality Criteria to engage in self and peer assessment, and spontaneous quality improvement. They generally set quality standards at a higher level than the teacher, and are more critical in self-assessing their work! (Langford 1995, QLA 2011).

### *Values and Behaviours - replacing imposed school rules*

For many schools, considerable time is spent on student behaviour management, distracting from learning. Where time is taken to identify and agree guiding values and behaviours with students, staff and parents, the need for disciplinary action can be dramatically reduced. The behaviours to which the community aspires are made explicit and used as the basis for continuous self-assessment and self-regulation. Thus eliminating the need for school rules (QLA 2009a).

### *Explicitly Improving Processes*



*Year 5/6 Student with flowchart of the math program Pascoe Vale Nth Primary School Vic.*

Flowcharting enables students and other key stakeholders to accept greater responsibility, as they develop shared understanding about how things are done. This reduces frustration, and saves considerable time, removing the need to ask questions: why, how, who, what and when. Flowcharts also help with identifying quality issues and potential improvements. Students arrive in class and commence work without waiting for instructions from the teacher. Relief teachers love these classrooms too. Typical school processes include enrolments, reporting to parents, and curriculum planning. Classroom processes include home learning, project planning, and students’ record keeping (QLA 2009b).

## **Theory of Knowledge**

### *Applying PDSA - developing and deploying theories for improvement*

The Plan-Do-Study-Act (PDSA) cycle guides thinking and action in the improvement of learning in the classroom (Deming 1993). Jordan (pictured on the next page) is a Year 1 student who wants to improve the quality of his handwriting. He is applying the PDSA cycle to writing about what he did on the weekend. Jordan’s teacher works with the class to brainstorm the quality characteristics of good handwriting. **Plan** – Jordan uses these to plan his work, deciding what he will write about. **Do** – Jordan completes his writing, referring to his plan. **Study** – Jordan uses the quality criteria to self-assess his work. **Act** – After identifying that ‘straight lines’ are a major opportunity for improvement, Jordan ‘acts’ by rewriting his story, focusing on this area and showing great improvement.

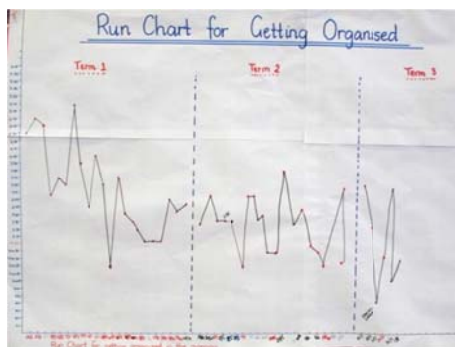


Year 1 Student, Jordan, using PDSA  
Roxburgh Homestead Primary School, Vic

A more comprehensive and structured (9-step) PDSA improvement process is used for complex improvement efforts, where detailed exploration of the system and its interactions are required (QLA 2010). Improvement tools are used during the cycle to facilitate stakeholder input, achieve shared focus and clarity, gather data, analyse causes, to plan and deliver a more sustainable, 'owned' solution. Storyboarding provides a means to document the process, to provide evidence for, and communicate decision-making. It also facilitates progress, by allowing the improvement team to reconnect more quickly with where they were up to (QLA 2010).

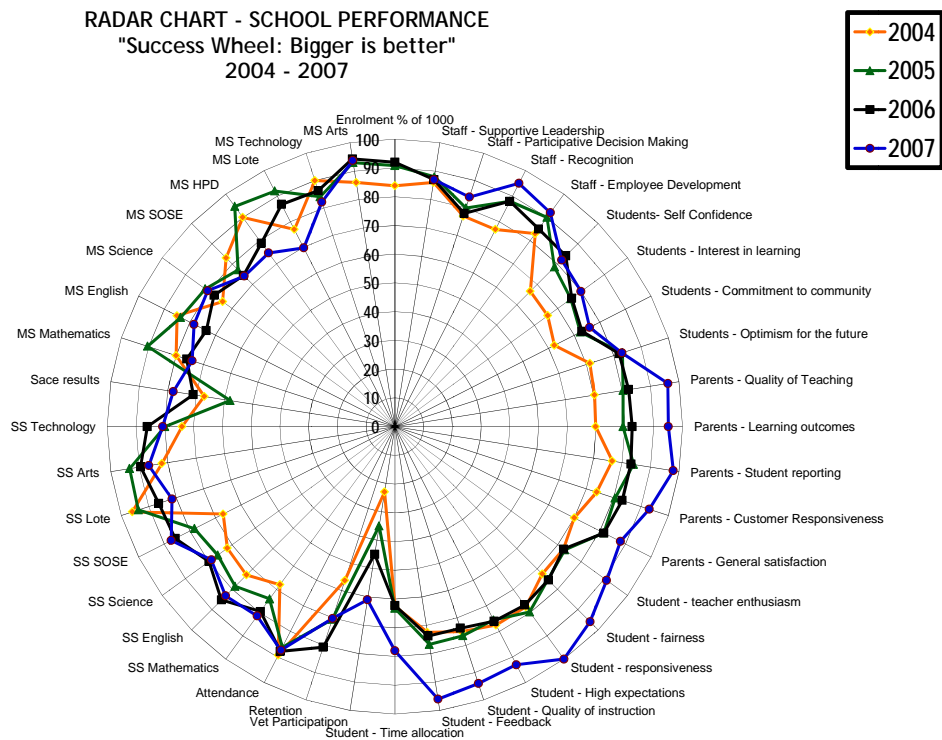
### Knowledge about Variation

Using data and understanding variation - measuring progress and informing improvement



Year 2 Classroom Run Chart  
Roxburgh Homestead Primary School, Vic

Quality improvement tools greatly assist with establishing measures of school and classroom performance, progress and improvement. They provide simple effective and efficient ways to facilitate the collection, display and analysis of data. An example of this is the Run Chart (pictured left). The Radar Chart (below) is a tool used to measure success at the whole-of school level (Jenkins 2003). It displays a broad range of measures and data relating to performance over time (on a single page). This facilitates the tracking of progress, prediction, and identification of strengths and opportunities for improvement. Schools report that the Radar Chart promotes increased understanding and focus on student learning outcomes (QLA 2011b).



School Performance Radar Chart 2004-2007 Seaford 6-12 School, SA.

## Psychology

### Capacity Matrices - putting curriculum and responsibility into the hands of the learner



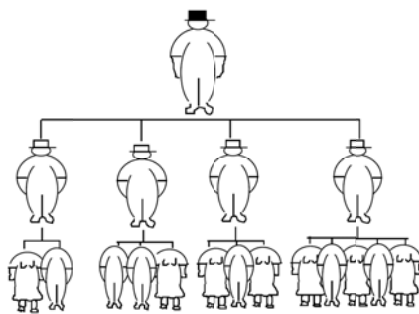
Year 1 student Megan, uses Capacity Matrices to accelerate her learning in spelling Hackham East Primary School, SA.

The Capacity Matrix is a visual learning tool or charting technique developed by David Langford and Myron Tribus (Langford 1995, QLA 2011b, Tribus 1998). It helps the student to understand **what** they need to learn by detailing the capacities to be developed, and the depth of learning to be achieved. The learner uses the Matrix to self-assess, plan, monitor and record their learning as it develops. The Matrix also provides a summary of the evidence used by the learner to demonstrate the learning achieved. This increases intrinsic motivation for the learner. Capacity Matrices, when used in conjunction with a Learning Portfolio provide an excellent reference in supporting Student Led Conferences, which replace the traditional parent-teacher interview. In a Student-led Conference the learner takes responsibility for sharing their

learning progress and discusses goals and improvement with their parent(s). The teacher plays a supportive role (Langford 1995, QLA 2011a).

### Removing Barriers to Intrinsic Motivation – Giving Students Voice

Our experience would suggest that the diagram (below) (originally used by Myron Tribus to illustrate the relationship dynamic between managers and workers in industry), represents a current paradigm of the school education system. It illustrates the relationship that we have observed existing in most schools and classrooms between teachers and students. This paradigm and the behaviour it drives, is in contradiction of two simple facts:

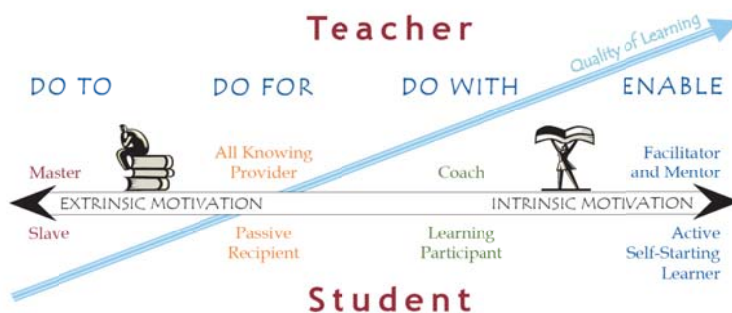


The hidden assumption in many manager's heads (Tribus undated).

- “(1) Only the people working *IN* the system know what is going wrong and creating waste.
- (2) Only the managers, working *ON* the system, have the authority to change it” (Tribus 1998).

So to improve the system of education, there is a very simple place to begin. If we want to improve the experience and outcomes for our students, then we can begin by **asking them** to help identify ‘*what is getting in the way of learning?*’ and ‘*what is creating lost opportunity, frustration and wasted effort?*’ Armed with this knowledge, we can work **with** our students to make improvements. Quality Improvement tools, such as the Plus Delta, Force-Field Analysis and Multi-Voting can help us to collect and analyse this feedback.

David Langford with his students developed the continuum illustrated below. It describes the nature of the relationships that can exist between teacher and student (Langford 1995). Learning performance improves as the learner is empowered to take increased responsibility for their learning.



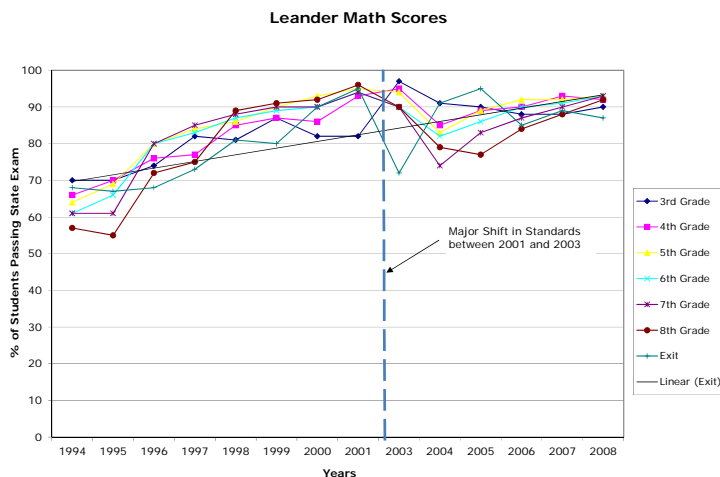
Teacher – Student relationship continuum (Langford 1995)

The Quality approach provides the means to create systems and processes that can equip all students to move progressively towards the ‘enable’ end of the spectrum.

“If we want students to be responsible for their learning, we must first make them responsible: able to respond to the challenge of responsibility” (Tribus undated).

## Research: the Impact of Quality on School Education

The impact of application of Deming's System of Profound knowledge on industry is well documented. To date, there is limited data available regarding its effect upon education. There is one location where there is evidence of the approach having a positive impact in the US.



*Leander Independent School District Improvement in Math State Test Scores 1994-2008*

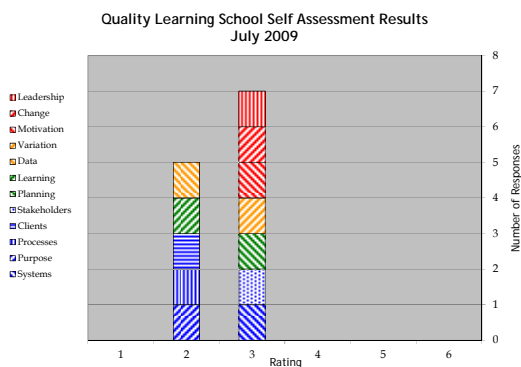
The Leander Independent Schools District, Texas, has been working with David Langford and applying the Quality approach since 1992, across their 35 schools. The diagram (left) shows the significant improvement achieved between 1994 and 2008 in the district's State test scores for Math (LISD 2008). It is worth noting that this systemic improvement has been achieved during this time whilst growing the student population from 2,000 to 33,000.

In 2009, a doctoral research project was completed that investigated the impact of *Quality Improvement* on school education. The improvement performance of a random sample of 'Quality' schools was compared to that of a control group of 'like' schools. The 'Quality' schools had

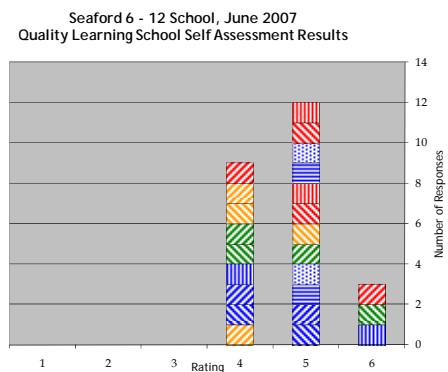
participated in the *Quality in Schools* initiative in Victoria between 1997 and 2002 (Kovacs 2009).

The study assessed the depth of deployment of the Principles of Quality Learning (discussed earlier), relative to school performance (stakeholder perception and student learning outcome data). 'Quality deployment' was measured using a series of matrices (very similar to those we now use with schools for Quality Learning School Self-assessment (QLA 2007)). The assessment involved staff reflecting upon a matrix for each of the 12 Principles of Quality Learning. Each matrix comprises a series of descriptors that map progress through rudimentary application of the Quality philosophy, to a deep and mature application across the systems and policies of the school. Schools allocate a rating between 1 and 6 reflecting school status against each principle. An important aspect of this process is the dialogue that results regarding school leadership and management systems. This includes the identification of strengths and opportunities for improvement to inform planning. Improvement can be tracked over time through periodic self-assessment.

The two diagrams (below) contrast a typical evaluation outcome for a school just commencing Quality learning with a school that has been deploying the approach for a number of years. The column graphs show the ratings achieved (1 to 6), for each of the 12 principles as assessed by teams of staff at the school.



*Typical school self-assessment results*

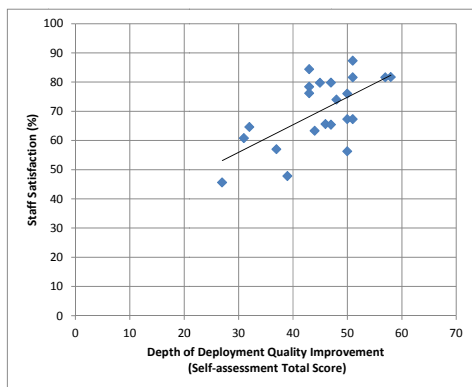


*Seaford 6-12 school self-assessment results*

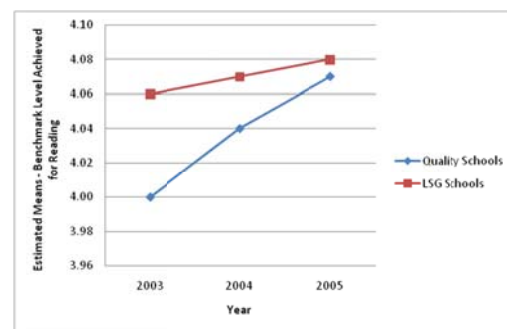
The research established that:

1. There is a greater deployment of the Quality approach in the schools that participated in the *Quality in Schools* initiative than those that did not (the control schools). Furthermore, the evidence of deployment is still apparent up to nine years later.
2. There is a significant positive correlation between deployment of the Quality approach and staff satisfaction (see Scatter Plot next page).
3. The 'Quality' schools show an overall trend in improved performance in student learning (Reading, Writing and Number), and Staff and Parent Satisfaction, when compared to the reported State average for other Like School Group (LSG) schools (see Interaction Charts next two pages).

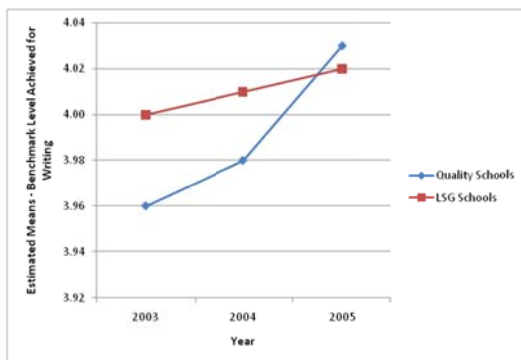
In summary, the evidence from Australia and the USA show that this approach can deliver significant and sustainable improvement in school education.



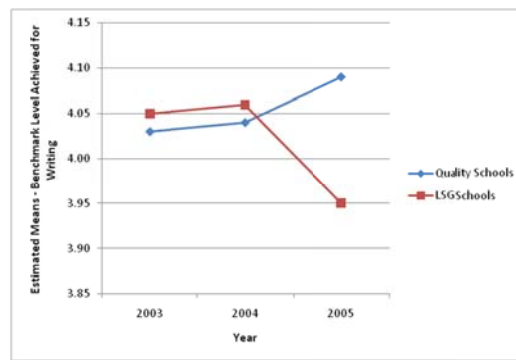
*Scatter Plot Deployment of Quality and Staff Satisfaction*



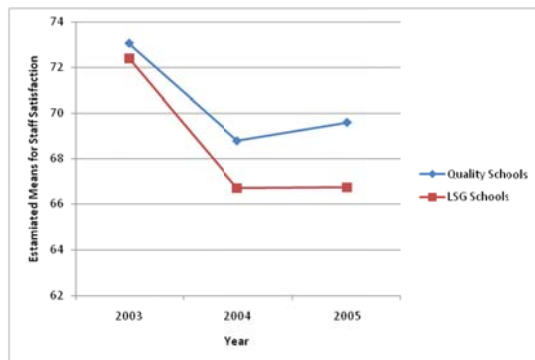
*Interaction Chart: Quality and Like School Improvement for Reading 2003 to 2005*



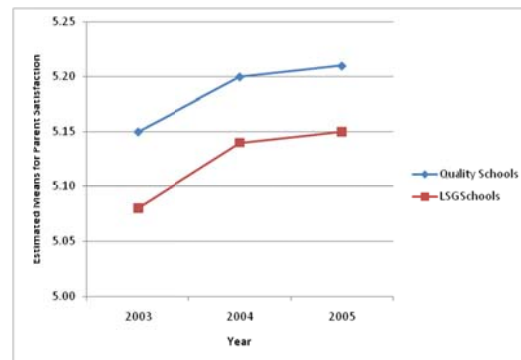
*Interaction Chart: Quality and Like School Improvement Writing 2003 to 2005*



*Interaction Chart: Quality and Like School Improvement Number 2003 to 2005*



*Interaction Chart: Quality and Like School Improvement Staff Satisfaction 2003 to 2005*



*Interaction Chart: Quality and Like School Improvement Parent Satisfaction 2003 to 2005*

## Conclusion

Our aim has been to show that Deming's System of Profound Knowledge provides a proven, robust and coherent approach that can be applied directly to schools and their classrooms. The tools, methods and philosophy provide a 'how to' approach to improvement that is often missing from discussions of excellence in schools.

The improvement methods are being applied successfully by many schools in Australia and are providing a unified approach for administrators, school leaders, teachers, support staff and students. This is leading to much needed improvement of the system including the rediscovery of joy in learning.

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